# The effect of work on the health of health workers and the impact on early workforce exit.

Analysis of secondary routinely collected data.

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A thesis submitted in partial fulfilment of the requirement of Edinburgh Napier University, for the award of Doctor of Philosophy

# Declaration

This work presented in this thesis has not been submitted for any other degree or professional qualification. This thesis is the result of the student's own independent work. Published material associated with the work presented in this thesis has been written by the student.

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# Abstract

**Aims:** To describe the health behaviours and health of those described as health workers; explore the possible effect of work on their health and early exit from the workforce; and make comparisons to other occupational groups.

**Study design and methods:** The aims were addressed through 5 studies incorporating both a literature review and secondary analyses of existing data sets using both cross-sectional and longitudinal approaches.

Data was collected on demographic data, health, health behaviours, impact of health on work, and workforce exit. Descriptive analysis was used to summarise the comparisons and binary logistic regression and Cox proportional Hazard models were applied to give more in depth analysis.

**Results:** A disability was reported by 11.1% of nursing and midwifery professionals compared to 7.1% of health professionals and 16.8% of caring personal service workers. One in four nursing and midwifery professionals reported a health problem that affected the amount and type of work they could undertake compared to one in two workers categorised in *other occupations.* Predictors of poor health included demographics, occupation and health behaviours. Age appeared to be the only significant predictor of workforce exit in the study. Compared to nursing and midwifery professionals, those identifying themselves as nursing auxiliaries, care assistants, and home carers were significantly more likely to leave the workforce before retirement age ($p < 0.001$).

**Conclusion:** The findings suggest that nurses' health is poorer than some other health professionals and that they engage in a number of health behaviours known to lead to health problems. Occupation plays a direct or indirect role on health and early exit from the labour market; however, the inter-relationship appears complex. Further research is needed to understand, address and improve the health of nurses and care workers. Factors that explain auxiliaries', care assistants' and carers' workforce exit also require further examination.

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# Chapter 1 Introduction

# Situating the study

Increasing employment and maintaining sustained employment underpins many public health policies and agendas. Arguments for the importance of this are often concerned with economic, social and moral reasons. Evidence suggests that employment is one of the most effective ways to enhance health and wellbeing at an individual, community, and population level (Waddell and Burton, 2006). People actively engaged in paid work are generally assumed to have better health than the unemployed (Waddell and Burton, 2006) with discontinued employment associated with poorer health outcomes (von Bonsdorff, Kuh, von Bonsdorff and Cooper, 2016). Maintaining sustained employment is important for optimum health outcomes.

This research focuses on five key areas, namely, (i) the importance of health to employment, (ii) the relationship between health and employment, (iii) the importance of maintaining the health of nurses, (iv) the epidemiology of nurses, and (v) the challenge of maintaining the health of nurses.

## 1.1 The importance of health to employment

Healthy workers experience a lower risk of sickness absence, reduced absenteeism, and make a quicker recovery from illness (Fit for Work, 2016). In the UK National Health Service, ill health accounted for a loss of 27.3 million working days in 2014/15

(Health and Safety Executive (HSE), 2016a). Eight percent of these days were lost in Scotland (2.2 million) (Fit for Work Scotland, 2016). In the UK, almost 23.3 million working days were lost due to work-related ill health and 4.1 million due to workplace injuries (HSE, 2016a). By looking after the health of employees, organisations could benefit from higher staff morale, reduced staff turnover and absenteeism, and higher productivity.

## 1.2 Understanding the relationship between health and employment

The nature of the relationship between health and employment involves an interaction between personal/social attributes of the worker and the attributes and requirements of the job. These are now explored.

### 1.2.1 Influence of health on employment

Poor health is a strong risk factor for transition into disability pension, unemployment, and early retirement (Rijn, Robroek, Brouwer and Burdorf, 2014). A systematic review of 29 studies on health and workforce exit reported a pooled risk ratio (RR) of 3.61 (95% Confidence Intervals [CI] 2.44, 5.35) for disability pension, unemployment 1.44 (95% CI 1.26, 1.65) and early retirement 1.27 (95% CI 1.17, 1.38) for people with self-assessed poor health (Rijn et al., 2014). In the same review, chronic disease was a risk factor for transition into disability pension (RR=2.11; 95% CI 1.90, 2.33) and unemployment (RR=1.31; 95% CI 1.14, 1.50).

The link between many health conditions and workforce exit has become of increasing importance due to a rise in the state retirement age in many developed countries. Despite this rise, people's physical and psychological abilities to work on longer into older age remains unknown. As age increases, the risk of injury and disease rises due to general wear and tear on their bodies (Jazwinski, 1996; Kirkwood, 1996). This wear and tear coupled with a decline in active metabolic cells and cellular functions (Jazwinski, 1996; Kirkwood, 1996) can impact one's ability to remain in active employment. Increased age heterogeneity coupled with certain health behaviours causes differential rates of decline and changes on cells, tissues and organ systems. This has contributed to people ageing at different rates with some biologically 'old' at 50, while others can be 'young' at 50 (McDonald, 2013). Therefore, the health of older workers may have different impacts on employment than younger workers (e.g. 17-25 year olds).

### 1.2.2 Influence of employment on health

There is an abundance of evidence demonstrating the influence employment has on health. Van der Noordt, Jzelenberg, Droomers and Proper's (2014) systematic review of 33 cohort studies published between 1990 and March 2012 reported that employment had a protective effect on a number of health outcomes. For example, depression (Odds Ratio [OR] 0.52; 95% CI 0.33, 0.83) and general mental health (OR=3.8), and to a lesser extent psychiatric morbidity, and several physical health outcomes (e.g. cardiovascular symptoms and illnesses, musculoskeletal symptoms, bodily pains and physical role functioning). There are three mechanisms in which employment has been shown to influence health: role of occupation type, the influence of sociodemographic factors, and the importance of health behaviours.

**Occupation type**

Evidence suggests that occupation type is more important than many sociodemographic factors on workers' health status. A longitudinal study of 9,586 workers showed that the occupation individuals spent the most time in had the biggest impact on self-reported health (Gueorguieva et al., 2009). This finding remained even after a change in job or retirement, despite controlling for occupational risk factors (e.g. education, income and health insurance). Occupations included professional and technical support, managerial, clerical and administrative support, sales, mechanics, construction and precision production, service, operators, fabricators and labourers, and farming, forestry and fishing. Although evidence suggests that occupation type has an important influence on workers' health, many of these factors cannot be reasonably mitigated, often being complexly related to sociodemographic factors.

Evidence has shown that there are a number of external agents linked to occupation that can impact on workers' health (Jorm et al., 1998; Najimi, Goudarzi and Sharifirad, 2012). For example, noise, vibration, radiation, chemicals and solvents, and strenuous or repetitive movements (Costa, Lacerda and Marques, 2013). These external agents disproportionately affect workers in some types of occupation more than others, potentially accounting for differences in health outcomes. Occupations at higher risk may include radiographers, nursing professionals, and care workers.

The distribution of illness varies with occupation type and role requirements. Within the health sector alone there is a variation in prevalence of overall work-related illness, potentially due to subtle differences in external agents and role demands.

The highest prevalence of work-related illness was reported by nursing and midwifery professionals (6.3%), followed by health and social services managers and directors (5.1%), caring personal services, including nursing auxiliaries, care workers and home carers (4.4%), and health professionals (4.4%) (HSE, 2016b). The report classified health professionals to include medical and dental practitioners and medical radiographers.

There has been some evidence to show that manual and non-manual occupations experience differences in health outcomes which widen until the point of retirement and decline thereafter. A cohort study of males in England highlighted that those in their 50s in unskilled or manual jobs often experienced health problems not typically found in workers in professional occupations until their 70s (Marmot Review, 2010). Yet despite the precise reasons for this difference remaining unclear, salary and/or occupation are thought to be important determinants of health.

There has been some evidence to indicate that contractual occupation type differences have an important influence on health, with full-time workers at greater risk of injury than part-time or casual workers. A cross-sectional analysis of 8,640 registered nurses and 2,967 care assistants in Canada (Alamgir, Chavoshi and Ngan, 2008) found that the overall rates of injuries for registered nurses were 7.4, 5.3 and 5.5 per 100 person-years among care assistants for full-time, part-time and casual workers respectfully. Overall injuries for care assistants were 25.8, 22.9 and 18.1 per 100 person-years among care assistants for full-time, part-time and casual workers respectfully. Despite this, it might be argued that the role of contractual occupation type may be less important with workers preferred contractual arrangement more important.

One of the first measures used to understand the association between social class and chronic diseases in the UK was that of social gradient in the 1970s' Whitehall Studies. The term social gradient refers to the global phenomenon whereby the poorest of the poor experience worse health regardless of the country in which they reside (World Health Organisation (WHO), 2017). However, while social gradient is a feature of people but not their occupation, it has been shown to be a useful measure in understanding the relationship between social class and chronic disease. The Whitehall Studies revolutionised people's understanding of the role of occupation on health through a cohort study of 18,000 male British civil servants in London aged 20 to 64 years. The studies found a marked social gradient difference between British civil servant grades and a range of health outcomes (e.g. coronary heart disease and self-assessed health). One study determined that employment grade was a stronger predictor of subsequent mortality from coronary heart disease than any other major coronary risk factor (Marmot, Rose, Shipley and Hamilton, 1978). The same study reported that men in the lowest grade of employment (messengers) experienced three to six times the coronary heart disease mortality compared to those in the highest grade of employment (administrators). Occupational role appears to have a crucial influence on health, far greater than many other known risk factors.

**Sociodemographic factors**

A large and growing body of evidence has shown that a variety of sociodemographic factors – age, gender, marital status, ethnicity, education and income, for example – can influence the health of people in work. Research has shown casual links between low income to poor housing and sanitation, inadequate diets and hazardous jobs, to poor health from infectious diseases, injuries and accidents (Benzeval et al., 2014). A Canadian cohort study of healthy ageing among 946 community-dwelling adults aged 65 years or over (White, John, Cheverie, Iraniparast and Tyas, 2015) found that educational attainment increased the likelihood of healthy ageing (OR=1.16; 95% CI 1.08, 1.25; $p<0.05$). Healthy ageing was defined in the study as longer life and delayed disease onset. After adjusting for education, perceived income adequacy was associated with healthy ageing among men (adequately OR=1.49; 95% CI 0.96, 2.34 and very well OR=1.51; 95% CI 0.93, 2.47). Perceived income adequacy was evaluated through the question, "*How do you think your income and assets currently satisfy your needs?*" (White et al., 2015: 3). These suggest that sociodemographic factors have an important influence on the health of workers.

There is some evidence to suggest that workers' ethnicity can influence perceived workplace stress and induce unhealthy behaviours. A literature review of 60 articles pertaining to ethnicity and workplace (Capasso, Zurlo and Smith, 2016) concluded that compared to non-ethnic minority groups, ethnic minority groups experienced more environmental stressors in the workplace that contributed to stress and stress related behaviours (e.g. alcohol consumption, tobacco smoking).

**Health behaviours**

Unhealthy behaviours are related to income and the development of a range of health conditions (Pirie et al., 2013; Shield, Parry and Rehm, 2014). Those on lower incomes may be more likely to engage in unhealthy behaviours such as tobacco smoking (Adler and Stewart, 2010), being physically inactive (Jeffery and French, 1996), high alcohol consumption (Ferrie, Shipley, Smith, Stansfeld and Marmot, 2002), and poor dietary habits (Jeffery and French, 1996). There are three possible reasons for this relationship. First, stress associated with economic deprivation or social comparisons may inadvertently lead people to self-medicate through behaviour choices (Pampel, Krueger and Denney, 2010). Second, low incomes may negatively influence health behaviours through future expectations or feelings of self-worth (Benzeval et al., 2014). Third, workers may display health behaviours to consciously or subconsciously signpost their social status (Benzeval et al., 2014). Decisions around occupation and health investment or health investment and occupation are likely made simultaneously by individuals and so it is important to consider these together rather than in isolation.

## 1.3 The importance of maintaining the health of health workers

Driven by increasing life expectancy and reducing birth rates, healthcare is one of the fastest growing industries with an important role in maintaining the health of the nation. The National Health Service (NHS) employs close to 1.4 million people (1.2 million in England (NHS, 2016) and 0.2 million in Scotland (Information Service Division (ISD), 2016)). Despite this, the gap between demand and supply of health workers is widening. This is particularly true for nursing professionals. In 2015 there was an estimated shortage of 15,000 nurses in the UK (cited in NHS Improvement, 2016). In 2016/17, the Nursing and Midwifery Council (2017) reported a 45 percent shortfall between the number exiting the profession and the number entering the register. These figures will likely have been amplified by workers who exited the workforce early for health reasons.

Health workers have been defined in this report as all people engaged in actions that have the primary intention to enhance health. This report will focus on paid health workers.

Increasing the supply of health workers through investing in their health is arguably one of the most important measures health systems can take to address the current deficit and thus protect the population in which it serves. The potentially life changing effect that short staffing has on the population's health was highlighted in the 2013 Francis Report. The report highlighted the damaging role short staffing had on poor care at a health board in England, Mid-Staffordshire. This finding was supported in a multi-country (Belgium, England, Finland, Ireland, the Netherlands, Norway, Spain, Sweden, and Switzerland) retrospective cohort study of nurses using 422,730 patients aged 50 years or older who underwent common surgeries in 300 hospitals (Aitken et al., 2014). Aiken et al. (2014) found that reducing a nurse's workload by one patient was associated with a ten percent decline in mortality rates among patients. Therefore, investing in the health of health workers is important to prevent short staffing from sickness absence.

One often overlooked argument for maintaining the health of health workers is in relation to retaining the vital knowledge and experience these workers possess. Older workers generally have experience, judgement and job knowledge far superior to younger workers (Department for Work and Pensions, 2013). This mix cannot be easily replicated among the younger population.

## 1.4 The epidemiology of health status among health workers

There are good theoretical reasons to suspect that the health of health workers is currently problematic with reports of objective and subjective health problems.

### 1.4.1 Objective health status

The fast-paced health industry presents unique health challenges. Describing the health of these workers will be done by objective health status. For example, the incidence of mental health problems, heart, blood pressure or circulatory problems, musculoskeletal injuries, and diabetes mellitus type II.

There are several known occupational risk factors that contribute to an increased risk of mental health problems in health workers, specifically nurses. These include sharps injuries, dealing with difficult patients and families, poor communication, time pressures, job insecurity, lack of influence, discrimination, and long and irregular hours. Sharps (e.g. needles and ampoules) also present a major risk for nurses (Costigliola, Frid, Letondeur and Strauss, 2012; Elseviers, Arias-Guillén, Gorke and Arens, 2014), with almost half of nurses injured in 2008 (Ball and Pike, 2008). The impact of sharp injuries can extend beyond the simple penetration of the sharp into the worker's skin. Sharps injuries have been reported to induce a number of emotional responses, including depression, sleeping or eating abnormalities, relationship issues, panic attacks, and excessive anxiety (Costigliola et al., 2012).

Mental health conditions (e.g. stress, depression and anxiety) account for the highest prevalence of poor health reports and sick days lost among health workers. Nearly a third (30%) of all sick days in the NHS are attributed to work-related stress, with a financial cost of £400 million each year (NHS, 2015). Annually, around 2.1 percent of health workers self-reported suffering from a mental health condition they perceived was work-related (HSE, 2016b). This rate was significantly higher than the rate across all industries (1.2%; $p<0.05$) (HSE, 2016b).

Occupational risk factors including stress and irregular eating patterns can contribute to an increased risk of heart, blood pressure and circulatory problems. A cohort study of 159 healthy Dutch female nurses with a mean age of 35.9 years (Riese, Van Doornen, Houtman, and De Geus 2004) used workers' systolic and diastolic blood pressure as one measure of the impact of job-strain on workers' cardiovascular profile. The study found that blood pressure was significantly higher on workdays than days off (multivariate $F[2,147]=24.1$, $p<0.001$; univariate ambulatory systolic blood pressure $p<0.001$ and diastolic blood pressure $p<0.001$). This is unsurprising given the stressful nature of the nurses' role and the environment in which they work.

There are a number of occupational factors that increase the risk of musculoskeletal injury among health workers. Risk factors include manual handling (Smedley, Egger, Cooper and Coggon, 1995), patient transfers (Trinkoff, Lipscomb, Geiger-Brown, Storr and Brady, 2003), heavy lifting (Trinkoff et al., 2003), awkward postures (Ngan et al., 2010), and slips, trips and falls (Ngan et al., 2010). Musculoskeletal problems are one of the leading causes of nonfatal injuries and illnesses involving days off work in the health industry (Callison and Nussbaum, 2012), affecting around 1.7% of health workers annually (HSE, 2016b). This is higher than that across all industries (1.3%; $p<0.05$) (HSE, 2016b).

There are a number of occupational risk factors that are associated with the role of health workers that contribute to diabetes mellitus type II, such as shift work, leadership, health behaviours, and health status. A Danish cohort study of 7,305 health care workers in elderly services (Poulsen, Cleal, Clausen and Andersen, 2014) found that several factors were associated with an increased risk of diabetes. These included poor general health ($p=0.005$), musculoskeletal pain ($p=0.004$), sleep problems ($p=0.019$), shift work ($p=0.002$), and quality of leadership ($p=0.0002$). Lifestyle factors were also shown to be related to an increased risk of diabetes, such as exercise ($p<0.012$) and obesity ($p<0.0001$).

### 1.4.2 Self-assessed health measures

The extent to which poorer self-assessed health is prevalent among workers in the health sector is less clear, with conflicting findings reported in the literature. Self-assessed health refers to a subjective measure of overall health status using a three or five-point scale (e.g. excellent, very good, good, fair or poor; or good, fair or poor). The precise wording of this scale varies between studies, potentially accounting for differences seen. For example, a cross-sectional study of nurses in Greece indicated that 19.8 percent of their sample reported very poor to poor health (Pappas, Alamanos and Dimoliatis, 2005) compared to 1.5 percent of nurses and physicians in Lithuania who reported poor to quite poor health (Misevičienė, Strumylaitė, Pajarskienė and Zalnieraitienė, 2013). This is discussed further in Chapter Two.

## 1.5 Working to improve the understanding of nurses' health

With many health conditions experienced by nurses preventable or reducible to a more manageable level, understanding: (i) the relative importance of determinants of health in relation to occupation, (ii) the relationship between health and sociodemographic factors, health behaviours and occupation, and (iii) the role of poor health in early exit from the UK workforce is important. Conditions include but are by no means limited to mental health problems, circulatory problems (including blood pressure), musculoskeletal injuries, and diabetes mellitus type II. These conditions were selected based on existing evidence of the health conditions of workers in the health sector who are at greatest risk due to the demands of their occupational roles.

There are four main types of health determinants explored here. These are: (i) individual and household level determinants (e.g. age, gender, marital status and living arrangements, religion and ethnicity); (ii) behavioural factors (e.g. tobacco smoking, physical activity, alcohol consumption and dietary habits); (iii) socioeconomic factors (e.g. employment status, work factors, education, health literacy, income, social class, socioeconomic group, deprivation and housing); and (iv) area, environment and population factors (e.g. area, environment, policy, health policy, economic policy, migration, area deprivation, transport, and crime and violence).

## 1.6 Background summary

Measuring the occurrence of work-related injuries and illnesses, levels of sickness absence and workforce exit are relatively straightforward; however, preventing these requires a degree of understanding and measuring of casual factors (e.g. health behaviours, job characteristics and work environment). Despite this, the relative importance and relationship between these determinants and health in the process of early exit from the labour force are still largely unknown. Gaining a better understanding of workers in the health sector and, more specifically, the health profile of these workers is important. Understanding in greater depth the role health has in continuing or withdrawing from the labour force is also fundamental for the success of many policies and initiatives aimed at sustaining this vital workforce. Health workers' health is important not only for health systems and patients, but for the workers themselves. Yet there are good theoretical reasons as outlined above to suggest that the health of these workers is problematic.

To date, there is a lack of UK and Scottish studies on the health of those described as health workers (including nursing and midwifery professionals, health professionals, therapy professionals, caring personal services, health and social services managers and directors, and managers and proprietors in health and care services) and the extent to which workers reporting poor self-assessed health exit the workforce.

**Table 1.1 Thesis Structure.**

| Chapter | Objective | Research Question |
|---|---|---|
| Chapter 2: Literature review | A | 1) What is the international evidence of the prevalence of tobacco smoking, physical activity, alcohol consumption, and dietary habits, specifically sugar, fat and fruit and vegetable intake, among nurses and student nurses? |
| Chapter 3: Integrative review | A | 1) What is the international evidence of the prevalence of tobacco smoking, physical activity, alcohol consumption, and dietary habits, specifically sugar, fat and fruit and vegetable intake, among nurses and student nurses? |
| Chapter 4: Data and methods | | |
| Chapter 5: Annual Population Survey analysis | B | 2) What is the percentage of nursing and midwifery professionals compared to other professions and occupations in the UK, who report a current disability, health problem that affects the amount or kind of work undertaken, and low satisfaction with life associated with disability or health problems?<br>3) What role do demographic and work variables have in explaining the answer to Q2? |

**Table 1.1 Thesis Structure Continued.**

| Chapter | Objective | Research Question |
|---|---|---|
| Chapter 6: Labour Force Survey analysis | C | 4) What is the prevalence of: back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; 'depression or bad nerves'; and progressive illness among nursing and midwifery professionals compared to other professions and occupations? |
| | | 5) What is the association between demographic and work variables and the occurrence of: back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; 'depression or bad nerves' and; progressive illness among nursing and midwifery professionals compared to other work groups? |
| Chapter 7: Scottish Health Survey analysis | D, E | 6) What percentage of: nurses; other health professionals; care workers; teachers; and *other occupations* in Scotland self-report smoking tobacco, engaging in physical activity, and consuming alcohol and fruit and vegetables? |
| | | 7) What is the association between health behaviours, demographics and (i) self-assessed health, (ii) the presence of a long-term illness, (iii) the presence of a mental health condition, and (iv) satisfaction with life among nurses compared to other occupational groups in Scotland? |

**Table 1.1 Thesis Structure Continued.**

| Chapter | Objective | Research Question |
|---|---|---|
| Chapter 8: British Household Panel Survey and Understanding Society analysis | F | 8) What percentage of nursing and midwifery professionals who reported poor health left the workforce between 2003 and 2016 compared to other occupational groups?<br>9) How do demographic and behavioural variables and life satisfaction relate to early workforce exit of nurses and midwives compared to other occupational groups? |
| Chapter 9: Conclusion and discussion | | |

## 1.7 Research aim and objectives

The overall aims of the thesis are to describe the health behaviours and health of those described as health workers; explore the possible effect of work on their health and early exit from the workforce; and make comparisons to other occupational groups:

A. To review the current literature on the self-reported prevalence of tobacco smoking, physical activity, alcohol consumption, and dietary habits, specifically sugar, fat and fruit and vegetable intake, among nurses and student nurses internationally.
B. To compare the health status of nursing and midwifery professionals to: caring personal services; health and social service managers and directors; managers and proprietors in health and care services; teaching and educational professionals; and *other occupations* in the UK.
C. To compare the self-reported health and satisfaction with life of nursing and midwifery professionals to: caring personal services; health and social service managers and directors; managers and proprietors in health and care services; teaching and educational professionals; and *other occupations* in the UK.
D. To assess the importance of behavioural influencing factors on the health of nurses in comparison to: other health professionals; care workers; teachers; and *other occupations* in Scotland.

E. To conduct a comparative analysis of health and satisfaction with life of nurses and other health professionals to: care workers; teachers; and *other occupations* in Scotland.
F. To examine the relation of poor health to early workforce exit of nursing and midwifery professionals in comparison to: nursing auxiliaries, care assistants and home carers; primary and nursery education teaching professionals; and secondary education teaching professionals in the UK.

## 1.8 Research questions

Substantive research questions have been designed to address these objectives.

For objective A the question (Q1) to be resolved is what is the international evidence of the prevalence of tobacco smoking, physical activity, alcohol consumption, and dietary habits, specifically sugar, fat and fruit and vegetable intake, among nurses and student nurses.

Two research questions are formulated to address objective B. These are Q2 What is the percentage of nursing and midwifery professionals compared to other professions and occupations in the UK, who report a current disability, health problem that affects the amount or kind of work undertaken, and low satisfaction with life associated with disability or health problems? And Q3 What role do demographic and work variables have in explaining the answer to Q2?

For objective C, two questions are formulated. Q4 What is the prevalence of: back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus;

‘depression or bad nerves’; and progressive illness among nursing and midwifery professionals compared to other professions and occupations? And Q5 What is the association between demographic and work variables and the occurrence of: back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; ‘depression or bad nerves’; and progressive illness among nursing and midwifery professionals compared to other work groups?

For objectives D and E, Q6 is used. What percentage of: nurses; other health professionals; care workers; teachers; and *other occupations* in Scotland self-report smoking tobacco, engaging in physical activity, and consuming alcohol and fruit and vegetables? And Q7 What is the association between health behaviours, demographics and (i) self-assessed health, (ii) the presence of a long-term illness, (iii) the presence of a mental health condition, and (iv) satisfaction with life among nurses compared to other occupational groups in Scotland?

Finally, two research questions are used to inquire into objective F. First of these, Q8 What percentage of nursing and midwifery professionals who reported poor health left the workforce between 2003 and 2016 compared to other occupational groups? And Q9 How do demographic and behavioural variables and life satisfaction relate to early workforce exit of nurses and midwives compared to other occupational groups?

Table 1.1 shows how each of the objectives and research questions outlined above are addressed in this thesis.

## 1.9 Achieving objectives

The objectives and questions will be achieved by three means. Firstly, a review of the literature on health determinants. Secondly, an integrative review of four key health behaviours of nurses and student nurses – tobacco smoking, physical inactivity, excess alcohol consumption, and poor dietary habits (e.g. inadequate fruit and vegetable consumption, and high sugar and fat intake). Thirdly, analysis of four secondary data sources will address the remaining objectives.

The following chapter focusses on the first of these areas by providing an overview of the literature on determinants of health.

# Chapter 2 Determinants of health: a review of the literature

## 2.1 Introduction

In this chapter self-assessed health is discussed before a framework is used to structure the examination of determinants of health under six main themes. The framework is provided through the combination of three models.

## 2.2 Self-assessed health

Maximising people's health and subjective wellbeing is important – but the evidence indicates that people's definition of health varies by demographics. Self-assessed health allows researchers to identify and distinguish the difference between objective ill health and self-assessed health. People may rate their health as good or very good despite having numerous co-morbidities (Bopp, Braun, Gutzwiller and Faeh, 2012; Cott, Gignac and Badley, 1999). However, the measure offers little guidance into what people were thinking when they assessed their health status (Jylhä, 2009). Despite this, the validity, reliability and predictive ability of self-assessed health for key health outcomes including mortality, morbidity and health service use (Heistaro, Jousilahti, Lahelma, Vartiainen and Puska, 2001; Miilunpalo, Vuori, Oja, Pasanen and Urponen, 1997) makes this a useful measure of health.

**Comparison of two studies which used different scales**

The wording of the self-assessed Likert scale can impact how people rate their own health. The example offered in Chapter One was that of Pappas et al.'s (2005) Greece study which found that 19.8 percent of their sample reported very poor to poor health compared to 1.5 percent reported by Misevičienė et al.'s (2013) Lithuanian study. These studies were chosen because they both addressed a clearly focused research question and used an appropriate and similar study design. Both studies provided a clear description of their research subjects and received a satisfactory response rate. However, neither study provided a sample size/ statistical power calculation. The statistical analysis carried out by both studies was deemed appropriate.

There are four main differences between Pappas et al.'s (2005) and Misevičienė et al.'s (2013) studies – the wording of questionnaire used, characteristics of sample included, geographical locations under study, and prevalence of health behaviours reported. First, each study used subtly different scales to measure respondents' self-assessed health (shown in Table 2.1). Pappas et al. (2005) used the descriptors very poor, poor, fair, good and excellent, while Misevičienė et al. (2013) used poor, quite poor, average, quite good and good. Although only subtle, this difference hindered comparison of findings between the studies and produced differences in the findings. Next, there were minor differences in sample characteristics between the studies – a six-year difference in mean sample age, five percent difference in gender, and 13 percent difference in people practising in internal medicine – which could have further strengthened variations in self-reported health.

**Table 2.1. Self-Assessed Health Descriptors.**

| Pappas et al. 2005 (n=443 nurses) (%) | | Misevičienė et al. 2013 (n=1025 health professionals [739 nurses and 286 physicians]) (%) | |
|---|---|---|---|
| Very poor | 1.7 | Poor | 0.4 |
| Poor | 18.1 | Quite poor | 1.1 |
| Fair | 38.5 | Average | 34.4 |
| Good | 31.4 | Quite good | 29.7 |
| Excellent | 10.2 | Good | 34.4 |

Evidence indicates that advancing age (Misevičience et al., 2013), gender (Pappas et al., 2005), early life factors and family history (Singh-Manoux et al., 2006), marital status (Pappas et al., 2005) and socioeconomic status (Pappas et al., 2005), occupation (Karpansalo, Manninen, Kauhanen, Lakka and Salonen, 2004), and rotating shift patterns (Pappas et al., 2005) influence self-assessed health. Then, there were differences in the geographical locations used by each study. In 2004/5, Greece was reportedly in debt reaching 110.6 percent of gross domestic product (Malkoutzis, 2012), with potentially negative consequences on health due to financial uncertainty. In 2009, Lithuania experienced a deep financial recession, but by 2010 gross domestic product growth began to resume. Finally, there were differences seen in the percentage of study subjects who reported engaging in health hindering behaviour. For example, Pappas et al. (2005) found that 47.0 percent of nurses smoked tobacco compared to 9.3 percent reported by Misevičienė et al. (2013). There were also differences in the percentage of study subjects who reported consuming alcohol once a month or more (45.6% [Pappas et al., 2005], 34.9%

[Misevičienė et al., 2013]). Some research has shown that health behaviours (Manderbacka, Lundberg and Martikainen, 1999; Singh-Manoux et al., 2006) influence one's self-assessed health status.

## 2.3 What are determinants of health?

Determinants of health are an array of factors both within and outwith individuals' control that combine to affect the health of individuals, communities and populations across all age bands. For example, people's health is influenced by their circumstances (e.g. wealth), environment (e.g. area of residence), and genetics.

*Models of determinants of health*

There are a number of models which can aid exploration and articulation of health determinants. The models which are commonly used to inform health research and policy and were used as a framework in this thesis are: Dahlgren and Whitehead's (1991) Rainbow Model, WHO's The Solid Facts (Wilkinson and Marmot, 2003), and the WHO Commission for Social Determinants of Health (WHO, 2005i).

In 1991, Dahlgren and Whitehead provided researchers with the Rainbow Model, depicted in Figure 2.1, as a framework to raise questions and construct hypotheses about the determinants of health. A systematic review (Pruss-Ustun et al. 2016) of international literature, including the UK, on 133 diseases and injuries concluded that in 2012, 23 percent (95% CI 13%, 34%) of global deaths and 22 percent (95% CI 13%, 32%) of global disability adjusted life years were attributable to environmental risk factors. The review contributed to knowledge, providing a useful summary of the available literature. Moreover, in Scotland, Dahlgren and Whitehead's model is used to inform policy aimed at addressing health disparities experienced across society. For example, the model was used to inform the Equally Well: Report of the Ministerial Task Force on Health Inequalities (Scottish Government, 2008). Yet while Dahlgren and Whitehead's model provides a useful framework in which to examine the determinants of health, the model omits occupation, an important determinant of health.

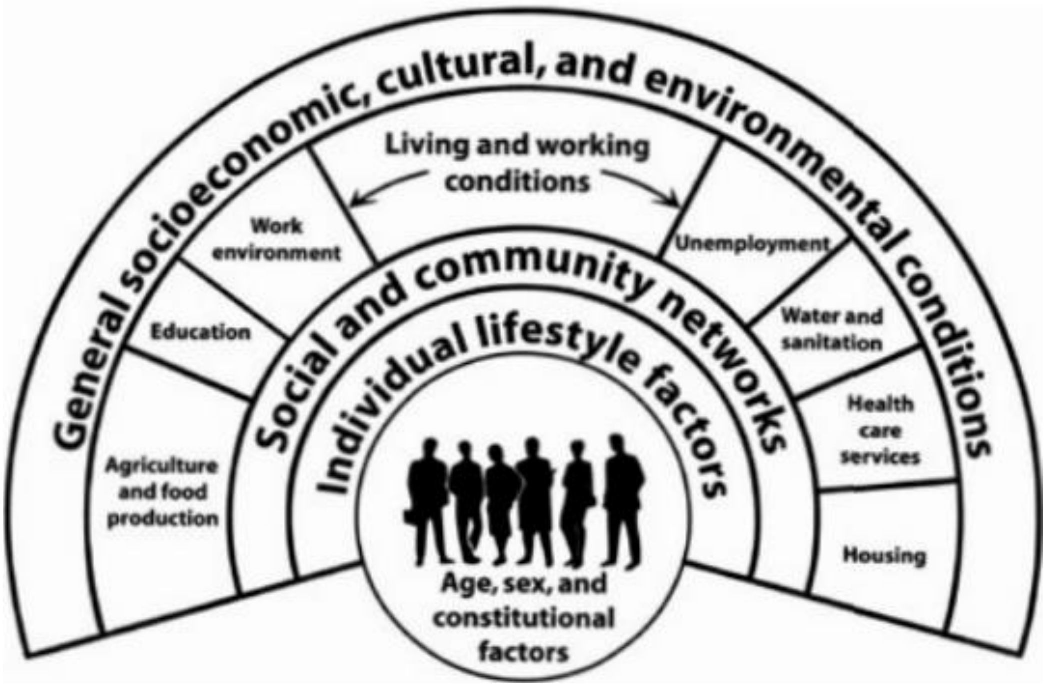
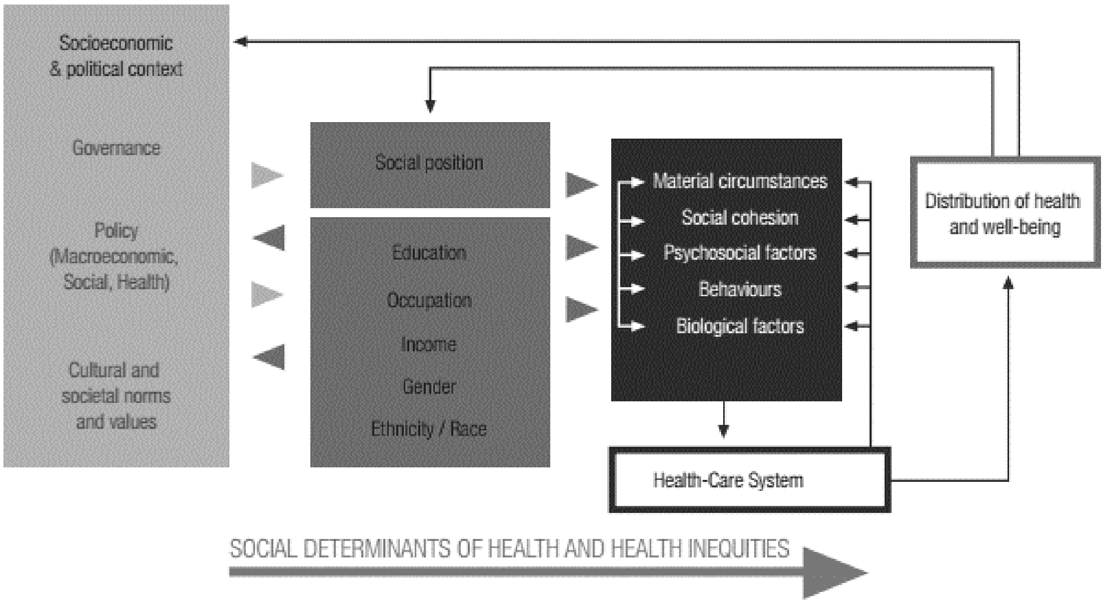



**Figure 2.1 Dahlgren and Whitehead's (1991) Determinants of Health Model.**

Over a decade later (2008), the Commission on Social Determinants of Health established by the WHO provided a conceptual framework depicting the causes of the determinants, displayed in Figure 2.2. The framework promotes interventions that are targeted at the circumstances of daily life and the structural drivers. For example, poor education, insecure employment, employed in a hazardous or dead-end job and living on a low income. These factors are interrelated and tend to cluster around the same people, accumulating over their live course: "The longer people live in stressful economic and social circumstances, the greater the physiological wear and tear they suffer, and the less likely they are to enjoy a healthy old age" (Wilkinson and Marmot, 2003, p. 10).




Taken from WHO (2008: 43).

**Figure 2.2 Commission on Social Determinants of Health Conceptual Framework.**

This thesis will examine six main themes of determinants, first in relation to the health of workers in general (Part A) and then in relation to the health of health workers (Part B). The six themes selected from the above models are perceived to be most important to the focus of this thesis. The six themes are: (i) individual and household level determinants; (ii) behavioural factors; (iii) socioeconomic factors; (iv) contextual factors; (v) broader context; and (vi) theoretical perspectives. Omitting the other factors from this thesis is believed to have little impact on the overall strength and findings of this thesis.

# Part A Health determinants of workers in general

## 2.4 Individual and household level determinants

There are a variety of individual and household level determinants that increase the likelihood of disease or poor health. These include age, sex, marital status and living arrangements, working parents, religion, and ethnicity.

### 2.4.1 Age and health

The number of older workers in active employment has increased over recent years although the proportion is unequally distributed across occupational groups. In the UK, the number of workers aged over 50 has reached 9.4 million, equivalent to over 30 percent of the workforce (Chartered Institute of Personnel and Development and International Longevity Centre, 2015). As shown in Table 2.2, this proportion is not equally distributed across industry groups with the proportion of workers aged over 50 ranging from 20.3 percent in accommodation and food services to 50.3 percent in agriculture.

By exploring health as a categorical rather than a continuous variable, research can better understand the distribution of workers at different ages. The distribution of health may differ between age bands with an inverse relationship between age and health reported in the literature. A multinational cohort study based on 104 observations (8 waves and 13 cohorts of the European Community Household Panel) reported a moderate steady decline in self-assessed health until the age of 70 and then a steep decline thereafter until death (van Kippersluis, van Ourti, O'Donnell and van Doorslaer, 2009). The study examined individuals' health in Belgium, Denmark, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain

**Table 2.2 Percentage Aged Over 50 by Industry Group.**

| Industry group | % aged over 50 | % fall in number of people in employment aged 60-64 relative to 45-49 |
|---|---|---|
| Education | 36.7 | -53.1 |
| Health and social work | 36.2 | -52.0 |
| Public admin and defence | 33.1 | -68.4 |
| Transport and storage | 39.0 | -51.1 |
| Manufacturing | 33.8 | -52.7 |
| Construction | 33.1 | -53.8 |
| Financial and insurance activities | 22.6 | -57.7 |
| Information and communications | 25.0 | -68.0 |
| Professional, scientific and technical | 32.7 | -47.7 |
| Accommodation and food services | 20.3 | -45.3 |
| Wholesale, retail | 29.9 | -39.6 |
| Agriculture | 50.3 | -15.6 |
| Admin and support services | 34.3 | -38.8 |

Taken from Chartered Institute of Personnel and Development and International Longevity Centre (2015, p. 4).

and the UK over the life cycle using age as a categorical variable. A critical appraisal of the study indicated it was of good quality and the findings trustworthy. The decline in self-assessed health may be a result of generational changes in health systems. For example, advances in medical technologies (e.g. digital health), improved treatment of age-specific health conditions, or advances in preventing or managing the development of preventable health conditions may partly explain this change. Alternatively, changes in people's definitions of health may have contributed to this change, for example they may now have higher expectations. In contrast, a Canadian longitudinal study of 13,665 people (Asakawa and Senthilselvan, 2012) reported that on average, the decline in general health as age increases is negligible until the age of 60 at which point it accelerates and may vary by country and context. Asakawa and Senthilselvan (2012) use a national survey to address a clearly focused research question. However, not all relevant statistics were presented (e.g. percentage correctly predicted and Analysis Of Variance [ANOVA]). Nonetheless, sufficient basic statistics were presented which facilitated interpretation of findings. These studies suggest that, while an inverse relationship between age and health exists, the precise age at which a decline in health is seen remains contested. Differences in findings between these studies may be a result of different geographical settings used, research designs employed, confounders controlled for, and the years from which the study data related.

Besides identifying the presence of an inverse relationship between age and health, it is also important to establish whether individuals' mental and physical ability reduces with age from a workforce perspective. With an ageing global population (United Nations, Department of Economic and Social Affairs, and Population Division, 2015), understanding the physical ability of workers over the age of 40 is important. Ng and Feldman's (2013) meta-analysis found no decline in self-reported mental or physical health of older workers, but a modest decline in the clinical indices of physical health (e.g. high blood pressure and body mass index). Older workers were defined by Ng and Feldman as workers aged 40 or over and compared to older adults defined as those aged 65 or over. These findings were not supported by later studies. Nonetheless, there is strong evidence to suggest that age is associated with health and thus it is crucial to adjust for differing age profiles in the population under study to draw comparisons between different groups (McDonald, 2013).

### 2.4.2 Sex and health

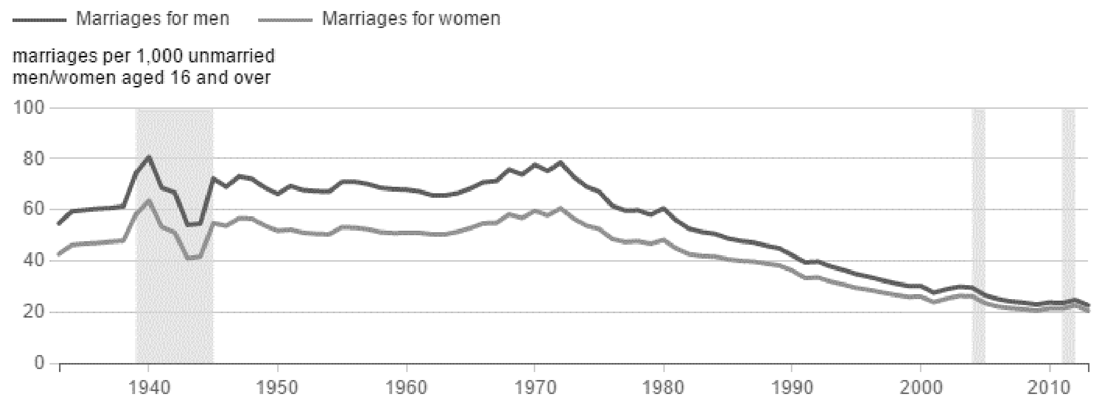
The existence of gender inequalities in health are well established (Ghonça, Tomassini, Toson and Smallwood, 2005; Oksuzyan, Juel, Vaupel and Christensen, 2008), but the causes are not fully understood. The life expectancy of women far exceeds that of men in developed countries (Ghonça et al., 2005). For example, between 2012 and 2014, a man in the UK aged 65 lived an additional 18.4 years but for women it was an average of 20.9 years (Office for National Statistics [ONS], 2015). This means that a man aged 64 could expect to live to the age of 83 and a woman to 86. For the same period, a man in England could expect another 18.6 years of life and a women 21.1 years; and a man in Scotland 17.3 years and a woman 19.6 years (ONS, 2015). These differences exist despite women having a higher prevalence of morbidity compared to men (Oksuzyan et al., 2008).

The distribution of health may differ between sexes because of variations in biological, social and psychological factors between men and women, or definitions of health. Differences in genetic factors, hormones, and pregnancy and child birth, as well as disease patterns between men and women are important contributors to gender differences in health. Vlassoff (2007) suggested that women have unique health needs over and above that of men. However, in some countries, women have been treated as socially inferior with gendered behavioural and cultural norms and values impinging on health (e.g. income, education, health care and diet) (WHO, 2009). Examining the health and health behaviours of males and females separately is therefore important because of known differences in their health profiles.

### 2.4.3 Marital status and health

Evidence has shown that compared to married individuals, unmarried people generally experience poorer health and higher mortality (Robards, Evandrou, Falkingham and Vlachantoi, 2012; Verbrugge, 1979). This difference remained even after adjusting for age and gender. Four potential confounders are overestimation of health of married individuals (Zheng and Thomas, 2013), quality of marital status (Robles, Slatcher, Trombell, and McGinn, 2014), perceived stress (Omoniyi and Ongunsanmi, 2012; Vanassche, Swicegood and Matthijs, 2013) and health behaviours engaged in (Orchard, 2014). A meta-analysis of 126 articles comprising over 72,000 people (Robles et al. 2014) found a small effect between greater marital quality and better health (effect size between $r=0.07$ and 0.21) and lower risk of mortality ($r=0.11$) suggesting the effect is trivial. Despite the small effect size, differences in marital health may be partly explained by married couples generally being happier ($p<0.001$) (Vanassche, Swicegood and Matthijs, 2013) and less stressed than single people ($p<0.05$) (Omoniyi and Ongunsanmi, 2012). Conversely, this difference may be attributable to a perceived obligatory requirement of married people to engage in health promoting behaviours to prevent their loved one having to look after them. For example, in 2013, unmarried people in Great Britain were almost twice as likely as married people to be cigarette smokers (Orchard, 2014).

Over the past three decades the number of couples in England and Wales getting married has decreased, shown in Figure 2.3. The view of society that couples should be married prior to living together has reduced and the number of unmarried couples cohabiting has increased. For some, the prospect of marriage is not something they wish to pursue for a number of reasons, instead opting to cohabit. Individuals can receive comfort, support and love from each other in an official or unofficial caring union. Marriage may therefore be an outdated ideology with little importance to younger generations because of a change in norms and acceptability. Adjusting for marital status in research may therefore provide misleading results because of this generational shift.




Taken from Office of National Statistics (McLaren, 2016).

**Figure 2.3 Marriage Rates 1993 to 2013.**

### 2.4.4 Health of working parents

There are health and lifestyle implications potentially arising from a shift in traditional gender ideologies whereby men were historically cast as breadwinners, while women are more responsible for domestic work and childcare (Håkansson, Axmon and Eek, 2016). This shift has led to an increase in part-time employment among female parents (Håkansson, Axmon and Eek, 2016) with over two-thirds reporting to have work, household and childcare responsibilities (Cramp and Bray, 2011). Among these women, those who experienced insufficient time for their children reported a higher risk of poorer subjective health and work-related fatigue (Håkansson et al., 2016). However, the level of physical activity engaged in by working parents is similar to that of the general working population (Cramp and Bray, 2011).

### 2.4.5 Religion and health

The effect of religion on health differs between religious groups, but its causes are not yet well understood. Abdel-Khalek and Lester's (2017) study of Muslim Arab college students in Kuwait aged 18-27 reported a positive correlation between religion and mental health (men $r=0.19$, $p<0.01$; women $r=0.22$, $p<0.01$), self-efficacy (men $r=0.12$, $p<0.05$; women $r=0.18$, $p<0.01$) and happiness (men $r=0.20$, $p<0.01$; women $r=0.14$, $p<0.01$). However, the effect size of the relationship between religion and health was small, often confounded with economic status. Despite the small effect size, differences in the health of religious groups may partly be explained by the values of comfort, hope and meaning individuals apply to their religion (Jarvis and Northcott, 1987). Some religions impose rules and activities to ward off sickness and death. For example, religions may encourage behaviours that promote health, discouraging tobacco smoking and alcohol consumption and encouraging physical activity and healthy nutritious foods, and the maintenance of support networks by helping others. The advantage of adjusting for religion in workforce health research may inadvertently confound findings.

### 2.4.6 Ethnicity and health

There are generally clear areas of overlap between religion and ethnicity but it is important not to collapse ethnicity into religion or religion into ethnicity. Rather, keeping them separate and investigating the relationship between health and each of these in turn is important. Karlsen and Nazroo's (2010) study of 23,796 people in the Health Survey for England kept religion and ethnicity separate and showed an important difference in the health experiences of people allocated to different ethnic and religious groups. Karlsen and Nazroo found varying degrees of associations between ethnicity and self-assessed health, hypertension, diabetes, waist-hip ratio, tobacco smoking, and physical activity. People from ethnic minority groups were more likely to report fair or poor self-assessed health, be diagnosed with diabetes, and were less likely to smoke tobacco or engage in regular physical activity, irrespective of religion. While these findings are generally supported in the wider literature (Bhopal, 2007b; Nielsen and Krasnik, 2010), a minority of studies have found the opposite in that ethnic minority groups reported better health outcomes compared to white people (Bhopal, 2007b; Tunstall, Mitchell, Gibbs, Platt and Dorling, 2011). These differences are likely to be partly attributable to differences in group structures and confounders adjustmented for, for example, self-assessed health, presence of a health condition, health behaviours, religion, and socioeconomic status. Moreover, Karlsen and Nazroo (2010) found that the risks of reporting fair or poor self-assessed health, be diagnosed with diabetes, self-report smoking tobacco or engaging in regular physical activity, varied between individuals with the same ethnic status but with different religious connections. This was further confounded by gender despite controlling for age and socioeconomic status. Other confounders include an individual's perception, or subjective, sense of ethnic group membership (Niemann, Romero, Arredondo and Rodriguez, 1999) and their subjective sense of racial discrimination and harassment and class (Karlsen and Nazroo, 2002). Controlling for ethnicity in relation to ethnic minorities and ethnic majorities in health research is therefore important.

## 2.5 Behavioural factors

There are several major behavioural determinants that increase the likelihood of disease or poor self-assessed health. These include tobacco smoking, physical inactivity, high alcohol consumption, and poor dietary habits.

### 2.5.1 Tobacco smoking and health

The negative effect of tobacco smoking on an individual's health at all stages of life in Europe and elsewhere is well established. Tobacco smoking is the single biggest avoidable cause of morbidity and mortality in developed countries (US Department of Health and Human Services, 2004). There are a number of confounders that may explain some of the differences seen between smokers and non-smokers. These can include differences in age, gender, socioeconomics, childhood exposure to family smoking, presences of smoking within social networks, perceived stress relief achieved from smoking, and clustering of unhealthy behaviours (e.g. physical inactivity, excess alcohol consumption, low fruit and vegetable intake).

There is considerable evidence to support a strong link between smoking 1-14 cigarettes per day and the risk of developing a number of health conditions. Health conditions can include lung cancer (RR=1.07; 95% CI 1.06, 1.08) (Gandini et al., 2008), stroke (RR=2.2; 95% CI 1.5, 3.3) (Colditz et al., 1988), coronary heart disease (women RR=4.12; 95% CI 3.57, 4.76 and men RR=1.95; 95% CI 1.66, 2.28) (Tolstrup et al., 2014), and chronic obstructive pulmonary disease (COPD) (point prevalence of 8.31% smokers and 3.04% non-smokers; $p<0.001$) (Parasuramalu et al., 2014). For every additional cigarette smoked per day, the risk of lung cancer increases by seven percent (RR=1.07; 95% CI 1.06, 1.08) (Parasuramalu et al., 2014). Adjusting for smoking status is therefore important when conducting research on health even where tobacco smoking is not the primary variable of interest.

Tobacco smoking remains unequally distributed across society with the prevalence higher among those in lower socioeconomic groups (Hiscock, Bauld, Amos, Fidler and Munafò, 2012), educational level and income (Margerison-Zilko and Cubbin, 2012). One potential explanation for this association is stress, with disadvantaged social position a source of adversity and greater depletion of capacity to cope (Pearlin, 1989). In these circumstances, smoking can represent a form of relaxation and enjoyment that aids in the improvement of mood (Layte and Whelan, 2009).

Besides identifying the effect of tobacco smoking on health, it is also important to establish the effect on health of exposure to second-hand smoke. Fischer and Kraemer's (2015) meta-analysis of 24 studies found that exposure to second-hand smoke increased the risk of COPD (RR=1.66; 95% CI 1.38, 2.00), stroke (RR=1.35; 95% CI 1.22, 1.50), and ischaemic heart disease (RR=1.27; 95% CI 1.10, 1.48). Therefore, non-smokers exposed to second-hand smoke experience higher levels of diseases more typically associated with smokers than that of non-smokers not generally exposed to second-hand smoke. The availability of information on exposure to second-hand smoke is limited.

### 2.5.2 Physical activity and health

The benefits of regular physical activity on an individual's health at all stages of life in Europe and elsewhere is well established, with a number of factors known to confound findings. Warburton, Nicol and Bredin's (2006) narrative review of the literature concluded that regular physical activity can reduce the risk of cardiovascular disease, diabetes, cancer, hypertension, obesity, depression and osteoporosis. The review reported a linear relation between physical activity (expending >2000 kcal [8400 kJ] per week) and health status, with further increases in physical activity leading to improvements in health status. However, precisely how regular physical activity was defined in the review and particularly in this statement is unclear. Differences in individual (e.g. psychological and biological), interpersonal (e.g. social support and cultural norms and practices), environmental (e.g. social environment, built environment and natural environment), regional or national policy (e.g. parks, recreation spaces and organised sports events), and global factors (e.g. global media, global product marketing, and social and cultural norms) are also potentially important contributors to differences in health between different categories of physical activity (Bauman et al., 2012).

Physical activity guidelines of (i) 30 minutes of moderate-intensity activity on five or more days per week, (ii) 75 minutes vigorous-intensity activity, or (iii) a combination of these (Bull and the Expert Working Groups, 2010) are designed to significantly lower levels of morbidity and mortality among individuals (Shiroma, Sesso, Buring and Lee, 2014). The strength of this relationship differs between genders, with males more sensitive to this preventative effect than females (Shiroma et al., 2014). Examples of activities categorised as moderate-intensity and vigorous-intensity are outlined in Table 2.3.

**Table 2.3 Intensity of Physical Activity**

| **Moderate-intensity physical activity (Approximately 3-6 Metabolic Equivalent Time (METs))** | **Vigorous-intensity physical activity (Approximately >6 METs)** |
|---|---|
| Requires a moderate amount of effort and noticeably accelerates the heart rate. | Requires a large amount of effort and causes rapid breathing and a substantial increase in heart rate. |
| Examples of moderate-intensity exercise include:<br>• Brisk walking<br>• Dancing<br>• Gardening<br>• Housework and domestic chores<br>• Traditional hunting and gathering<br>• Active involvement in games and sports with children/walking domestic animals<br>• General building tasks (e.g. roofing, thatching, painting)<br>• Carrying/moving moderate loads (<20 kg) | Examples of vigorous-intensity exercise include:<br>• Running<br>• Walking/climbing briskly up a hill<br>• Fast cycling<br>• Aerobics<br>• Fast swimming<br>• Competitive sports and games (e.g. traditional games, football, volleyball, hockey, basketball)<br>• Heavy shovelling or digging ditches<br>• Carrying/moving heavy loads (>20 kg) |

Taken from WHO (2014).

### 2.5.3 Alcohol consumption and health

Alcohol consumption has been reported to have both a harmful and protective effect on health depending on the number of units consumed. According to government guidelines (Scottish Government, 2016a), as of 2016, females are recommended to consume no more than 14 units of alcohol per week and males 21 units, spread evenly over three or more days. Drinking over and above this government guideline has an adverse effect on health over a sustained period of time.

The negative effect of consuming more than the government recommended limits of alcohol on health has been widely documented. An estimated 5.1 percent of the global burden of disease and injury has been attributed to alcohol (WHO, 2014). A systematic review and meta-analysis (Roerecke and Rehm, 2012) was conducted on 34 observational studies with 110,570 chronic drinkers (on average ≥6 g pure alcohol/day) and 3,086 ischaemic heart disease events (fatal and non-fatal events). The study found that, for males, the pooled relative risk of ischaemic heart disease events was 1.04 (95% CI 0.83-1.31; $I^2$=54%) compared to lifetime abstainers. Studies on females generally measured the relative risk in relation to those with alcohol use disorders. The pooled relative risk of ischaemic heart disease events in this group was 2.09 (95% CI 1.28, 3.41). Roerecke and Rehm's (2012) study provided a collation, critical appraisal and meta-analysis of existing literature and, in doing so, delivered a valuable resource for others interested in the effect of alcohol consumption on health.

There is evidence to show that moderate alcohol consumption (females <15 units of alcohol per week and males <22 units of alcohol per week), spread evenly over three or more days (Scottish Government, 2016a), can have a protective effect on health. For example, a standard glass of red wine (175ml) each day has been shown to have a protective effect against cardiovascular disease (Chiva-Blanch, Arranz, Lamuela-

Raventos and Estruch, 2013; Ronksley, Brien, Turner, Mukamal and Ghali, 2011). More specifically, moderate alcohol consumption has been shown to protect against coronary heart disease (Roerecke and Rehm, 2014), ischaemic stroke (3-4 drinks or 30-34g ethanol OR=0.54; 95% CI 0.39, 0.74) (Lee et al., 2015)), and heart failure (1-20 oz of alcohol OR=0.71; 95% CI 0.56, 0.92) (Abramson, Williams, Krumholz and Vaccarino, 2001).

There are a variety of determinants that have been reported to increase the risk of alcohol-related ill health. Evidence has suggested that people more vulnerable to alcohol-related harms include children, adolescents and elderly, males aged 15-59, those with a family history of alcohol misuse, and those in lower socioeconomic groups (WHO, 2014). People with a mental health condition have also been reported to be more likely to engage in addictive behaviours such as alcohol consumption (Regier et al., 1990). There is some evidence to suggest that among both males and females, there is a positive relationship between employment grade and alcohol consumption over the recommended limits ($p \leq 0.01$) (Ferrie et al., 2002).

### 2.5.4 Dietary habits and health

Consumption of high energy-dense foods and micronutrient poor foods are known risk factors for obesity (Swinburn, Caterson, Seidell and James, 2004), and obesity contributes to poor health. Obesity is significantly associated with an increased risk of diabetes, high blood pressure, high cholesterol, asthma, arthritis and poor health status (Mokdad et al., 2003).

Adherence to a Mediterranean diet of foods such as vegetables, fruits, legumes, cereals, fish and a moderate intake of red wine during meals has been reported to reduce the risk of many chronic diseases. For example, a meta-analysis of 12 studies from European countries found that adherence to a Mediterranean diet was associated with better health status (Sofi, Cesari, Abbate, Gensini and Casini, 2008). The study reported a significant reduction in overall mortality (RR=0.91; 95% CI 0.89, 0.94; p<0.0001; 9%) and in the incidence of Parkinson's disease and Alzheimer's disease (RR=0.87; 95% CI 0.80, 0.96; p=0.004; 13%).

There is strong evidence to show an association between the average numbers of fruit and/or vegetable portions consumed daily and health, with higher intake reported to have a protective effect on health. A review of epidemiological evidence on the health benefits associated with fruit and vegetable consumption in relation to a range of conditions including cancer, coronary heart disease and hypertension (Duyn and Pivonka, 2000) concluded that there was strong evidence to support this association. The study reported that a diet rich in fruit and vegetables reduced cancer risk by approximately 20 percent, coronary heart disease by 15 percent and stroke by 27 percent. Similar findings were found in a narrative review of systematic reviews and meta-analyses (Fardet and Boirie, 2014) with the highest consumption of fruit and vegetables reported to significantly reduce the relative risk of cardiovascular disease and cancer by 26 percent and 32 percent respectively. Cancer types included kidney (-32%), lung (-21%), breast (-11%), colon (-9%) and colorectal (-8%). An American cohort study of 9,608 adults aged 25-74 (Bazzano et al., 2002) reported that consuming fruit and vegetables three or more times a day compared to less than once was associated with a reduction in stoke incidence by 27 percent (RR=0.73; 95% CI 0.57, 0.95; p=0.01), stroke mortality by 42 percent (RR=0.58; 95% CI 0.33, 1.02; p=0.05), ischaemic heart disease mortality by 24 percent (RR=0.76; 95%

CI 0.56, 1.03; p=0.07), and cardiovascular disease mortality by 27 percent (RR=0.73; 95% CI 0.58, 0.92; p=0.008). The study addressed a clearly focused question, used appropriate methods and described the subjects in sufficient detail. A validated and reliable survey was used and thus it is assumed that the results are generalisable.

### 2.5.5 Health behaviours and workforce exit

Unhealthy behaviours may potentially influence transitions out of employment from midlife to old age. Hagger-Johnston et al.'s (2017) longitudinal study of 7,704 civil service workers reported that males who smoked cigarettes (OR = 3.23, 95% CI 1.22, 8.55) or regularly consumed a high amount of alcohol (>21 units of alcohol per week; OR = 2.66, 95% CI 0.96, 7.40) were more likely to leave employment over a 22 year period (1991 to 2013). Females with a poor diet were almost one and a half times more likely to leave employment (OR = 1.31, 95% CI 1.01, 1.72). The strength of the relationship was strong among those self-reporting exiting employment on health grounds and those consistently engaging in unhealthy behaviours. Predictors of workforce exit among those with an unhealthy diet were: physical health functioning; and physical and mental functioning. There were two main limitations with the Hagger-Johnston et al. study. First, the study used data from the Whitehall II study of civil servants and therefore the findings might not be representative of manual workers. Second, the study sample was mainly formed of males (70.0%) and therefore the findings may not be representative of the female population.

## 2.6 Socioeconomic factors

There is a wealth of literature documenting the effects of socioeconomics on health, specifically morbidity and mortality. ‘Socioeconomic position’ refers to the social and economic factors that influence the position held by an individual or group within the multiple-stratified structure of society (Krieger, Williams and Moss, 1997). There is an overlap between socioeconomic factors relating to health, preventing the study of each factor in isolation. Thus, it is important to consider a range of socioeconomic factors in relation to health. The nine main socioeconomic factors that will be considered are employment status, work factors, education, health literacy, income, social class, socioeconomic group, deprivation, and housing.

### 2.6.1 Employment status and health

Employment status – unemployed or employed – has been shown to be a powerful determinant of health with bidirectional causality – unemployment can contribute to poor health and poor health to unemployment. People in employment have been found to report significantly lower levels of psychiatric disorders ($p<0.01$) (Gratz, 1993) and are largely unaffected by socioeconomic status, demographic characteristics, living arrangements and employment characteristics. Milner, Page and LaMontagne’s (2013) systematic review and meta-analysis of 16 articles found that, compared with those in employment, the pooled relative risk of suicide associated with long-term unemployment over an average 7.8 years follow up period was 1.70 (95% CI 1.22, 2.18). Therefore, unemployment can have morbidity and mortality implications over a prolonged period of time. One method for researchers who are interested in exploring the association between employment and health, is to restrict the study sample to include only those currently in employment.

Waddell and Burton (2006) argued that there are four key areas to consider in relation to employment. First, employment is the most important way of securing adequate economic resources which underpin many materials that promote health and engagement in society. Second, employment is perceived as the norm and helps meet important psychosocial needs. Third, employment and socioeconomic status are major contributors to social gradients in physical and mental health and mortality. Fourth, the physical, psychosocial and environmental aspects of work can negatively impinge on health. Nonetheless, the overall benefits of employment outweigh the risks, and exceed the harmful effects of long-term unemployment or prolonged sickness absence.

### 2.6.2 Work factors and health

There are a number of work stressors and hazards that can impact on people's health, including shift work, overtime and long hours, physical violence and verbal abuse from the public, physical and mental job demands, educational mismatch, and other factors (e.g. organisational change). Evidence in relation to the contribution of specific work-related factors is complex.

The impact of shift work on health is well established (Ellingsen, Bener and Gehani, 2007; Harrington, 2001; Matheson, O'Brien and Reid, 2014; Moon, Lee, Lee, Lee and Kim, 2015; Armstrong, Cairns, Key and Travis, 2011). Evidence has shown that shift workers are at greater risk of gastrointestinal disturbances (Matheson, O'Brien and Reid, 2014), cardiovascular disease (RR=1.65; 95% CI 1.38, 1.97; $p<0.001$) (Ellingsen, Bener and Gehani, 2007) and depression (Harrington, 2001). However, these findings are not consistently supported across the literature. Wang et al.'s (2011) literature review found evidence to support both an association and no association between shift work and diabetes mellitus (Wang et al., 2011). Differences between studies may be due to factors including shift length and pattern, direction and speed of shift rotation, and availability and length of rest breaks (Barton et al., 1995). Shift workers also experience disruption of circadian rhythms, length and quality of sleep (Trinkoff et al., 2008), and interruption to their daily routines making regular eating and exercise habits difficult to maintain (Amani and Gill, 2013; Turner, 2008).

The occupational role of workers will impact to some extent on the distribution of poor health seen among different occupational groups. Occupational factors can include physical and mental demands, chemical and allergenic hazards (Schwensen, Friis, Menné and Johansen, 2013), organisational change (Falkenberg, Fransson, Westerlund and Head, 2013), and individual perception that they are learning new things (Schell, Theorell, Nilsson and Saraste, 2012). Other important contributors to health include differences in physical job conditions (e.g. manual labour, environmental and mechanical hazards, exposure to excess noise and heat), psychosocial job characteristics, stress, social support and other work factors (e.g. biological and infectious agents, chemical and allergenic hazards, and staff shortages). There is some evidence to support a link between occupational factors (e.g. frequent hand washing, wet work and use of hand disinfectants) and the development of dermatitis with the onset age higher among females (Schwensen, Friis, Menné and Johansen, 2013). Dermatitis has been linked to quality of life, daily function and home relationships, and having to take time off work in up to half of individuals with dermatitis (Nicholson, Llewellyn and English, 2010).

There is evidence to suggest a link between organisational change and health. A cohort study using data from the Whitehall II studies, examined the impact of organisational change on 10,308 workers aged 35-55 (Falkenberg, Fransson, Westerlund and Head, 2013). The study found that British Civil Service workers who experienced or anticipated major organisational change reported higher rates of poor health such as poor self-assessed health and minor psychiatric disorders ($p < 0.001$) than those reporting no change. Despite this, it is worth noting that the study used data from the period 1991 to 1999 which may not be reflective of the current day, however, it is reasonable to assume that the underlying principle remains relevant. Yet the disentanglement of this, while important, is not within the remit of this study. Acknowledging the existence of ambiguous findings is nonetheless important.

### 2.6.3 Socioeconomic status

Measuring health by socioeconomic status often uses individual level data such as education, income or class to classify people into socioeconomic groups. These are discussed below.

**Education and health**

There is a positive association between education and health with well-educated people often experiencing better health than the poorly educated, indicated by higher levels of self-assessed good health and low levels of disease. A meta-analysis (Smith et al., 2014) of 414 studies reported an odds ratio of 0.835 indicating a 16 percent odds risk reduction in the likelihood of developing a chronic disease among the more educated compared to the less well-educated. The education gradient remained robust across genders. Conversely, low educational attainment is associated with higher rates of infectious and chronic diseases, poor self-assessed health and premature mortality (Nagel et al., 2008).

Educational attainment may affect health for three main reasons; (1) work and economic conditions, (2) social-psychological resources, and (3) health behaviours. Firstly, well-educated people are more likely to be in employment, specifically full-time employment, have subjectively rewarding jobs, high incomes, and lower economic hardship (Ross and Wu, 1995). Secondly, well-educated people generally report a greater sense of control over their personal lives and health, with greater social support networks. Thirdly, well-educated people are less likely to engage in health hindering behaviours such as tobacco smoking, physical inactivity, and excessive alcohol consumption, contributing to better health. While much of the association between health and education correlates with these factors, education continues to have a strong and positive direct effect on health even after accounting for these factors (Ross and Mirowsky, 1999). Therefore, educational attainment has both a direct and indirect effect on health.

*Health literacy and work*

Health literacy is an important determinant of health although defining it appears more complex. A systematic review (Sorensen et al., 2012) of definitions and conceptual frameworks of health literacy identified 17 definitions and 12 conceptual models of health literacy. The review defined health literacy as:

*the ability to regularly update oneself on determinants of health in the social and physical environment…and derive meaning, to interpret and evaluate information on determinants of health in the social and physical environment, and…to make informed decisions on health determinants in the social and physical environment*" (Sorensen et al., 2012, p. 10).

This definition links to the determinants of health models discussed in section 2.1.

In accordance with the definition provided above, the occupational groups included in the analysis presented in this thesis, which can be categorised as health literate, are nurses, nursing and midwifery professionals, and other health professionals. Theoretically, the analysis presented in this thesis should show that these occupational groups have lower percentages of workers with long-term conditions and better health behaviours than non-health literate occupations such as nursing auxiliaries, and care assistants and home carers.

The burden of lower health literacy is unequally distributed across society with high rates of limited (low or marginal) health literacy associated with older age (OR=5.74; 95% CI 3.90, 8.43; p<0.001), lower educational level (OR=6.94; 95% CI 4.74, 10.14; p<0.001), lower income (OR=3.11; 95% CI 2.09, 4.62; p<0.001) and perceived poor health (OR=5.28; 95% CI 3.00, 9.29; p<0.001) (Protheroe et al., 2016). The effect of health literacy on health is potentially confounded by occupation and education.

**Income and health**

There is a wealth of evidence confirming the association between income and health with those on lower incomes experiencing poorer health, economic strain and perceived material deprivation (Arber, Fenn and Meadows, 2013). Arber et al. (2013)

indicated that people in midlife with lower incomes and greater subjective financial difficulties have a higher risk of poor health; conversely, the effect of income on health in later life is mediated entirely through subjective financial wellbeing. Alternatively, there is weak evidence to suggest that income inequalities can have positive effects on economic growth by providing incentives to work, potentially improving health. Nonetheless, the association between income and health might be down to health and social problems leading to lower income rather than vice versa. In general, evidence indicates that *"socioeconomic disadvantage precedes poorer health…*[but] *this does not exclude reverse causation – poor health does affect earnings – but it is not the primary mechanism behind the association between income and health"* (Lynch et al., 2004, pp. 9-10). The effect of income on health is potentially confounded by occupation and education.

**Social class and health**

Categorising people by social class whereby individuals are allocated to a social class based on their role in the labour market is a common feature in most European social class research. Employing a structured occupational typology can enhance occupational health research and improve comparability between studies. One of the most influential class typologies developed was the Erikson Goldthrope Portocarero (EGP) Schema. The typology had no commonly agreed method which contributed to low consistency when using EGP across different developed countries (Erikson and Goldthorpe, 1992). This reduced its usefulness and reliability for use in research. Later occupational classifications– including National Statistics Socioeconomic Classification (NS-SEC) – used the same theoretical base as EGP but, as a result, the European Union Sixth Framework Programme project has produced comparative European research (Rose and Harrison, 2011). For example, NS-SEC classified occupations into eight classes based on the title of the role and the role description (shown in Table 2.4), from doctors in the highest and unemployed individuals in the lowest classifications.

The Whitehall Studies were fundamental to epidemiology research interested in the relationship between social class and health. The first of the Whitehall Studies, Whitehall I, showed a steep inverse association between social classes, assessed by grade of employment and mortality from a variety of diseases. Men in the lowest grade of employment experienced three to six times higher coronary health disease mortality compared to those in the highest grade of employment (Marmot et al., 1978). In the same study, compared to those in the highest grade of employment, those in the lowest grade exhibited four main risk factors – they were heavier for their height, had higher blood pressure, smoked more, and reported less leisure-time physical activity. Findings such as these demanded further explanation and thus Whitehall II was established.

Whitehall II studied 10,314 (6,900 men, 3,414 women) British Civil Servants in London aged 35-55 (Marmot et al., 1991), advancing the available evidence about the health of workers at that time. The studies found that health was related to some degree to health behaviours and monotonous work characterised by low control, satisfaction and social support, with workers in lower classes at greater risk. Arguably this led to increased interest among the research community evidenced by an increase in occupational research.

**Table 2.4 National Statistics Socioeconomic Classification Eight-Class Grouping.**

| | Classification title | Description | Occupations |
|---|---|---|---|
| 1 | Higher managerial and professional occupations | This includes employers in large occupations, managerial professionals and higher professional occupations. | Doctors |
| 2 | Lower managerial and professional occupations | This includes lower professional and higher technical occupations, lower managerial occupations and higher supervisory occupations. | Nurses<br>School teachers |
| 3 | Intermediate occupations | These are positions in clerical, sales and intermediate technical occupations that do not involve general planning or supervisory powers. | Auxiliary nurses |
| 4 | Small employers and own account work | Small employers are those, other than higher or lower professionals, who employ others and so assume some degree of control over them.<br>Own account workers are self-employed people engaged in any (non-professional) trade, personal service or semi-routine, routine or other occupation but have no employees other than family workers. | Self-employed builders<br>Hairdressers<br>Shopkeepers – own shop |
| 5 | Lower supervisory and technical occupations | Lower supervisory occupations have titles such as 'foreman' and 'supervisor' and have formal and immediate supervision over those in classes 6 and 7. | Train driver<br>Employed plumbers or electricians |
| 6 | Semi-routine occupations | The work involved requires at least some element of employee discretion/decision making. | Care assistants |
| 7 | Routine occupations | Positions with a basic labour contract, in which employees are paid for the specific service. Employee discretion/decision-making less relevant here. | Bus drivers<br>Waitresses |
| 8 | Never worked and long-term unemployed | People in this category have never had an occupation or have been unemployed for an extended period and can therefore not be assigned to an NS-SEC category. 'Long-term' can be defined as any period of time but is generally one or two years. | |

Taken from *A picture of the United Kingdom using the National Statistics Socio-economic Classification* (Hall, 2006, p. 8).

Later studies on social class and health have provided inconsistent findings indicating the absence of an absolute graded relationship. For example, a Spanish cross-sectional study (Casado, González and de la Torre Esteve, 2015) of 52,121 people aged 16 or above found that the percentage of females reporting self-assessed poor or very poor health increased as class fell (Class I [professionals and managerial] 4.3%; 95% CI 3.2, 5.5 and Class V [unskilled manual workers] 15.2%; 95% CI 13.6, 16.9). A similar finding was seen for women reporting three or more health problems (Class I 8.5%; 95% CI 6.7, 10.3 and Class V 26.6%; 95% CI 24.2, 29.0). There appeared to be no graded relationship between social class and self-assessed health although the lowest percentage was reported by Class I (3.6%; 95% CI 2.6, 4.6) and the highest by Class V (10.7%; 95% CI 9.2, 12.3). The percentage of males reporting three or more health problems increased as class fell (Class I 6.7%; 95% CI 5.0, 8.4 and Class V 12.8%; 95% CI 10.9, 14.8). While the study used a reliable and validated questionnaire, the results may not be generalisable outside of the Spanish study area.

Richards and Paskov's (2016) UK cross-sectional study of 131,898 (120,921 in English Health Survey and 10,977 in British Household Panel Survey) people aged 25-65 showed no social class gradient for psychological wellbeing. Some research has shown that being in a lower social class is associated with having older identities with individuals more likely to classify themselves as "old", "elderly" or report feeling older than their chronological age (Barrett, 2003). These differences are more pronounced among older adults. In addition, in a cross-sectional study of 5,412 adults aged 50-60 in Denmark, by Hansen et al. (2014), found no interaction between gender and social class gradient for physical performance tests (p=0.23).

Lower social classes often display more harmful health behaviours than higher socioeconomic groups. Nandi, Glymour and Subramanian's (2014) study of 8,037 people aged 50 or above in 1992 and resident in the United States found that, compared to higher socioeconomic groups, people in lower socioeconomic groups had a mortality risk ratio of 2.84 (95% CI 2.23, 3.60). Unhealthy behaviours including tobacco smoking, alcohol consumption of any level, and physical inactivity explained 68 percent (95% CI 35, 104) of this variance, leaving a risk ratio of 1.59 (95% CI 1.03, 2.45) for lower socioeconomic status. The study findings are ungeneralisable to the current general population because of the age inclusion criteria used; furthermore sufficient time has elapsed that behaviour may have changed substantially.

**Deprivation and health**

The effect of deprivation on health in the UK has been firmly established, with those living in more deprived areas at greater risk of morbidity and mortality (Barnett et al., 2012; Carstairs and Morris, 1990; Doebler and Glasgow, 2016; Kuo and Chiang, 2013; Stafford and Marmot, 2003) irrespective of measure used (e.g. Townsend deprivation index or Carstairs-Morris index). For example, compared to the most affluent areas, those living in the most deprived areas experience the onset of multi-morbidity ten to 15 years earlier (Barnett et al., 2012) and spend twice as many years in poor health (Bajekal, 2005; The Scottish Government, 2010). This is potentially confounded by neighbourhood deprivation (Shouls, Congdon and Curtis, 1996) where there is a dependency on collective neighbourhood resources (Stafford and Marmot, 2003), subjective deprivation (Mishra and Carleton, 2015), and both current and past deprivation, such as poor housing (Marsh, Gordon, Heslop and Patazis, 2000).

### 2.6.4 Housing and health

Poor housing has been widely used as an indicator of poverty and a target for interventions to improve health and reduce health inequalities (Tunstall et al. 2013). Living in poor housing is the primary socioeconomic determinant of poor health (Angel and Bittschi, 2014) with a direct proportional relationship between social class and housing conditions (Filandri and Olagnero, 2014). Nevertheless, while housing remains on many government agendas, evidence linking housing and health continues to lag behind (Thomson, Petticrew and Morrison, 2001).

There has been an increase in the number of low-income homeownership with Bostic and Lee (2009) attributing this to three causes: increases in income, education and wealth; market innovations; and a rise in government incentive schemes that expanded credit and mortgage lending to low-income households. Those in low-income households will inevitably have less disposable income and may struggle to maintain mortgage payments. A study (Nettleton and Burrows, 1998) based on 3,500 people in the British Household Panel Survey aged over 16 found that those behind on their mortgage payments also suffered negative health consequences. The study reported an association between mortgage problems and changes in subjective wellbeing ($p<0.001$) even after controlling for other influences including health problems. For men, the odds increased by 1.81 and for women by 3.24.

## 2.7 Area, environment and population factors

There are a variety of area, environment and population determinant risk factors that influence health. These include environment, migration, area deprivation, transport, crime and violence and other influences or factors.

### 2.7.1 Environment and health

Over the past two decades, research into the impact of the physical and social environment in which individuals find themselves living and population health has begun to gather momentum (de Gelder et al., 2016; Yen and Syme, 1999). This may be partly due to the role of the environment in reducing health inequalities (Public Health England, 2014).

The environment can have both a positive and negative effect on people. In the past decade, an increasing number of reviews (Croucher et al., 2007; van den Berg et al., 2015) have found a strong positive relationship between greenspaces and several determinants of health. These include better self-assessed health, improved mental health, lower body mass index and increased longevity (Croucher et al., 2007; van den Berg et al., 2015) irrespective of socioeconomic status (Croucher et al., 2007). For example, Maas et al.'s (2006) study of 250,782 people in the Netherlands reported a positive relationship between self-assessed health and agricultural green (1 km per house: $\beta$=0.004; Standard Error [SE]=0.001) and natural green (1 km: $\beta$=0.004; SE=0.001; 3 km: $\beta$=0.006; SE=0.001) in a living environment. Conversely, a literature review by Sreetheran and van den Bosch (2014) has pointed to a negative aspect of urban greenspace with regard to evoking fear of crime. Greenspaces can include; play parks, fields, rivers, forests, and essentially any open spaces where there is natural vegetation. These greenspaces provide the opportunity for more physical activities (see physical activity section 2.5.2 for its health benefits), social contacts and relaxation.

### 2.7.2 Migration and health

Migration is an important determinant of global health and poses a major public health challenge. People are moving in greater numbers than ever before and the distance involved has increased. Rechel et al., (2011) suggest that this poses a major problem for health with implications for not only those who move but also the people left behind and those who host migrants. The impact of migration can be harmful to health with population movement linked to diseases, such as tuberculosis, HIV/AIDS, cardiovascular diseases, cancer, and poor mental health (Carballo, Divino and Zeric, 1998). Migrants are also more susceptible to occupational health hazards (Rechel et al., 2013). These differences are explained to some extent by risk factors and disease patterns of the origin country (e.g. high prevalence of communicable diseases), poor living conditions in the host country, gross national product of the host country, precarious and dangerous work, and psychological stress associated with the reason for and process of migration (e.g. conflict, unemployment and poverty) (Close et al., 2016; Rechel et al., 2013).

### 2.7.3 Transport and health

The positive and negative impacts of transport on health are unequally distributed across society. People who experience most negatives from transport are the disadvantaged, such as women, children, elderly, ill or disabled, those on low incomes or from ethnic minority groups (Cohen, Boniface and Watkins, 2014). In many cities, people from lower socioeconomic groups are most likely to live in neighbourhoods affected by traffic and its associated problems, such as air pollution, noise and large infrastructures causing community severance. For those living on low incomes, walking is a part of daily life, despite potentially having good public service transport links. The health benefits of active transport that incorporates walking and cycling to work is one way in which an active lifestyle can be incorporated into day-to-day life, increasing physical activity (see physical activity section 2.5.2 above for the health benefits of physical activity) (Xu, Wen and Rissel, 2013). Nonetheless, evidence linking active transport to health outcomes is less clear.

Car access has been shown to predict longevity and health in many European countries as it is a crude measure of socioeconomic position. The association between car access and morbidity and mortality persists even after adjusting for income and self-esteem (Macintyre, Ellaway, Der, Ford and Hunt, 1998). Inability to access motorised transport often restricts people to areas lacking in health, retail and other social resources further compounded by living in places that are neglected, depressed and socially isolating (Bostock, 2000). Those without transportation may be further disadvantaged by reduced opportunities for employment, further impacting on both mental and physical health.

### 2.7.4 Crime and violence and health

Crime and violence is a public health issue due to its link with poor health. The precise impact of crime on health varies dependent on the level of crime. For example, violent crime can have prolonged, sometimes permanent, physical and psychological injuries. Common property crimes, such as theft and burglary, can have psychological impacts on those affected and in some cases negatively impact on living standards, particularly among people in poorer communities. Crime rates are highest in areas of high unemployment, low high school graduation rates, and high poverty rates (Ajimotokin, Haskins and Wade, 2015). Nonetheless, people do not necessarily have to fall victim to crime to be affected. A systematic review of UK studies (Lorenc et al., 2013) reported that physical environmental factors, such as visible signs of neglect and local social environmental factors, such as social cohesion, are perceived to impact on fear of crime. The fear of crime can lead to a variety of health outcomes and self-restricted mobility, negatively impacting health.

### 2.7.5 Other influences on health

In 1948 the NHS was established. The move to establish a publicly funded healthcare system was a pivotal point in the UK's history, with free equal access to healthcare for both the richest and poorest of society. The reliance of the UK population on the government to provide this vital service for every UK citizen has undoubtedly been central to tackling a large proportion of health inequalities present 70 years ago. Therefore, it could be argued that the government has a substantial influence on the health of its citizens both positively and negatively.

Since receiving devolved powers, the Scottish Government has published numerous health policies aimed at improving the health of the nation. One such policy is the introduction of the nationwide ban on smoking in public places in 2006, including hospital premises, in an attempt to tackle the growing health burden attributable to tobacco smoking. The reduction in exposure to second-hand smoke will inevitably have both immediate and long-term health benefits to people resident in Scotland.

This is supported by Haw and Gruer (2007, p. 552) who reported that "*reductions in exposure to second-hand smoke of the order observed in Scotland may generate immediate health gains in the Scottish population as well as longer term reductions in morbidity and mortality related to second-hand smoke*" in the wake of the smoking ban. This was confirmed by Pell et al. (2008) who reported a 17 percent reduction (95% CI 16, 18) in the admission rates for acute coronary syndrome in Scotland post ban compared to a 4 percent reduction in England (no legislation).

## 2.8 International, UK and Scottish perspective

It is important, when studying health, to consider the broader perspective in terms of international findings, generalisability, unique regional factors, and identifying countries, which are similar to Scotland in some way. This section presents an overview of the literature under three main headings: international, UK and Scotland.

### 2.8.1 International studies on health

Health inequalities are a complex public health problem affecting numerous countries worldwide. Life expectancy at birth in 2015, to take one measure, ranged from 50.1 years in Sierra Leone to 83.7 years in Japan, with countries such as the United States (79.3 years) and UK (81.2 years) falling within this range (WHO, 2016). Within countries there are also large inequalities in health – "*for each mile travelled* [from the south east of downtown Washington to Montgomery Country Maryland], *life expectancy rises about a year and a half. There is a 20-year gap between the poor blacks at one end of the journey and rich whites at the other*" (Marmot, 2004, p. 150). In addition, the healthy life expectancy at birth for the same period ranged from 79.3

in Singapore to 44.4 in Sierra Leone (WHO, 2016). The international response to health inequalities has been to control major diseases that are linked to premature mortality, improve health systems and tackle the social determinants of poor health (e.g. poverty, housing and employment opportunities). For example, the WHO sought to tackle ten aspects relating to the determinants of health, these are: early years, the social gradient, social exclusion, social support, stress, work, unemployment, addiction, food, and transport (Wilkinson and Marmot, 2003).

### 2.8.2 United Kingdom studies on health

The UK, not too dissimilar to other countries, has been party to numerous studies exploring the factors which underpin health inequalities. One of the main geographical patterns is the widening gap in the 'north-south' divide in Great Britain (Hacking, Muller and Buchan, 2011), the difference between the more economically prosperous wealthier 'south' and the less dynamic 'north'. In other words, the differences between the 'north' and the 'south' which are seen in all areas of life, such as employment, housing and health. This difference persisted into the 21st century with a northwest-southeast divide also seen in Great Britain, particularly between Scotland and London (Doran, Drever and Whitehead, 2004). The north-south divide in relation to England and Wales appears to have increased between 2001 and 2011 in the case of poor self-assessed health (Lloyd, 2016).

This is supported by the Black Report (Black, Morris, Smith and Townsend, 1980) which found that significant differences were seen in morbidity and mortality that disproportionately affected those in lower social classes, often going unchecked. The Independent Inquiry into Inequalities in Health Report (Acheson, 1998, p. 1) stated that “*inequalities in health exist, whether measured in terms of mortality, life expectancy or health status; whether categorised by socioeconomic measures or by ethnic group or gender*,” indicating an urgent need to tackle the public health problem of health inequalities.

### 2.8.3 Scottish studies on health

In Scotland, the Ministerial Taskforce on Health Inequalities (2012, p. 1) has stated that “*of all the challenges facing Scotland, the gaping health inequalities and high mortality rates are clearly our greatest*”, suggesting a need for further research. The stark difference between the socially and economically well off and those who are socially disadvantaged is significant. In 2006, men living in the most affluent communities in Scotland could, on average, expect 67.9 years of healthy life and women 69.0 years compared to men in the most deprived 15 percent with 57.3 years of healthy life and women 59.0 years (Scottish Government, 2008). The most deprived 15 percent of the population was calculated using the Scottish Multiple Index of Deprivation, a tool used to measure area deprivation in Scotland. Healthy life years is a general health quality outcome measure used by the Scottish Government which combines life expectancy and self-assessed health from survey data to provide an indication of the average number of years a person born today can expect to live. However, it is important to point out that health inequalities do not solely affect the most deprived communities. Several studies have found that for many health indicators, there is a clear gradient showing progressively poorer health with declining affluence and influence. In addition, disadvantaged people, whether that is by sex, race, disability or other factors, experience poorer health than their non-disadvantaged counterparts. Nonetheless, there is however, a gap in the literature with limited studies exploring health inequalities in Scotland, separate from other UK countries and in relation to specific occupational groups.

## 2.9 Theoretical perspectives of health

Exploring and understanding the determinants of health is complex and often demands the use of a theoretical framework/perspective. Using a theoretical framework/perspective to explore determinants of health offers a number of benefits. Nilsen (2015) suggested that three such benefits include: guiding the process of translating research into practice; aiding understanding and explaining what influences outcomes; and assisting with evaluating outcomes. Theoretical frameworks can help open up analysis by providing a specific set of questions and particular perspective. Painter, Borba, Hynes, Mays and Glanz's (2008) systematic review of research published between 2000 and 2005 suggested that only around one in three (35.7%) studies mentioned a theory. With two-thirds of studies omitting to mention the theoretical stance in which they interpreted study findings, having an awareness of the main theories is important.

There are numerous theoretical perspectives in existence – including life course, behavioural, materialistic, psychosocial and natural selection approach – that are important in better understanding health. These will each be discussed in turn below.

### 2.9.1 Life course approach to health

Life course approaches to health are an overarching approach in epidemiology and are often downplayed as 'common sense'. A life course epidemiology approach is the study of long-term biological, behavioural and psychosocial processes that connect adult health and disease risk to the physical or social exposures present "*during gestation, childhood, adolescence, young adulthood and later adult life*" (Ben-Shlomo and Kuh 2002, p. 285). For example, people who experienced substandard housing conditions in childhood are more likely to experience occupational disadvantage. The life course model emerged from research conducted in the 1980s-90s which showed that exposures in early years of life, such as failure to thrive or unhealthy environmental conditions during childhood, were associated with increased risk of chronic disease in adulthood. Two hypotheses are that firstly, "*adult chronic disease and many of its risk factors are biologically 'programmed' during critical periods of growth and development in utero or early infancy*" (Kuh and Shlomo 2005, p. 3). The extent to which later life overrides these early year effects is a key question in life course research. Secondly, "*adult chronic disease reflects cumulative differential lifetime exposure to damaging physical and social environments* [with] *risk factors… often cluster together because many are related to socioeconomic position*" (Kuh and Shlomo 2005, p. 3). These two hypotheses are likely intertwined and operate simultaneously suggesting a need for early intervention.

### 2.9.2 Behavioural approach to health

The behavioural model has often been cited in attempts to explain health inequalities with behavioural factors, such as tobacco smoking, physical inactivity and high alcohol consumption and poor diet, unequally distributed across socioeconomic groups. In fact, there is strong evidence to support an inverse relationship between socioeconomic position and behavioural factors. Studies have shown that a lower socioeconomic position is generally associated with higher rates of tobacco smoking (Hiscock et al., 2012), lower levels of physical activity (Lindström, Hanson and Östergren, 2001), poorer dietary habits (Galobardes, Morabia and Bernstein, 2001), and obesity (Wardle, Waller and Jarvis, 2001), all of which are related to poor health. The relationship between socioeconomic position and alcohol consumption is more complex (Bloomfield, Grittner, Kramer and Gmel, 2006). Two potential hypotheses are firstly that health behaviours exhibited among adults are to a large extent intra-individual phenomenon whereby people make a free choice (Lynch et al., 1997). For example, health hindering behaviours are largely the result of poor lifestyle management on a daily basis. This approach is generally associated with a blame culture where people or populations with health hindering behaviours are typically blamed for their poor health habits. Conversely, an alternative hypothesis may be that people make choices about their health behaviours embedded in economic, historical, cultural, political and family situation factors. For example, people make behavioural choices based on these influences. Some authors have argued that by decontextualising behaviours from the real world, the socioeconomic influence is obscured and victims of inequality are blamed for their unhealthy lifestyles. This approach is best viewed through a life course perspective as the cumulative effects of their socioeconomic position influence their health.

### 2.9.3 Materialistic approach to health

Similar to behavioural explanations, the materialistic explanation views the relationship between social class and health as causal, and health as the dependent variable. Unlike the behavioural explanation, materialist explanations are concerned with the effects of social structure on health, and structurally determined differences in the realms of production and consumption are considered one of the most important and likely causes of social class inequalities in health (Blane, 1985).

The Black Report (Black et al., 1980), a foundational report on health inequalities noted that materialist explanations take various forms. At a basic level, people with higher incomes are able to purchase higher quality food, better housing and live in safer environments. At an intermediate level, health has been connected to factors such as the distribution of income and thus wealth, poverty, access to education and employment. It is at this level that most studies have focused. For example, on health and working conditions (e.g. hazards), poor housing and unhealthy diet, most of which can be traced back to distribution of income, wealth and employment.

### 2.9.4 Psychosocial approach to health

The psychosocial literature on health has been strongly influenced by Wilkinson and Marmot who argued that position in the social hierarchy is an important determinant of health. People in lower socioeconomic groups experience higher levels of mental health conditions and premature mortality (Wilkinson and Marmot, 2003). The accumulation of psychosocial risks, such as prolonged anxiety, insecurity, social isolation and lack of autonomy at work and home life over a lifetime can have a negative effect on health. For example, there is a protective influence of social networks on health (Pillai and Verghese, 2009). Conversely, a review of international literature (Cacioppo and Cacioppo, 2014) reported that today's social world can adversely affect health and wellbeing. Those without social and community ties experience higher premature mortality irrespective of gender and independent of self-assessed health, socioeconomic status, and health behaviours such as tobacco smoking, physical inactivity, high alcohol consumption and obesity (Berkman and Syme, 1978).

### 2.9.5 Natural selection explanation of health

The natural selection explanation views people's health as having an important influence on their chances of social mobility. Those in good health, it is argued, are more likely to be upwardly mobile and those in poor health downwardly mobile leading to a concentration of people with a higher risk of premature mortality in lower socioeconomic groups. This can include selective marriage with women in poorer health marrying down the social hierarchy (Smith et al., 1990). This explanation therefore supports a causal association between health and social class, with social class viewed as the dependent variable (Blane, 1985).

Although these studies have questionable conclusions, one cannot deny that downward social mobility may be the fate of those in poor health (Campos-Matos and Kawachi, 2015). People in poor health have long been discriminated against and this is often part of what sociology theorises as ‘stigma’ (Major and O’Brien, 2005). For example, it could be argued that those employed in the public health service will be promoted into more managerial roles when their health deteriorates or into a lower paid role but keeping the same pay they were previously on due to a no redundancy policy. Workers in the private sector may not receive the same protections as public sector workers where there are fewer no redundancy policies and workers may be pressured into leaving higher paid work and move into lower paid work for health reasons.

### 2.9.6 Other theories on health

There are several other theories which have been used to explore and understand health inequalities. For example, status syndrome (Marmot, 2004), affluenza (James, 2007), vitamin theory (Warr, 1987), artefact explanation (Black et al., 1980; Bloor, Samphier and Prior, 1987), and control (Bobak, Pikhart, Hertzman, Rose and Marmot, 1998). These theories are not explained in any depth in this thesis, detailed explanations are provided by the authors cited above.

## 2.10 Part A summary of the association between determinants of health and health of workers in general

In summary, part A of this chapter explored a wealth of literature on the socioeconomic and geographical determinants of health and, in doing so, has provided a background to the analysis that follows. Table 2.5 summarises each health determinant indicating whether it has a positive, negative or mixed effect on health for workers in general. From part A of this chapter, it is apparent that there are several individual level determinants of poor health such as tobacco smoking and alcohol consumption, as well as income and area deprivation, which are important to consider when examining health among different occupations, with a focus on caring professions. Factors prior to point of workforce participation can contribute to workers' health and thus considering these known risk factors that accumulate across the individual's life course is important if not essential. By neglecting to take account of these factors, research findings can be misleading and thus not reflective of the actual situation.

**Table 2.5 Health Determinants by Effect on Health.**

| Health determinant | Effect on health | | |
|---|---|---|---|
| | **Positive** | **Negative** | **Mixed** |
| Individual and household level determinants | | | |
| Age (older) | | ✓ | |
| Gender | | | ✓ |
| Marital status and living arrangements | ✓ | | |
| Religion | | | ✓ |
| Ethnicity | | | ✓ |
| Behavioural factors | | | |
| Tobacco smoking | | ✓ | |
| Physical activity | ✓ | | |
| Alcohol consumption | | | ✓ |
| Dietary habits | | | ✓ |
| Socioeconomic factors | | | |
| Employment status | | | ✓ |
| Work factors | | ✓ | |
| Socioeconomic status (low) | | ✓ | |
| Deprivation (high) | | ✓ | |
| Housing (poor) | | ✓ | |
| Area, environment and population factors | | | |
| Environment | | | ✓ |
| Migration | | ✓ | |
| Transport | | | ✓ |
| Crime and violence | | ✓ | |

## Part B Health determinants of health workers

In part B of this chapter, the health determinants of nurses are examined highlighting large gaps in the literature. The literature is discussed below on gender, behavioural factors (same as in section 2.7), socioeconomic factors (e.g. income, physical violence or verbal abuse, physical job conditions, sharps, chemical or allergenic hazards, working hours and meal breaks), and the potential effect of the smoking ban on nurses' health.

### 2.11 Male-female distribution among nurses, care workers and teachers

Unlike many other occupations, nurses and nursing and midwifery professionals, nursing auxiliaries, care workers, care assistants and home carers, caring personal services and teachers, attract a disproportionately high number of female workers. For example, the Royal College of Nursing ([RCN], 2015) estimated that females accounted for almost 90 percent of nursing professionals and 80 percent of nursing auxiliaries/assistants in the UK workforce. Teaching professionals are the closest occupation to employ a disproportionally high number of female workers with 74 percent of the workforce being female (Department for Education, 2013). A large proportion of females within teaching professionals will be primary teaching educational professionals. Adjusting for these gender differences is therefore important when comparing nurses to care workers, health professionals, other health professionals and secondary educational teaching professionals to produce more accurate and reliable findings.

## 2.12 Behavioural factors exhibited among nurses

There is some evidence to indicate a relationship between health behaviours and health among nursing professionals (Pappas et al., 2005; Perry, Gallagher and Duffield, 2015). However, there is little evidence in the literature on the effects of tobacco smoking, alcohol consumption, physical activity and fruit and vegetable intake on the health of nurses. Relying on a few references limits our confidence that what we have found in the literature is an accurate and reliable reflection of the impact of health behaviours on nurses' health. The extent to which the findings presented below are applicable to the UK and to Scotland is not certain.

### 2.12.1 Tobacco smoking among nurses and health

Evidence suggests that tobacco smoking is associated with an increased risk of chronic disease but not self-assessed health among nurses (Pappas et al., 2005; Perry et al., 2015). A cross-sectional study of 381 nurses in two Sydney metropolitan hospitals using self-completed questionnaires found a risk factor of 6.8 percent for chronic disease among daily smokers compared to non-smokers (Perry et al., 2015). Conversely, the rate of lower back pain in Iranian nurses was higher among non-smokers, 73.6 percent (95% CI 68.8, 78.5%, $p$ = 0.0001) (Azizpour, Delpisheh, Montazeri and Sayehmiri, 2017). Another cross-sectional study (Pappas et al., 2005) of 353 hospital nurses in North West Greece using self-completed questionnaires reported no significant association between smoking and self-assessed health status. These findings are potentially confounded by gender, age and study setting (e.g. hospitals). Controlling for tobacco smoking status in research on the health of nurses is important to explain differences in health status seen.

### 2.12.2 Physical activity among nurses and health

Evidence has shown that physical inactivity is linked to both an increased risk of chronic disease and good self-assessed health among nurses. Compared to individuals engaging in >150 minutes of moderate to vigorous activity per week, those engaged in <150 minutes of moderate to vigorous activity per week had an increased risk factor of 18.0 percent for the development of chronic disease (Pappas et al., 2005). A positive association between physical activity and self-assessed health ($p<0.001$) has also been reported, with those reporting to engage in physical activity more likely to report good self-assessed health (Pappas et al., 2005). These findings are potentially confounded by gender and age. Examining physical activity in relation to self-assessed health and specific health conditions in nurses is important to ascertain a more detailed understanding of the health of this workforce.

### 2.12.3 Alcohol consumption among nurses and health

Alcohol consumption has been associated with an increased risk of chronic disease (Perry et al., 2015) and shown to be unrelated to self-assessed health status (Pappas et al., 2005). A cross-sectional study (Perry et al., 2015) of hospital nurses in Sydney reported an association between alcohol consumption and chronic disease. More specifically, the study reported a 34.7 percent chronic disease risk factor for risky alcohol consumption – ≥5 alcoholic drinks per day more than once per month. Despite this association, Pappas et al.'s (2005) cross-sectional study of nurses found no significant association between self-assessed health status and alcohol consumption. This may be due to differences in geographical locations, the years the studies were conducted in or confounders that failed to be adjusted for in each study.

Examining nurses' health by alcohol consumption level in Scotland can make an important contribution to knowledge.

### 2.12.4 Dietary habits among nurses and health

There is evidence to show that dietary habits such as fruit and vegetable consumption are associated with health. Low consumption of fruit (<2 pieces of fruit per day) among Sydney nurses has been reported to have a risk factor for chronic disease of 81.9 percent and low vegetable consumption (<5 servings of vegetables per day) of 90.6 percent (Perry et al., 2015). Examining the health of nurses in relation to fruit and vegetable consumption is important to aid the explanation of the differences identified.

## 2.13 Socioeconomic factors among nurses

There are seven main socioeconomic factors that are examined in the literature in relation to nursing professionals: health literacy; income; physical violence or verbal abuse; physical job conditions; sharps; working hours; and meal breaks.

### 2.13.1 Income and health among nurses

The average wage of nursing professionals is below that of teaching professionals who have a similar level of education and workplace responsibility. Registered nurses are paid on average £21,909 to £41,373 (RCN, 2015) compared to teaching professionals who are paid on average £22,500 to £59,000 (National Careers Service, 2016). Nevertheless, health workers, such as nursing professionals and nursing auxiliaries/assistants in the NHS and other health care settings have experienced a cumulative real term drop between 9.2 percent and 9.6 percent in median weekly earnings between 2008 and 2014 for full-time workers and between 6.2 percent and 7.1 percent in part-time workers for the same period.

### 2.13.2 Physical violence or verbal abuse and health among nurses

A considerable number of nurses experience physical violence or verbal abuse from patients, service users or their relatives (Woodrow and Guest, 2012) at one point in their career, negatively impacting on health. A cross-sectional study of 9,611 public sector workers in Sweden (Vaez, Josephson, Vingård and Voss, 2014) found that a third of employees reported exposure to or threat of violence at work. Irrespective of gender, age, hours of work, night shift, and type of occupation, work-related violence was associated with less-than-good (fair and poor) self-assessed health on a scale of good health (excellent, very good and good) and less-than-good health (fair, poor) – psychiatric nurses (OR= 3.19; 95% CI 1.28, 7.98), medical doctors/dentists (OR=2.46; 95% CI 1.35, 4.49), compulsory school teachers (OR=2.14; 95% CI 1.33, 3.45), and other nurses (OR=1.87; 95% CI 1.23, 2.84). However, caution is required when interpreting these results as the questionnaire used was created for a different purpose than that of this study. Woodrow and Guest (2012) show that other consequences of physical violent or verbal abuse include increased stress, anxiety, depression, burnout/turnover and decreased job satisfaction.

### 2.13.3 Physical job conditions and health among nurses

The physical job conditions associated with a nurse's role have the potential to adversely affect health, particularly in relation to musculoskeletal health contributing to workplace absence. For example, environmental and mechanical hazards including manual handling (Smedley et al., 1995), patient transfers (Trinkoff et al., 2003), awkward postures (Ngan et al., 2010), heavy lifting (Trinkoff et al., 2003), and slips and falls (Ngan et al., 2010) have been associated with musculoskeletal injury among nurses. More specifically, the strongest association for neck (OR=6.20; 95% CI 3.76, 10.19), shoulder (OR=6.31; 95% CI 3.74, 10.64) and back (OR=4.8; 95% CI 3.00, 7.92) musculoskeletal disorders were working for long periods with head or arms in awkward positions (Trinkoff et al., 2003). Musculoskeletal complaints represent a major risk for nurses, particularly nursing professionals and care workers (Reme et al., 2014) involving one of the highest rates of non-fatal injuries and illnesses involving days off work (Callison and Nussbaum, 2012).

### 2.13.4 Sharps and health among nurses

There is evidence to indicate that nurses are at increased risk of sharps injuries due to the nature of their role. A narrative literature review (Elseviers et al., 2014) reported that handling of sharps, such as needles and ampoules, represented a major risk for nurses. The occupational setting will likely have an effect on the level of risk of sharps injuries (e.g. theatre, care of the elderly, and community). In 2008, sharps injuries, including needle stick injuries, were estimated to have affected around 48 percent of nurses (Ball and Pike, 2008) exposing them to more than 20 pathogens (Elseviers et al., 2014). Other implications of sharps injuries include psychological harm inducing emotional responses including depression, sleeping or eating abnormalities, relationship issues, panic attacks, excessive anxiety and an inability to work (Costigliola et al., 2012).

### 2.13.5 Chemical and allergenic hazards and health among nurses

The chemical and allergenic hazards nurses are regularly presented with can include medications, solutions and gases, which are potentially toxic or an irritant to the body system. Occupational contact dermatitis is common, estimated to affect up to 30 percent of nurses (Moline et al., 2014). A cross-sectional study of the last 1,000 severe cases of occupational contact dermatitis seen at one occupational department in Denmark (Schwensen et al., 2013) reported that the incidence rate per 10,000 workers per year among female workers was 3.4 for nurses and nursing assistants (95% CI 2.9, 4.0) and 6.7 for physicians (95% CI 3.2, 10.2). Among male health workers, the incidence for nurses and nursing assistants was 1.1 (95% CI <0.001, 2.2) and physicians 4.5 (95% CI 1.6, 7.4). Small sample sizes can have large errors and hence confidence intervals. In some instances if the confidence interval contains zero that is indicative of no effect but in logistic regression a confidence interval containing one indicates no difference in odds.

### 2.13.6 Working hours and health among nurses

There has been considerable research conducted into the association between health and working hours among nurses largely from a patient safety and patient outcome perspective rather than from a worker's perspective. Almost half of the nurses in Scotland (49%) reported to work 12-hour shifts compared to over a quarter (28%) of nurses in the UK (Ball and Pike, 2009). The proportion of workers working 12-hour shifts is likely to be lower for many other health professionals (e.g. GPs, physiotherapists, occupational therapists) who often work Monday to Friday, 9am to 5pm. Nonetheless, for some workers, longer shifts are preferred requiring people to work fewer shifts and thus have more days off.

### 2.13.7 Meal breaks and health among nurses

The length and availability of breaks are an important factor for the health and wellbeing of workers such as nurses (Nejati, Shepley and Rodiek, 2016). There is some evidence to indicate that nurses may be sacrificing their own health for the benefit of their patients. An estimated 70 percent of nurses (Sarna et al., 2009) frequently skip meal breaks to deliver patient care (Rogers, Hwang and Scott, 2004), with non-smokers almost twice as likely to miss breaks compared to smokers (Sarna et al., 2009). While this evidence is generally weak, it is nonetheless an important factor to consider when examining the health and health behaviours of nurses.

## 2.14 Potential effect of smoking ban on nurses' health

The introduction of the smoking ban in public places, including hospital premises, in 2006 will likely have had a positive effect on the health of many public sector workers in relation to exposure to second-hand smoke. Some workers in health occupations, such as nursing professionals and care workers, were unnecessarily exposed to second-hand smoke on a regular basis from their patients who requested to be taken outside for a cigarette. In addition, many hospital entrances pre-smoking ban were congested with smokers with hospital staff required to walk through this second-hand smoke to get to work. There is currently no available evidence on the effect of the smoking ban on the health of nurses and other public health sector workers.

## 2.15 Part B summary of the association between determinants of health among nurses

In summary, part B of this chapter examined available literature on the health determinants among nurses and in doing so has highlighted a gap in existing knowledge. It is apparent from this section that there are several factors associated with the nurse's role that have the potential to impair health. However, evidence in this area is somewhat lacking and further research is needed to address this gap. More specifically the health profile of nurses and the association between health and health behaviours and workforce exit is required.

## 2.16 Conclusion on the determinants of health of workers

From a review of the literature on the health and health determinants of health workers in the UK, the nature and quality of data currently available relating to the health of workers in general and nurses was established. Confounders were identified which will be controlled for in the analysis presented in Chapters 5 to 8, this alone contributing to knowledge. Confounders include gender, age, ethnicity, occupation, working hours, self-assessed health, health behaviours, presence of a health condition, satisfaction with life, and, child dependants. From the review it can be seen that research in this area is lagging behind that of workers in general. To examine this further, a comprehensive review of international literature on four key health behaviours associated with morbidity was undertaken. The findings from this review are presented in the next chapter providing the most comprehensive picture to date of nurses' health behaviours internationally. By drawing on a health literate group, nurses, this report explored the impact of health education on health behaviours. This is important as, with health behaviours, this is one risk factor that people have more power to change than any other health determinant and, hence, these are often the focus of health promotion and intervention activities.

Having provided a general overview of the literature on health determinants it is possible to begin to focus more specifically on what is already known about the population this thesis is concerned with, namely nurses and related health professional. The following chapter describes the methods and findings of an integrative review focussed on this issue.

# Chapter 3 Study One: Nurses' health-related behaviours: integrative review

This chapter builds on the wider review of the literature on determinants of health in order to address the thesis' first research question: What is the international evidence of the prevalence of tobacco smoking, physical activity, alcohol consumption, and dietary habits, specifically sugar, fat and fruit and vegetable intake, among nurses and student nurses? The methods, and justification for the approach are provided prior to a report of the findings of the review.

## 3.1 Introduction

Given the importance of a nurse's own health status for health service delivery and continuous employment, identifying and understanding the causes of poor health is crucial. Unhealthy behaviours such as tobacco smoking, physical inactivity, excessive alcohol consumption, and dietary habits, including consumption of foods high in sugar and fat and low in fruit and vegetables, are known to contribute to poor health and workforce exit; yet the extent to which the nursing workforce engages in these behaviours and how this varies between countries remains less clear. Increasing demand for nursing care coupled with a shortage of nurses worldwide (Rodgers, Stenhouse, McCreaddie and Small, 2013) has contributed to the timely need to understand the influence health behaviours have on the health of the nursing workforce for three main reasons: Firstly, to enable targeted interventions to address these negative behaviours; secondly, that nurses may be role models for these behaviours for their patients; and thirdly, to improve the health of the workforce and thus reduce sickness absence and early exit from the workforce.

However, to date, there has not been a comprehensive and comparable assessment of nurses' health-related behaviours internationally to inform the development of, or support, behavioural change interventions among the nursing workforce.

## 3.2 The review

**Aim**

The aim of this quantitative literature review was to numerically analyse the prevalence of nurses' health-related behaviours by critically appraising international studies on tobacco smoking, physical activity, alcohol consumption and dietary habits, including sugar and fat intake and fruit and vegetable consumption. In doing so, this review contributes to the understanding of health-related behaviours in the international nursing workforce and addresses the research question, what is the prevalence of tobacco smoking, physical activity, alcohol consumption, and dietary habits, specifically sugar, fat and fruit and vegetable intake, among nurses internationally?

**Design**

This quantitative integrative review was conducted in accordance with the study protocol published in the Journal of Advanced Nursing (Neall, Atherton and Kyle, 2016) in which design details are provided (shown in Appendix ii). However, briefly, this study was conducted in accordance with the Joanna Briggs Institute (JBI) guide for prevalence and incidence studies handbook (Munn, Moola, Riitano and Lisy, 2014) and reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist (Moher, Liberati, Tetzlaff and Altman, 2009).

**Search methods**

A systematic search of literature published between January 2000 and December 2016 and indexed in the electronic databases Medical Literature Analysis and Retrieval System (MEDLINE), Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Psychological Information (PsycINFO) was conducted. Literature published before January 2000 was rejected to ensure findings were current and up-to-date. Other electronic databases were considered and rejected for two main reasons: (1) did not produce results meeting the inclusion criteria and (2) databases produced no additional literature not retrieved in the identified databases. Grey literature was excluded from this review due to the vast number of relevant published results retrieved and the assumption that there would be little advantage to or impact on the review findings. The search strategy was built around nurses and student nurses and health-related behaviours. Search terms included: ‘nurses’, ‘students’, ‘nursing’, ‘life style’, ‘health status’, ‘health behavior’, ‘physical fitness’, ‘exercise’, ‘alcohol drinking’, ‘substance abuse’, ‘smoking or smoking cessation’, ‘food habits’, ‘diet’, and ‘body weight’. Boolean operators were used to combine terms. An example of the full search strategy used in this review can be found in the review protocol (Neall et al., 2016) or in Appendix ii. All studies included in this review are original studies published in peer-reviewed journals.

All retrieved literature was assessed for eligibility by a single reviewer (Rosie Neall) using the predetermined criteria shown in Table 3.1 for which further information can be found in the protocol (Neall et al., 2016). The following criteria was used in this review: (i) studies using a cohort, case-control or cross-sectional study design; (ii) participants included qualified nurses and student nurses; (iii) studies that examined percentage of participants who engaged in a health-related behaviour, such as tobacco smoking, physical activity, alcohol consumption or dietary habit, including sugar and fat intake or fruit and vegetable consumption; (iv) articles published in English; and (v) studies published between 1 January 2000 and 31 December 2016.

**Table 3.1 Study Inclusion and Exclusion Criteria.**

| | **Inclusion criteria** | **Exclusion criteria** |
|---|---|---|
| Study type | Cohort studies, case-control studies, and cross-sectional studies | Qualitative studies and systematic reviews |
| Participants | Qualified (post-registration) and student (pre-registration) nurses | All other participant type |
| Outcome | Tobacco smoking, physical activity, alcohol consumption and dietary habits (sugar, fat and fruit and vegetable intake) | Studies not focusing on one or more of the inclusion outcomes |
| Language | English | Any language other than English |
| Publication date | 1 January 2000–-31 December 2016 | Studies published before 1 January 2000 and after 31 December 2016 |

Taken from Nurses' health-related behaviours: protocol for a quantitative systematic review of prevalence of tobacco smoking, physical activity, alcohol consumption and dietary habits (Neall et al., 2016).

**Search outcomes**

Application of the search strategy yielded 2,279 potentially relevant studies. The selection process is shown in Figure 3.1. Following importing of these studies into the reference management system Endnote (Thomson Reuters, Philadelphia, PA, USA) and duplicates removed, 1,984 potentially relevant studies remained. A further 45 duplicates were removed by hand, providing a final total of 1,939 studies. These studies were then screened by title and abstract for eligibility using the predetermined eligibility criteria shown in Table 3.1, resulting in the removal of 1,703 studies. All remaining studies were assessed for eligibility by their full-text which provided a sample of 156 studies that are included in this review.

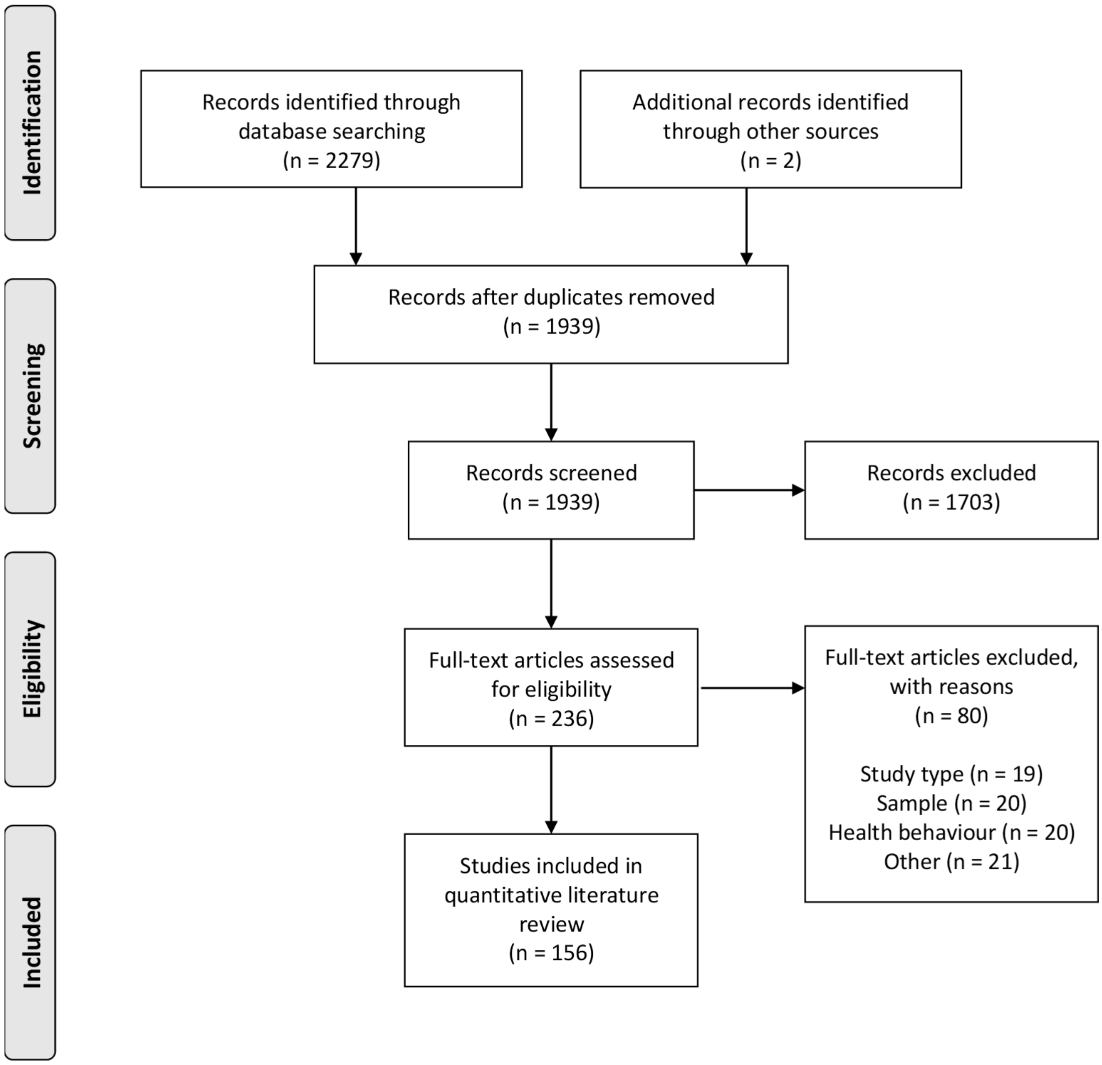



**Figure 3.1 PRISMA Flow Diagram.**

## Quality appraisal

The quality and risk of bias were assessed by one reviewer (Rosie Neall) for all 156 remaining studies using a JBI validated tool for quality appraisal of studies in systematic reviews of prevalence data (Munn et al., 2014). Although this study is not a systematic review, the rigorous process strengthens this literature review. The precise questions asked and the combination of yes answers to sub-questions that constituted a yes response to the main question is provided in Appendix iii to enable future replicability. No studies were excluded on the basis of quality.

## Data extraction

Data was extracted from all remaining studies based on the guidance from the JBI Data Extraction Form for Prevalence and Incidence Studies (2014) and collated in Microsoft Excel. Extracted study characteristics included: study details (study title, author, year, journal), study characteristics (study type, data collection method, year of data collection, setting), participant characteristics (type of participants, sample size, characteristics, gender, age group, nationality, nursing speciality), and outcomes and authors' conclusions (response rates, health behaviour measured, prevalence of health behaviour, unit of measurement).

## Synthesis

Synthesis of results is presented below in three stages. First, a descriptive summary of extracted data from eligible studies is presented, tabulating details about study type, outcome measures, geography, and quality assessment. Second, a narrative synthesis is presented on tobacco smoking, physical activity, alcohol consumption and each dietary habit in the global nursing workforce. Third, health-related behaviours exhibited by qualified and student nurses is narratively compared and subgroup analysis reported by gender and country. Finally, strengths and limitations of the review are identified and the implications of this review for future research, education, policy and practice discussed.

*Subgroup analysis*

Subgroup analysis was conducted by gender and country. Gender was further broken down by female nurses vs. male nurses and female student nurses vs. male student nurses. Countries were aggregated into three groups in accordance with The World Bank country classification by gross national income (GNI) per capita for the 2015 fiscal year (The World Bank, 2015). These included: high-income (GNI per capita >US $12,745), medium-income (US $1,045-US $12,745), and low-income (<US $1,045).

## 3.4 Results

### 3.4.1 Study selection

The exact number of studies excluded at each stage of the review is shown in Figure 3.1. Briefly, 80 full-text studies were excluded based on sample (n=20), health-related behaviour (n=20), study design (n=19) and other (n=21). One hundred and fifty-six studies remained.

### 3.4.2 Study characteristics

Over a quarter of studies were conducted in the USA (shown in Table 3.2). Over half (n=108, 69.2%) of studies examined qualified nurses. The proportion of women in study samples ranged between 43.3 percent and 100 percent with a mean age reported in studies of between 20.1 and 56.8 years. Studies generally used questionnaires (n=151, 96.8%) with a minority using diary/interviews (n=5, 3.2%). Of the studies included, 25 were cohort studies, 1 case-control study, and 130 cross-sectional studies.

**Table 3.2 Study Characteristics.**

| Country | Number (%) |
|---|---|
| USA | 42 (26.9) |
| China | 10 (6.4) |
| Greece | 4 (2.6) |
| Australia | 7 (4.5) |
| Canada | 5 (3.2) |
| Turkey | 8 (5.1) |
| Denmark | 4 (2.6) |
| Japan | 9 (5.8) |
| United Kingdom | 2 (1.3) |
| England | 4 (2.6) |
| Ireland | 6 (3.8) |
| Wales | 1 (0.6) |
| Italy | 5 (3.2) |
| Spain | 5 (3.2) |
| Germany | 2 (1.3) |
| Brazil | 3 (1.9) |
| France | 1 (0.6) |
| Iran | 2 (1.3) |
| Israel | 2 (1.3) |
| New Zealand | 2 (1.3) |
| Sweden | 1 (0.6) |
| Korea | 3 (1.9) |
| Taiwan | 2 (1.3) |
| Jordan | 2 (1.3) |
| Lithuania | 1 (0.6) |
| Hungary | 1 (0.6) |
| Norway | 2 (1.3) |
| Kuwait | 1 (0.6) |
| Syria | 1 (0.6) |
| Thailand | 2 (1.3) |
| Balkans | 1 (0.6) |
| Serbia | 1 (0.6) |
| Iceland | 2 (1.3) |
| Poland | 3 (1.9) |
| Other ((1) United Kingdom, China, USA; (2) United Kingdom, Taiwan, Japan, Korea, Canada, USA; (3) United Kingdom, Australia, New Zealand; (4) Australia, New Zealand; (5) Canada, Jordan; (6) 39 countries) | 6 (3.8) |
| Unknown | 3 (1.9) |

### 3.4.3 Risk of bias within studies

The risk of bias for each study was calculated with the total count for each question presented in Table 3.3. From Table 3.3, it can be seen that most studies described study subjects and settings in detail (n=146, 93.6%). Studies were generally representative of the target population (n=153, 98.1%) and had sufficient coverage

**Table 3.3 Percentage of Studies with Yes Response to Each Risk of Bias Question.**

| | Question | Yes responses No. (%) |
|---|---|---|
| A | **Was the sample representative of the target population?** | 153 (98.1) |
| A1 | Was the sample representative of the study aims? | |
| B | **Were participants recruited in an appropriate way?** | 105 (67.3) |
| B1 | Census/routinely collected data | |
| B2 | Registrants' lists sampled at random or as whole. | |
| C | **Was the sample size adequate?** | 19 (12.2) |
| C1 | Calculation reported | |
| C2 | National survey (sample size calculation not required). | |
| D | **Were the study subjects and the settings described in detail?** | 146 (93.6) |
| D1 | Sample characteristics | |
| D2 | Setting characteristics. | |
| E | **Was the data analysis conducted with sufficient coverage of the identified sample?** | 121 (77.6) |
| E1 | Response rate reported | |
| E2 | Response rate acceptable for method used | |
| E3 | Non-response explained and justified. | |
| F | **Were objective, standard criteria used for the measurement of the condition?** | 67 (42.9) |
| F1 | Validated instrument used | |
| F2 | Standard criteria used. | |
| G | **Was the condition measured reliably?** | 3 (1.9) |
| G1 | Measured by interviewer | |
| G2 | Self-reported | |
| G3 | Method of measurement justified. | |
| H | **Was there appropriate statistical analysis?** | 11 (7.1) |
| H1 | Adequate description of measures | |
| H2 | Appropriate use of statistical methods | |
| H3 | Description of how missing data was handled. | |

**Table 3.3 Percentage of Studies with Yes Response to Each Risk of Bias Question Continued.**

| | Question | Yes responses No. (%) |
|---|---|---|
| J | **Are all important confounding factors/subgroups/differences identified and accounted for?** | 31 (19.9) |
| J1 | Potential confounders identified | |
| J2 | Statistical modelling conducted to control for confounders. | |
| K | **Were subpopulations identified using objective criteria?** | 116 (74.4) |
| K1 | Subgroups created using objective criteria. | |

of the identified sample (n=121, 77.6%). Most studies used objective measures to identify subgroups (n=116, 74.4%) and participants were recruited in an appropriate way (n=105, 67.3%). Objective, standard criteria were used to measure the prevalence of health-related behaviours by under half of studies (n=67, 42.9%) and a fifth identified all important confounders (n=31, 19.9%). A minority of studies provided a sample size calculation or used a national survey (n=19, 12.2%), adequate description and use of statistically methods (n=11, 7.1%), and provided a justification for the prevalence of health-related behaviour measures used in the study (n=3, 1.9%). While studies varied in their risk of bias, the findings on prevalence of health-related behaviours were assessed by the reviewer as reliable.

### 3.4.4 Synthesis of results

*Descriptive statistics*

Of the 156 studies included in this review, 113 examined tobacco smoking, 64 physical activity, 52 alcohol consumption, and 18 dietary habits (3 sugar, 7 fat, 16 fruit and 13 vegetable consumption). To enable comparability between studies, this literature review will only synthesise studies that report prevalence as percentages rather than subjective scale measurements.

*Narrative synthesis*

Health-related behaviours by qualified and student nurses are presented below. Where possible, findings are presented by whether each group engaged in appropriate levels of healthy behaviours or if there was the presence of an unhealthy behaviour such as tobacco smoking. The challenge with this integrative review is that government definitions about what is healthy varies by country and is not provided by each paper. This has meant that findings are generally not presented by whether they met respective government guidelines but rather whether they engaged in the health behaviour and the amount or frequency consumed.

Tobacco smoking

Sixty-six studies (shown in Appendix iv) reported smoking behaviours in qualified nurses. Measurements used to measure smoking prevalence were smoker yes vs. no and non-smoker vs. occasional, frequent, heavy smoker. Prevalence of smoking in registered nurses internationally ranged between 2 in 100 (0.2%) (Yang, Yang, and Pan, 2001) and seven in ten (70.5%) (Kenna and Wood, 2004).

Forty-nine studies (shown in Appendix iv) reported smoking behaviours in student nurses. Similar to qualified nurses, measurements used to measure smoking prevalence were smoker yes vs. no and non-smoker vs. occasional, frequent, heavy smoker. Prevalence of smoking in student nurses internationally ranged from 0.3 percent (Klainin-Yobas, He and Lau, 2015) to 50.8 percent (Andrea, Walter, Elena, Alfea and Piersante, 2001).

Physical activity

Thirty-eight studies (shown in Appendix v and Table 3.4) reported physical activity in qualified nurses. Measures used varied, hindering easy comparisons between studies, for example mean hours of physical activity. Measurements included times per week, yes vs. no, and met their government guidelines. Eighty-nine percent of qualified nurses reported to meet government recommendations for physical activity (Flannery, Burket and Resnick, 2014). Almost 55 percent (Malik, Blake and Batt, 2011) of nurses reported to engage in 30 minutes' physical activity most days of the week and 25.1 percent (Friis, Ekholm and Hundrup, 2005) did heavy exercise for four or more hours a week.

**Table 3.4 Summary of Physical Activity Prevalence.**

| Country | Study | Qualified nurse | Student nurse | Prevalence |
|---|---|---|---|---|
| Canada | Chow & Kalischuk (2008) | | ✓ | 47% exercised 2–3 times per week for 30 to 60 minutes. |
| Denmark | Friis et al. (2005) | ✓ | | 25.1% engaged in heavy exercise ≥4 hours per week. |
| England | Blake et al. (2011) | | ✓ | 46.0% engaged in physical activity. |
| | Malik et al. (2011) | ✓ | ✓ | 51.4% of respondents engaged in physical activity ≥30 minutes most days of week (54.6% registered nurse, 46% pre-registered nurse). |
| Italy | Quattrin et al. (2010) | | ✓ | 66.4% reported to engage in physical activity. |
| UK | Blake & Harrison (2013) | | ✓ | 55.1% of respondents meet recommendations for physical activity. |
| USA | Flannery et al. (2014) | ✓ | | 89.2% met guidelines of physical activity 30 minutes or more 5 times a week. |
| | Shriver & Scott-Stiles (2000) | | ✓ | 22.5% in time 1 reported to exercise at least 3 times per week and 29.8% in time 2. |

Twenty-seven studies (shown in Appendix v and Table 3.4) reported physical activity in student nurses. The unit of measurement differed between studies hindering simplistic comparisons between studies. Between 29.8 percent (Shiver and Scott-Stiles, 2000) and 66.4 percent (Quattrin, Zanini, Zamolo and Brusaferro, 2010) of student nurses reported to engage in physical activity with between 46.0 percent (Blake, Malik, Mo and Pisano, 2011) and 55.1 percent (Blake and Harrison, 2013) found to meet government recommendations of 30 minutes five times a week. Nonetheless, 46 percent (Malik et al., 2011) reported to engage in 30 minutes of physical activity most days of the week. This is confirmed by findings by Chow and Kalischuk (2008) who found that 47 percent of student nurses reported exercising two to three times per week for 30 to 60 minutes.

Alcohol consumption

Twenty-six studies (shown in Appendix vi) reported alcohol consumption in qualified nurses. Measurements of the amount of alcohol consumed varied between studies with units of alcohol merged prior to being reported, hindering and, in some cases, preventing combination comparisons between studies. The proportion of qualified nurses internationally who reported to consume alcohol ranged between 11.1 percent (>15g/day) (Kenfield et al., 2010) and 93 percent (any use) [(and Wood, 2004). There was a wide variation in the number of people who reported themselves to be regular drinkers from 3.8 percent (Yang et al., 2001) to 48.5 percent (Kim et al., 2013). Between 0.8 percent (past month) (Kenna and Wood, 2004) and 17 percent (past year) (Trinkoff et al., 2000) of qualified nurses were categorised as heavy users consuming five or more drinks per typical occasion.

Twenty-seven studies (shown in Appendix vi) reported alcohol consumption in student nurses. The prevalence of student nurses who reported to consume any alcohol ranged widely from 5.8 percent (Ahmadi, Maharlooy and Alishahi, 2004) to 94.1 percent (Blake et al., 2011). Measurements of the amount of alcohol consumed varied between studies, hindering simplistic comparisons. For example, some studies reporting heavy episodic vs. heavy use while other reported risk level. For comparability, only those reporting times per week will be reported in the text. Fifteen percent (Evagelou et al., 2014) and 31 percent (Blake and Harrison, 2013) of student nurses in two different studies reported to consume alcohol three to four times a week. Fifty-nine percent reported moderate and 33 percent heavy alcohol use (Hensel, Middleton and Engs, 2014).

Dietary habits

Ten studies (shown in Appendix vii) reported dietary habits in qualified nurses, specifically one on sugar intake, four on fat consumption, ten on fruit intake and eight on vegetable intake. Some studies reported combined prevalence of fruit and vegetables while others provided these figures separately, obscuring comparisons between papers.

Sixty-one percent reported to consume foods high in fat and sugar a few times a week, 30.7 percent once a week, and 5.6 percent two to three times a day (Malik et al., 2011). Between less than 0.1 percent (Happell, Gaskin, Reid-Searl and Dwyer, 2014) and 4.7 percent (Fair et al., 2009) reported to consume five or more portions of fruit a day. Between 10.4 percent (Fair et al., 2009) and 15 percent (Happell et al., 2014) of nurses reported to consume five or more portions of vegetables a day. Ten percent of nurses reported rarely consuming five portions of fruit and vegetables a day, 47.7 percent sometimes, and 40.3 percent every day (Malik et al., 2011).

Nine studies (shown in Appendix vii) reported dietary habits in student nurses, specifically three on sugar intake, five on fat consumption, and seven on fruit and five vegetable intake. Some studies reported combined prevalence of sugar and fat intake while others provided these figures separately and this was similar for fruit and vegetables, obscuring comparisons between papers.

Twenty-three percent of student nurses reported to consume foods high in sugar, every day (Blake and Harrison, 2013) and 22.4 percent foods high in fat every day (Blake and Harrison, 2013). Thirty-nine percent (Malik et al., 2011) of student nurses reported to consume sugar and fat once a day and 15 percent (Blake et al., 2011; Malik et al., 2011) two to three times a day. Those reporting to consume five fruit portions on six to seven days was 41.6 percent (Quattrin et al., 2010). Those reporting to consume any vegetables seven times a week was 39.2 percent (Evagelou et al., 2014). Between 23.1 percent (Blake et al., 2011; Malik et al., 2011) and 27.4 percent (Blake and Harrison, 2013) of student nurses reported to consume five portions of fruit and vegetables every day. Student nurses reported to consume a mean of 4 portions of fruit and vegetables per day (Zapka, Lemon, Magner and Hale, 2009).

*Analysis by The World Bank country income categories*

Analysis was carried out by gender (women vs. men) and country (low-income vs. middle-income, high-income) for qualified and student nurses. Of the 156 studies included in this review, 108 were on female nurses and 50 on female student nurses, 120 were on high-income countries, 26 on middle-income countries, one on a low-income country. Eight studies looked at a mixture of countries; however, the results for these countries were not presented separately and thus have been removed from this sub-analysis. Not doing so would cause bias in the findings.

Tobacco smoking

Sixty-six studies measured smoking behaviours in qualified nurses42 on women and 24 on men in high-income countries, 11 women and ten men in middle-income countries and one on women and men from low-income countries. Prevalence of smoking in registered nurses in high-income countries ranged from 0.2 percent (Yang et al., 2001) to 46 percent (Tselebis, Panaghiotou, Theotoka and Ilias, 2001) for women and 4 percent (Fair et al., 2009) to 32.2 percent (Fathallah, Maurel-Donnarel, Baumstarck-Barrau and Lehucher-Michel, 2012) for men. In middle-income countries, between 2.1 percent (An et al., 2014) and 46.7percent (Merrill, Gagon, Harmon and Milovic, 2010a) of women smoked and between 29.5 percent (Fernades et al., 2013) and 51.9 percent (Merrill et al., 2010a) of males smoked. In low-income countries, 17.4 percent of women and 48.1 percent of males reported to smoke (Asfar, Al-Ali, Ward, Vander Weg and Maziak, 2011).

Forty-nine studies measured smoking behaviours in student nurses, 38 on women and 35 on men in high-income countries and six women and men in middle-income countries. Prevalence of smoking in student nurses in high-income countries ranged from 10.8 percent (Smith and Leggat, 2007) to 42.0 percent (Melani et al., 2000) for women and 17.8 percent (Fernández et al., 2015) to 53.0 percent (Biragh and Torttorano, 2010) for men. Similar findings were found for women in middle-income countries with between 3.5 percent (Yiğitalp, 2015) and 19.4 percent (Ahmadi et al., 2004) reporting to smoke. Among males in middle-income countries, between 21.9 percent (Yiğitalp, 2015) and 59.3 percent (Ahmadi et al., 2004) reported to smoke.

Physical activity

Thirty-eight studies measured engagement in physical activity in qualified nurses, 29 on women and 15 on men in high-income countries and three women and one on men in middle-income countries. Prevalence of women who reported to engage in any leisure time physical activity in high-income countries varied from 21 percent (James et al., 2013) to 87.2 percent (Fair et al., 2009). In middle-income countries, between 41.8 percent (Fernandes et al., 2013) and 90.3 percent (Fair et al., 2009) of males reported to engage in any leisure time physical activity and 49.1 percent (Fernandes et al., 2013) of women. No other comparable figures were identified for women.

Twenty-seven studies measured engagement in physical activity among student nurses, 18 on women and 15 on men in high-income countries and six on women and five on men in middle-income countries. However, no studies reported the prevalence for women and men separately in middle-income countries. One study reported (Lehmann, von Lindeman, Klewer and Kugler, 2014) that 85.4 percent of women engaged in over one hour of physical activity a week and 51.8 percent in two or more hours a week.

Alcohol consumption

Twenty-six studies measured alcohol consumption in qualified nurses, 21 on women and eight on men in high-income countries and two on women and men in middle-income countries. Prevalence of alcohol consumption in registered nurses varied from 11.1 percent (Kenfield et al., 2010) to 77.2 percent (Fair et al., 2009) for women and 66.7 percent (Fair et al., 2009) for men in high-income countries. No other comparable figures were identified for men. Among middle-income countries, 61 percent of women and 72.7 percent of men (Fernandes et al., 2013) reported to consume alcohol.

Twenty-seven studies measured alcohol consumption in student nurses, 21 on women and 19 on men in high-income countries and four on women and men in middle-income countries. Among high-income countries, the prevalence of alcohol consumption in student nurses was reported between 2.6 percent (Ahmadi et al., 2004) and 72.6 percent (Lehmann et al., 2014) for women and 23.7 percent (Ahmadi et al., 2004) for men. No other comparable figures were identified for men. Thirty-eight percent of women and 57 percent of men reported to consume a moderate amount of alcohol (Evagelou et al., 2014).

Dietary habits

Ten studies measured dietary habits in qualified nurses, nine of which were based on high-income countries. There were no studies that reported by women and men on sugar intake, three studies on women reported fat consumed and two on men, eight on women and four men for fruit, and six on women and four on men for vegetable intake. All except one were based on samples from high-income countries. Twenty-eight percent of women (Fair et al., 2009) and 31 percent of men (Fair et al., 2009) reported to consume butter. Almost all women (98.3%) (Fair et al., 2009) and men (96.2 %) (Fair et al., 2009) reported to consume fruit with 56 percent (Sanderson et al., 2005) of men and 71.3 percent (Friis et al., 2005) of women reporting to do so daily or several times a day. Almost all women (99.3%) (Fair et al., 2009) and men (98.1%) (Fair et al., 2009) reported to consume vegetables.

Nine studies measured dietary habits in student nurses, five of which were based on high-income countries. There were three studies that reported sugar intake for women and men, five studies on women reported fat consumption and three on men, six on fruit consumption, and five on vegetable intake among women and men. However, no studies reported findings by gender. One study measured fruit and vegetable intake among women and men in a middle-income country.

## 3.5 Discussion

The review has identified and summarised four key health behaviours associated with poor health reported by nurses and student nurses internationally. The measurements of behaviours used varied between studies preventing simple comparisons between studies.

As anticipated, there is evidence to suggest that nurses engage in more health promoting behaviours than student nurses and comparison with the wider literature suggests the general adult population does also. For example, 89.2 percent of nurses reported to meet the government recommendations of 150 minutes or more of physical activity a week compared to 61 percent of adults in England (NHS Digital, 2017), 49.0 percent of adults in the US (Ward, Clarke, Nugentand Schiller, 2016), and 55.1 percent of student nurses. Another example is fruit and vegetable consumption with 40.3 percent of nurses, 26 percent of adults in the general population (NHS Digital, 2017) and 27.4 percent of student nurses self-reporting to consume five or more portions of fruit and vegetables a day. This is likely age related, with other variables such as health literacy or general concern regarding health increasing with age. For example, nurses with high health literacy skills may be more likely than those with low literacy skills to feel empowered to make radical lifestyle changes to promote and sustain health. However, there is a clear evidence gap about the health behaviours of nurses compared to other health workers and it is not clear whether these differences in behaviours are due to being a nurse per se or something else.

Evidence of unhealthy behaviours and poor health suggests that nurses with worse health behaviours are at increased risk of chronic disease. A cross-sectional study (Perry et al., 2015) of 381 nurses with a mean age of 39.9 (SD 11.7) where many were female (82.7%) full-time (80.0%) shift workers (93.0%) reported a link between health behaviours and chronic disease. This study of nurses in two Sydney metropolitan hospitals used questionnaires to collect data on health and health behaviours of respondents. Under half (42.8%) of respondents indicated the presence of a chronic disease. Based on the New South Wales Health Population Survey, the relative risk factor for chronic disease varied between 6.8 percent and 90.6 percent –6.8 percent daily smoker, 18.0 percent insufficient physical activity (<150 minutes per week of moderate/vigorous activity), 34.7 percent risky alcohol consumption (≥5 alcoholic drinks per day more than once per month) and 81.9 percent inadequate fruit (<2 pieces of fruit per day) and 90.6 percent vegetable consumption (<5 servings of vegetables per day). Findings indicated that 68 percent of respondents were at risk of chronic diseases based on the New South Wales Health Population Survey in a mean of 3.9 categories (SD 1.3; range 0–7). Nonetheless, despite over two-thirds of respondents being at risk in 3.9 categories and under half (42.8%) indicating a chronic disease, the majority reported good, very good or excellent health (94.0%). This suggests that despite nurses' advanced heath knowledge, nurses may perceive themselves to be resilient or immune to many health problems – thus generally reporting good self-assessed health.

Another cross-sectional study (Pappas et al., 2005) of 353 nurses with a mean age of 36 (SD 5.6) where many were female (88%) shift workers (78.9%) reported a link between health behaviours and self-assessed health. This study of nurses working in hospitals in North West Greece collected data on self-assessed health and health behaviours by means of a questionnaire. The study found that 10.2 percent of respondents reported to have excellent health, 31.4 percent good health, 38.5 percent fair health, 18.1 percent poor health and 1.7 percent very poor health. Findings showed that 47 percent of respondents reported to currently smoke, 49.4 percent engaged in some level of physical activity and 13 percent consumed alcohol more than once a week. Examining self-reported health by health behaviours showed no significant association for smoking and alcohol consumption. There was a positive association between physical activity and self-assessed health ($p<0.001$), with those reporting to engage in physical activity more likely to report better self-assessed health.

**Strengths and limitations**

The findings from this review should be interpreted in the context of several considerations. A high number of papers were initially identified. However, a large number were excluded by title and abstract appraisal due to ineligibility. The inclusion of 'nurse' as a search term increased the sensitivity of the search but also contributed substantially to the number of papers that were subsequently excluded. This was because papers were referenced using this term which related to nurse interventions with patients.

The studies used different measures of health and cut-off points to categorise respondents' health behaviours. This is partly due to subtle differences in government guidelines and changes in guidelines as new evidence emerges about the recommended limits for health, for example, alcohol units. This obscured comparability, preventing clear conclusions being drawn, specifically in relation to the extent to which nurses and student nurses met government guidelines. To mitigate this risk as far as possible, study findings were aggregated where practicable to provide comparable prevalence's for smoking, alcohol consumed, engagement in physical activity and meeting government guidelines, and consumption of fruit and vegetables. For example, to compare the percentage of student nurses who reported to consume any alcohol, Blake et al.'s (2011) findings were combined as the study only reported the percentage by frequency of consumed alcohol. Despite this, study findings could not be used consistently to determine the prevalence of nurses and student nurses who met UK government guidelines.

Most of the papers in the review reported on studies conducted in the US. The findings may not be generalisable to other countries with differences in a country's economics (e.g. Gross Domestic Product, wealth distribution, and disposable income), geography (e.g. urban rural distribution), government guidelines and disease. Nevertheless, nurses will likely have comparable knowledge and a similar level of exposure to ill health and health education and promotion.

There are a number of potential confounders which may have contributed to differences in the percentage of participants reporting a specific health behaviour. For example, self-completion bias, cultural differences, differences in the wording of questions and who administered the questionnaire.

**Implications**

The findings from this quantitative narrative review have important implications for practice both from a patient's and nurse's perspective. Nurses' own health-related behaviours affect their engagement in health promotion with their patients (Fie, Norman and While, 2013; Lobelo and de Quevedo, 2016) and patients' uptake of this advice (Hicks et al., 2008). This health promotion advice is an important component of government policy (WHO, 2004, 2010) aimed at slowing down and preventing chronic disease in the general population. For nurses themselves, unhealthy behaviours (such as smoking, physical inactivity, heavy alcohol consumption, and poor dietary habits) can lead to poor health (Kasmel et al., 2004) and poor health to sickness absence (Kivimäki et al., 2003; Singh-Manoux et al., 2006).

Overall, the findings on the prevalence of tobacco smoking, physical inactivity, high alcohol consumption and low fruit and vegetable intake is generally lower among nurses than student nurses. Whether health behaviours are improved due to a nurse's role, being a health professional or something else is unclear. Age may also have been a confounder with the age profile of student nurses likely to be younger than qualified nurses due to the time required to train for individuals to become a qualified nurse. The identification of these potentially influencing factors on the health status of nurses and student nurses is important and requires further exploration.

## 3.6 Conclusion

Despite the need for greater consistency in measures for smoking, physical activity, alcohol consumption, and dietary habits, commonality in some studies suggests that nurses do not consistently "practice what they preach". While most nurses reported to meet government recommendations for physical activity, many reported engaging in risky behaviours, including smoking, heavy alcohol consumption and did not consume five portions of fruit and vegetables a day. The proportion that consumed sugar and fat is less clear. These findings reinforce the timely need for holistic health promotion interventions and to better understand the impact prolonged unhealthy behaviours have on workforce exit among the health workforce.

Having reported the findings of a review of earlier studies the thesis turns to a series of 4 new empirical studies, addressing the earlier stated objectives and research questions. The following chapter provides a description and explanation of the methods employed.

# Chapter 4 Methodology and methods

## 4.1 Introduction

Having completed the integrative review and prior to detailing each subsequent study, it is necessary to justify the approach used and the more detailed methodological issues involved. This is the purpose of this chapter.

The studies conducted in this thesis used quantitative secondary data to analyse the health, health behaviours and association with workforce exit among different health occupational groups, teachers and *other occupations* as shown in Appendix i. It drew on five surveys – the Annual Population Survey (Office for National Statistics and Social Survey Division, 2016), the Labour Force Survey (Office for National Statistics, Social Survey Division, Northern Ireland Statistics and Research Agency, and Central Survey Unit, 2016), the Scottish Health Survey (ScotCen Social Research, 2015), the British Household Panel Survey (Lynn, 2006) and Understanding Society (University of Essex, Institute for Social and Economic Research, and NatCen Social Research and Katar Public, 2016).

In this chapter, the research methodology and methods used in this study are discussed. The term methodology refers to the research methods; the underpinning rationale behind the methods used in this study and the reason that the author selected a particular method or technique and omitted others (Kothari, 2004).

## 4.2 Research questions and hypotheses

The nine research questions addressed in this thesis along with their associated alternative hypothesis ($H_a$) are presented below:

1. What is the international evidence of the prevalence of tobacco smoking, physical active, alcohol consumption, and dietary habits, specifically sugar, fat and fruit and vegetable intake, among nurses and student nurses?
2. What is the percentage of nursing and midwifery professionals compared to other professions and occupations in the UK, who report a current disability, health problem that affects the amount or kind of work undertaken, and low satisfaction with life associated with disability or health problems?
3. What role do demographics and work variables in explaining the answer to research question two? Specifically, the following eight alternative hypotheses are tested:

   $H_a$: There is a significant association between demographics and reporting a current disability.

   $H_a$: There is a significant association between demographics and reporting a health problem that affects the amount of work an individual is able to undertake.

   $H_a$: There is a significant association between demographics and reporting a health problem that affects the type of work an individual is able to undertake.

   $H_a$: There is a significant association between work variables and reporting low satisfaction with life.

$H_a$: There is a significant association between work variables and reporting a current disability.

$H_a$: There is a significant association between work variables and reporting a health problem that affects the amount of work an individual is able to undertake.

$H_a$: There is a significant association between work variables and reporting a health problem that affects the type of work an individual is able to undertake.

$H_a$: There is a significant association between work variables and reporting a low satisfaction with life.

4. What is the prevalence of: back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; 'depression or bad nerves'; and progressive illness among nursing and midwifery professionals compared to other professions and occupations?
5. What is the association with demographics and work variables and the occurrence of: back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; 'depression or bad nerves'; and progressive illness among nursing and midwifery professionals compared to other work groups? In answering this question, the following ten alternative hypotheses are tested:

   $H_a$: There is a significant association between demographics and the occurrence of back and neck problems among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between demographics and the occurrence of heart, blood pressure or circulation problems among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between demographics and the occurrence of diabetes mellitus among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between demographics and the occurrence of 'depression or bad nerves' among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between demographics and the occurrence of a progressive illness among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between work variables and the occurrence of back and neck problems among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between work variables and the occurrence of heart, blood pressure or circulation problems among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between work variables and the occurrence of diabetes mellitus among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between work variables and the occurrence of 'depression or bad nerves' among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between work variables and the occurrence of a progressive illness among nursing and midwifery professionals compared to other work groups.

6. What percentage of: nurses; other health professionals; care workers; teachers; and *other occupations* in Scotland self-report to smoke tobacco, engage in physical activity, and consume alcohol and fruit and vegetables?
7. What is the association between health behaviours, demographics and (i) self-assessed health, (ii) the presence of a long-term illness, (iii) the presence of a mental health condition, and (iv) satisfaction with life among nurses compared to other occupational groups in Scotland? To answer these the following eight alternative hypotheses are considered:

   $H_a$: There is a significant association between health behaviours and self-assessed health among nurses compared to other occupational groups in Scotland.

   $H_a$: There is a significant association between health behaviours and the presence of a long-term illness among nurses compared to other occupational groups in Scotland.

   $H_a$: There is a significant association between health behaviours and the presence of a mental health condition among nurses compared to other occupational groups in Scotland.

   $H_a$: There is a significant association between health behaviours and satisfaction with life among nurses compared to other occupational groups in Scotland.

$H_a$: There is a significant association between demographics and self-assessed health among nurses compared to other occupational groups in Scotland.

$H_a$: There is a significant association between demographics and the presence of a long-term illness among nurses compared to other occupational groups in Scotland.

$H_a$: There is a significant association between demographics and the presence of a mental health condition among nurses compared to other occupational groups in Scotland.

$H_a$: There is a significant association between demographics and satisfaction with life among nurses compared to other occupational groups in Scotland.

8. What percentage of nursing and midwifery professionals who reported poor health left the workforce between 2003 and 2016 compared to other occupational groups?
9. How do demographics and behavioural variables and life satisfaction relate to early workforce exit of nurses and midwives compared to other occupational groups? In answering this question, the following three alternative hypotheses are tested:

   $H_a$: There is a significant association between demographics and workforce exit among nurses and midwives compared to other occupational groups.

$H_a$: There is a significant association between behavioural variables and workforce exit among nurses and midwives compared to other occupational groups.

$H_a$: There is a significant association between satisfaction with life and workforce exit among nurses and midwives compared to other occupational groups.

## 4.3 The importance of clarifying a philosophical stance

Clarifying the overall philosophical stance taken to inform this thesis is important because it informs research design elements which impact on the validity and integrity of the project. According to Guba and Lincoln (1994), multiple research paradigms exist. Each philosophical stance/paradigm is constituted by assumptions falling into three inter-dependent categories: ontological (the nature of reality and what is real), epistemological (the nature of knowledge and how knowledge is acquired and validated), and methodological (how we know about the world and how we gain knowledge on it). Research paradigms are clusters of beliefs and assumptions shared between researchers about how problems should be understood and addressed (Weaver and Olson, 2006). The research paradigm used to inform this study was positivism.

### 4.3.1 Positivist ontology

This study used a positivist ontology, believing that the world is external and the existence of a single apprehendable reality that is driven by immutable natural laws and mechanisms (Guba and Lincoln, 1994). By adopting a positivist ontological stance, this thesis argues that the healthcare setting is a constraining force that demands workers abide by strict rules and regulations in order to continue in their current employment. From the outset a clear research topic was identified, hypotheses constructed and suitable research methodology adopted. Consistent with positivist research, a distance was maintained between participants and researchers to allow the researchers to remain emotionally neutral. Without remaining emotional neutral there is the potential for reason and feelings to merge. Other benefits of a positivist ontology include retaining a clear distinction between science and personal experience, fact and value judgement, objectivity, and rational and logical research approaches. Positivist research relies on statistical and mathematical techniques to identify single and objective realities.

Exploring the health and health behaviours of workers in the healthcare setting from a positivist ontology underpins this thesis.

### 4.3.2 Positivist epistemology

A positivist epistemological perspective is one which is concerned with the question of what acceptable knowledge is within a specific research discipline (Bryman and Bell, 2011). Central to this is the question of whether or not the social world can or ought to be studied by the same principles, procedures and ethos as that of the natural sciences.

A positivist position advocates the use of the methods employed in the natural sciences in the study of social reality and beyond. According to Bryman and Bell (2011), there are five principles associated with a positivist position:

1. *Only phenomena and hence knowledge confirmed by the senses can genuinely be warranted as knowledge (the principle of phenomenalism).*
2. *The purpose of theory is to generate hypotheses that can be tested and that will thereby allow explanations of laws to be assessed (the principle of deductivism).*
3. *Knowledge is arrived through the gathering of facts that provide the basis for laws (the principle of inductivism).*
4. *Science must (and presumably can) be collected in a way that is value free (that is, objective).*
5. *There is a clear distinction between scientific statements and normative statements and a belief that the former is the true domain of the scientist"* Bryman and Bell (2011, p. 15).

The research questions outlined in section 4.2 placed emphasis on specific health conditions and sought to discover the relations between health and health behaviours between different occupational groups outlined in Appendix i. Ascertaining how people's estimations of health (e.g. self-assessed health) differ by age, gender and occupation was important in this thesis. The cause of poor health and the effect this has on workforce exit was also an area of interest in this thesis. There was an assumption that health behaviours may be predicted to some extent by occupation rather than a result of an individual's choices. However, there are two important limitations of adopting a positivist position. Firstly, while demographic surveys help to predict an individual's health and health behaviours, they do not explain these. Secondly, ambiguities cannot be captured from a positivist position.

### 4.3.3 Positivist methodology

There are two main methodological positions, which researchers/scientists can adopt to address their research questions – quantitative and qualitative research. Distinguishing between these is important, all be it ambiguous, with disagreement between writers on the precise level of distinction between qualitative and quantitative research. From an ontological and epistemological perspective, quantitative and qualitative research can be considered as two clearly distinctive clusters of research strategy that provide a general framework to conduct research. The main differences between quantitative and qualitative research strategies are presented in Table 4.1.

**Table 4.1 Fundamental Differences Between Quantitative and Qualitative Research Strategies.**

| | **Quantitative** | **Qualitative** |
|---|---|---|
| Principal orientation to the role of theory in relation to research | Deductive; testing of theory | Inductive; generation of theory |
| Epistemological orientation | Natural science model, in particular positivism | Interpretivism |
| Ontological orientation | Objectivism | Constructionism |

Taken from Bryman and Bell (2011, p. 27).

A quantitative research strategy was used to inform the research conducted in this thesis supporting the analysis of data in three main areas. Firstly, a deductive approach was used to examine the relationship between the health of health workers comparative to teaching professionals and the wider general working population. Secondly, the research strategy used the natural science model incorporating the norms and practices through a positivistic stance. Thirdly, the social reality was perceived as an external objective reality.

## 4.4 Methodological challenges

This section will explore the methodological challenges associated with the use of secondary data. First, the relevance of secondary data over primary data in relation to each research question outlined above will be presented. Next, the advantages and disadvantages of performing secondary data analysis will be highlighted. Finally, the issues around ethics and access, as well as the rules around data management for secondary data, will be outlined.

### 4.4.1 Relevance of secondary data

In epidemiology and public health, there is one key distinction between primary and secondary data – the relationship between the research team who collect the data and the person who analyses it. This is an important distinction because the dataset could be primary in one study and secondary in another. Data which has been collected by the research team for the specific purpose of their study is called primary data. Data which has been previously collected by someone else for purposes other than that of the current research aim is secondary data.

Most research on health and health behaviours of health workers has been based on primary data rather than secondary data. Studies which have used primary data include Pirie et al. (2013), Riese et al. (2004), Pappas et al. (2005) and Misevičienė et al. (2013). Nevertheless, the analysis of secondary datasets has become increasingly possible and popular over the last decade.

### 4.4.2 Advantages and disadvantages of secondary data

Selecting data that are both appropriate to the research question and the resources available to the research – including personal expertise, time and financial resources - is one stage of the research process. In this section, a summary of the major advantages and disadvantages of working with secondary data as opposed to primary data is presented. A summary of this information is shown in Table 4.2.

The first major advantage of using secondary data is that the data collection process is often informed by expertise and professionalism not commonly available to smaller scale studies. For example, UK government surveys use a complex sample design and weighting system which provides researchers with more control over the analysis and manipulation of the sample population. Smaller scale surveys may employ convenience sample where generalisability is questionable.

The second major advantage of using secondary data is the breadth of data available for research purposes. There are few researchers who would have the resources to collect data from a representative sample of the population in the UK, let alone repeatedly collect this data or follow these individuals over time. Sorensen et al. (1996) suggested that sample size depending on subgroup analysis, representativeness and risk of bias (e.g. from recall, non-response) is an important advantage of secondary data. The UK government conducts a multitude of surveys on large representative samples of the population at set intervals providing a rich cohort and cross-sectional data source (UK Data Archive, 2016). National level data

**Table 4.2 Advantages and Disadvantages of Primary and Secondary Data.**

| Type | Advantages | Disadvantages |
|---|---|---|
| Secondary Data | • Inexpensive.<br>• Easily accessible.<br>• In some cases is available immediately.<br>• Clarify research problem.<br>• May provide required background information.<br>• May contribute to creativity. | • May not be current (e.g. census data).<br>• Possibility that data is unreliable.<br>• Collected by someone else for some other purpose.<br>• May not be applicable/suitable for research needs.<br>• Required data may be unavailable or difficult to obtain. |
| Primary Data | • Applicable to research question.<br>• Up-to-date as collected for immediate data needs. | • Expensive.<br>• Time consuming.<br>• Not immediately available.<br>• Specialist training and experience required to design study and collect data. |

is of particular importantance in epidemiology and public health where the focus is largely on the health of populations as opposed to individuals.

The third major advantage of secondary data is economy – that is that someone else has already collected the data requiring no further resources directed at this phase of the research. Many secondary data sets are publicly available for little or no cost. This means costs associated with the use of secondary data can be significantly lower than primary data (Herron, 1989) in relation to salary expenses, transportation, etc. There is also a time saving associated with secondary data. Castle (2003) highlighted that the traditional approach of primary data can lead to the loss of valuable time and resources. With the data already collected, often pre-cleaned to some extent by professionals and stored electronically such as in the UK Data Archive, researchers can devote more time to understanding the research process and analysing the data. Alvarez, Canduela and Raeside (2012) argued that students' use of secondary data will allow a more fuller understanding of the survey process as well as providing sufficient data for meaningful analysis. Alvarez et al. (2012) suggested that this provides an enhanced educational experience beyond that offered by small-scale primary surveys which often have questionable sampling frames and low response rates. Preference can also be an advantage – secondary data analysis provides an important opportunity for researchers to spend more time testing hypotheses using existing data as opposed to writing grant applications for funding to collect primary data. Thus, researchers can be more creative in how they address research questions (Alvarez et al., 2012).

The first major disadvantage of using secondary data is in relation to the distinct difference between primary and secondary data – the purpose it was collected for. As previously mentioned, in secondary data analysis the data is being explored for a different purpose than that of the current study and thus particular information which the secondary researchers might be interested in may not have been collected. For example, data may have been collected on a different geographical region or variables of interest may have been categorised differently (e.g. age was categorised as intervals rather than a continuous variable or race categorised as white or other rather than several groups).

A second major disadvantage of using secondary data is that because the secondary researcher was not involved in the planning and execution of the data collection phase, the reliability, accuracy, and quality of the data cannot be determined. More specifically the secondary researcher does not know how consistently the data collection phase was conducted and the extent to which the data was affected by problems such as low response rates and respondents' misinterpretation of questions. To mitigate this, secondary data, such as that provided by the UK government often have extensive documentation about their data collection phase, response rates, variable categorisation and other technical information readily available in data archives. Using only trusted secondary data sets and interrogating the data for potential problems is important in secondary research.

### 4.4.3 Issues around ethics, access and rules around data management

*Ethical and legal*

Utilising secondary data for research purposes requires that ethical and legal obligations are respected. From an ethical perspective, researchers are required to abide by professional bodies (e.g. Nursing and Midwifery Council), archiving institutions (e.g. UK Data Archive, 2017) and academic institutions (e.g. Edinburgh Napier University). From a legal perspective, data is governed by the Data Protection Act, Freedom of Information Act, and Statistics and Registration Services Act – however these are primarily aimed at those sharing or archiving research data.

*Consent*

In secondary data analysis, researchers often do not directly approach respondents for their consent. The uploading of data to online databases implicitly implies consent. To comply with the Data Protection Act (1998) the original researchers who collected the data should have secured informed consent from participants – particularly in relation to having their data archived and made available for further research.

*Confidentiality*

Prior to sharing or archiving data with others, researchers are required to anonymise data so that individuals or organisations cannot be identified. Re-users of data – secondary researchers – have the same legal and ethical obligations to protect respondents' identities. The UK Data Archive indicates that people's identities can be disclosed from direct identifiers (e.g. names, addresses, postcodes) or indirect identifiers which when linked to other data sources could identify individuals (e.g.

workplace information, occupation, exceptional values such as age or salary) (UK Data Archive, 2017).

*Access control*

Data held by the UK Data Archive (e.g. Annual Population Survey, Labour Force Survey, Scottish Health Survey, and Understanding Society) are not in the public domain – restricted to specific purposes such as research. Users are required to sign an End User Licence (shown in Appendix viii) which has contractual force in law, in which certain conditions are agreed including not to disseminate identifiable or confidential information.

*Ethics permission*

For researchers using de-identified secondary data there is an obligation that they must abide by ethical guidelines and practices, through ascertaining permission from their university's Research Ethics Committee, to not misrepresent data.

## 4.5 Statistical methods

The analyse presented in this thesis drew on various standard statistical methods, including: epidemiological measures, analysis of variance, correlation coefficient, and regression. These will each be discussed in turn below.

### 4.5.1 Epidemiological measures

Epidemiological methods are one of the primary methods used to measure the spread and burden of disease, offering a valuable means by which to study the health of the population. Several methods are briefly described below. These methods, when used appropriately, provide a comprehensive way to measure disease.

**Prevalence**

Prevalence is a measure of the proportion of individuals in a given population that has the health outcome of interest (e.g. poor health) at a specific point in time (point prevalence) or period of time (period prevalence).

**Point prevalence:** Point prevalence is a measure of the number of people in a given population that has the outcome of interest divided by the number of people in that population at the time. The equation is:

$$\text{Point prevalence} = \frac{\text{Number of cases in a defined population at one point in time}}{\text{Number of persons in a defined population at the same point in time}}$$

**Period prevalence:** Period prevalence is a measure of the proportion of people in a given population that has the outcome of interest at some point during the period under study. This includes people who already have the outcome of interest as well as those who develop it during the specified period. Period prevalence is the measure employed throughout the analysis in this study.

**Incidence**

In contrast, incidence is a measure of the number of new cases that develop the health outcome of interest over the specified period and there are three main methods for calculating incidence: odds ratio, risk ratio, and absolute risk reduction. The method used in this study was odds ratio.

**Odds ratio:** Odds ratios are commonly used to compare the relative odds of the occurrence of the outcome of interest (e.g. poor health), given exposure to the variable of interest (e.g. occupational group, health characteristics) (Szumilas, 2010). This measure can be used to determine whether the exposure of interest is a risk factor for a specific outcome, and to compare the magnitude of several risk factors for that outcome. An odds ratio=1 indicates that the exposure has no effect on the outcome; >1 the exposure is associated with higher odds of the outcome; and <1, the exposure is associated with lower odds of the outcome. Odds ratios were used in study three to investigate the odds of reporting each of the four health outcomes of interest among occupational groups.

### 4.5.2 Analysis of variance (ANOVA)

Analysis of variance (ANOVA) is a measure used to determine the amount of variation in a dataset which can be attributed to error and how much can be attributed to the condition under study and to test the difference between two or more means (Scott and Mazhindu, 2014). Where ANOVAs were conducted to compare two or more means, Scheffé post hoc tests were undertaken to see where any significances lay.

### 4.5.3 Correlation coefficients

Pearson product-moment correlation coefficient is a measure of the linear association between two variables, ranging from -1 to +1, where -1 indicates a perfectly negative linear relationship, 0 is no relationship and +1 is a perfectly positive relationship. The stronger the correlation, the closer the correlation coefficient comes to $\pm 1$. A positive value indicates a direct relationship and a negative value an inverse relationship. This test is useful for summarising the strength of the linear relationship between variables, however, it does not infer causality (Field, 2005).

### 4.5.4 Regression

Researchers rely on regression analysis when trying to explain a dependent variable as an outcome of various independent variables. The regression method used depends to a large extent on the type of data used in the research project. Common to all regression methods is the need to describe as simply as possible the relationships between the variables under study.

**Logistic regression**

Logistic regression is a statistical method used by researchers to analyse data with one or more independent variables that are associated with an outcome. The outcome is measured with a dichotomous or binary (categorical) dependent (outcome) variable (Field, 2005) where, for example, 0 would be the absence and 1 the presence of disease, with one seeking to estimate the probability of an individual being either 0 or 1.

Logistic regression analyses generate the coefficients, standard errors and significance levels of a formula to predict a logit transformation of the probability of the presence of the outcome of interest (e.g. poor health) (Szumilas, 2010). The exponential function of the regression coefficient is the odds ratio associated with a one unit increase in exposure. This is particularly useful in health research where most variables are dichotomous, for example whether or not an individual has a long-term illness. Therefore, logistic regression is used to describe data and explain relationships between a dependent variable and one or more independent (predictor) variables. This would enable questions on the odds of workers in each health occupation separately reporting poor health (e.g. poorer self-assessed health, long-term illness, mental health conditions, and poor health behaviours) compared to workers in *other occupations* to be addressed. Reference categories were used in all logistic regression models and were determined by the research questions and sample size, with the largest group often being used as the reference category. Reference categories were 40–49 year olds, females, of white ethnic origin, nursing and midwifery professionals/nurses, and in full-time work.

Interpreting and reporting of logistic regression models assumes a degree of knowledge. As mentioned above, estimated logistic regression coefficients are expressed in exponential form as odds ratios. The overall fit of the model is interpreted and expressed using the -2 log likelihood, the significance determined by Cox and Snell $R^2$ and Nagelkerke $R^2$ statistics, and the percentage correctly predicted. The Cox and Snell $R^2$ and Nagelkerke $R^2$ statistics provide an indication of the proportion of variance explained by the predictors. The percentage correctly predicted provides an overall percentage of cases that are correctly predicted by the model and each outcome category.

In the study, logistic regression was used to address research questions three, five, and seven. The questions are shown in Chapter 1.

**Cox proportional hazards regression**

Survival analysis is an important statistical procedure used by researchers to examine the relationship of the survival distribution (or the time it takes for an event to occur) to covariates. In this study, Cox proportional hazards regression was used to calculate the odds of workforce exit among different occupational groups in the study (see section 4.5.4). Workforce exit is measured with dichotomous variables where 0 equates to remained and 1 is left the workforce.

Cox proportional hazards regression generates the coefficient, standard errors and significance levels of a formula to predict the log-hazard of the probability of workforce exit. The exponential function of the regression coefficient is the relative hazard ratio associated with one unit increase in exposure. One main advantage of Cox proportional hazards regression is that there is no requirement to select a specific probability model to represent survival time or, in this case, time to workforce exit, and it is thus more robust than parametric methods. This is particularly useful when examining the relative odds of workforce exit among different occupations. The hypotheses were tested using the Wald test and the Likelihood ratio test.

In the study, Cox proportional hazards regression was used to address research question nine (see Chapter 1).

**Two-tailed tests**

Two-tailed tests are a measure used to determine whether a sample is greater than or less than a certain range of values. There were two main reasons for using two-tailed testing. First, a larger magnitude of the critical value is used providing a more conservative, rigorous test (Cho and Abe, 2013). Second, by drawing on a two-tailed test, the analysis was safeguarded against the parameter being significant in the opposite direct to that expected (Cho and Abe, 2013).

## 4.6 Studies

This section explores the methods used in each of the four studies separately. First, the methods used to address each research question will be outlined in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.

### 4.6.1 Study 1

The prevalence of tobacco smoking, physical activity, alcohol consumption, and dietary habits, specifically sugar, fat and fruit and vegetable intake, among nurses and student nurses internationally was the focus of question one. To address this research question, a quantitative integrative review of literature published between January 2000 and December 2016, and indexed in MEDLINE, CINAHL and PsycINFO on nurses' or student nurses' health behaviours was conducted. This study was presented in Chapter 3.

### 4.6.2 Study 2

**Research questions, objective and hypotheses**

The research questions and aims are shown in Chapter 1, sections 1.7 and 1.8.

**Methods**

*Study design, setting and participants*

A cross-sectional study design was used to quantify the health status of workers in eight occupational groups in the UK using routinely collected data from the APS (ONS, 2016). The APS comprises partly of the LFS, a survey of people resident at private addresses in the UK. The main purpose of the survey is to provide key social and labour market data that can be used to develop, manage, evaluate and report on workers in the UK labour market. The survey is managed by a subdivision in the Office for National Statistics.

The LFS covers an estimated 60,000 households each quarter and uses a panel design whereby samples remain in the survey for five consecutive rounds. The survey uses an unclustered sample of addresses in the UK to improve precision of estimates. In Scotland, there is a very small bias in that there is only partial coverage of the population north of the Caledonian Canal – approximately five percent of the total population in this area. The APS provides enhanced annual data for England – particularly urban areas - targeting a minimum of 510 economically active people in each unitary authority/local authority district and a minimum of 450 in each Greater London Borough (UK Data Archive, 2016). This provides an estimated sample size of 320,000 people, representing 0.16 percent of the British population.

There are four different sampling frames used in the LFS with the UK split into two areas – south of the Caledonian Canal (e.g. England, Wales and most of Scotland), north of the Caledonian Canal, Northern Ireland, and NHS accommodation establishments. In Wave 1 the sample was selected by ordering the sampling frames geographically and then drawing the selection systematically with fixed intervals. Samples were based on postcodes taken from the Royal Mail Postcode Address File or the telephone directories depending on geographical location. This sample was then retained for four more consecutive rounds before these respondents exited the survey. Data is collected in all regions by means of face-to-face interviews with the exception of those north of the Caledonian Canal where telephone interviews are undertaken. The main disadvantage of sampling from telephone directories was the potential bias from non-coverage of people not listed in the directories for several reasons (e.g. no telephone, mobile only, ex-directory, living in new-build housing). While this approach may bias the sample towards those with a telephone, alternative strategies (e.g. face-to-face interviews) would be costly and time consuming. The APS yields a response rate of around 66 percent.

Respondents who participated in the Annual Population Survey between January and March 2016, were economically active and aged between 17 and 69. The present study excluded respondents aged below 17 and over 69 since we assumed that people below 17 were generally in full-time education and those over 69 would typically be retired. While applying this assumption certainly has limitations, given the complexity to define working age at an individual level this was considered to be the best available criteria to enable comparisons to be drawn and meaningful findings to emerge.

*<u>Variables</u>*

*<u>Outcome variables</u>*

The choice of outcome measure was a crucial component of this study. A mixture of self-assessed health outcomes and self-reported health problems were chosen to provide a broad picture of workers' self-reported health.

<u>Current disability</u>

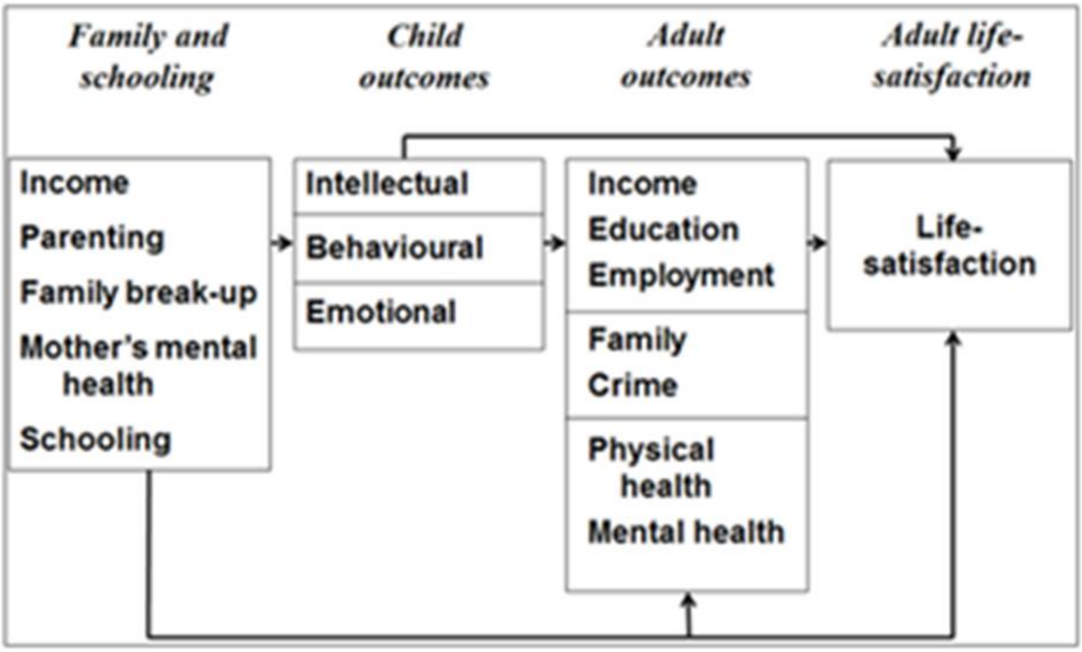
Current disability was measured in accordance with the Equality Act 2010 (Part 2, Chapter 1, Section 6), in which respondents self-reported to be either (Equality Act) disabled or not (Equality Act) disabled. The Equality Act 2010's legal definition of disabled is that "*a person has a disability if the person has a physical or mental* *impairment, and the impairment has a substantial and long-term adverse effect on the person's ability to carry out normal day-to-day activities*" (Equality Act, 2010, p. 4). Interviewers also asked respondents during their first interview if they had ever had any other health problem or disability that had lasted more than one year, yes versus no.

Health problem affecting amount or kind of paid work

Respondents who self-reported a health problem that they expected to last for more than one year, (and were aged below 64 and currently looking for or wanting work) were asked whether their health problem affected the amount of paid work they were able to do (yes/no). These respondents were also asked whether their health problem affected the kind of paid work they were able to do (yes/no).

Satisfaction with life

The Satisfaction with Life Scale, was based on a simple question, "How do you rate your satisfaction with life as a whole nowadays?" on a 10-point scale ranging between extremely dissatisfied (0) to extremely satisfied (10) and is a frequently used measure of wellbeing. The main advantage of using satisfaction with life is that the democratic measures allow people to self-evaluate their own life situation rather than have others – such as governments – decide what is important to them. Moreover, the scale leads people to evaluate their life, not merely in relation to health alone, but rather integrate life domains such as health and finances as they see fit, providing their own unique weights to each domain (Pavot and Diener, 2009). This is a subjective process whereby respondents rate their satisfaction with life against their own unique set of criteria presumably made by comparing one's own perceived life circumstances with a self-imposed standard. It is unclear precisely how each person makes this judgement. Of course, there are immediate influences from our current situation but also historic influences. An accumulation of influences over the life course from childhood, schooling and family backgrounds impact on life satisfaction. Figure 4.1 provides a visual representation of some determinants influencing how people rate their life satisfaction.




Taken from Clark, Fleche, Layard, Powdthavee and Ward (2016).

**Figure 4.1. Determinants of Adult Life Satisfaction.**

Clark et al. (2016) used survey data from four major countries – Australia, Britain, Germany and the United States – to investigate variations in life satisfaction. The study indicated that social relationships and mental and physical health mattered most to people, with emotional health as a child the best predictor of an adult's life satisfaction. Furthermore, the study reported that the greatest distinguishing feature in the least satisfied people (bottom 10% of the population in terms of life satisfaction) was not unemployment or poverty, but mental ill health (e.g. depression or anxiety). Nonetheless, the rating of life satisfaction remains fairly consistent over much of adulthood, with a steep decline in life satisfaction often seen among those aged over 70 (Baird, Lucas, and Donnellan, 2010).

*Control variables*

The Standard Occupational Classification (SOC) codes established in the UK in 1990 are an internationally recognised common classification of occupations based on skill specification and skill level and were used to categorise respondents into eight groups (see Table 4.3 for the occupational groups used in the analysis along with their SOC2010 codes). There is likely to be a small degree of bias associated with categorising occupations this way with skill requirements inevitably varying from job to job and workplace to workplace; complete agreement in every establishment or authority area is unlikely. Nevertheless, despite these minor points, SOC provides a straightforward and structured approach to classifying occupation, compatible with international standards (ONS, 2010).

In relation to 'occupation', respondents were identified as belonging to a health occupation or one of two comparison groups. Accordingly, the first group comprised:

*Health occupations included: health professionals, therapy professionals, nursing and midwifery professionals, caring personal services, health and social services managers and directors, and managers and proprietors in health and care services.*

**Table 4.3 Occupational Classification.**

| Occupational categories | Included occupations | SOC2010 Code (2012) |
|---|---|---|
| Health professionals | Medical practitioners; psychologists; pharmacists; ophthalmic opticians; dental practitioners; veterinarians; medical radiographers; podiatrists; and health professionals. | 221 |
| Therapy professionals | Physiotherapists; occupational therapists; speech and language therapists; and therapy professionals. | 222 |
| Nursing and midwifery professionals | District nurses; health visitors; mental health practitioners; nurses; practice nurses; psychiatric nurses; staff nurses; student nurses; midwifery sisters; midwives; and student midwives. | 223 |
| Caring personal services | Nursing and auxiliaries and assistants; ambulance staff (excluding paramedics); dental nurses; house parents and residential wardens; care workers and home carers; senior care workers; care escorts; and undertakers, mortuary and crematorium assistants. | 614 |
| Health and social services managers and directors | Managers and directors in health and social services. | 118 |

**Table 4.3 Occupational Classification Continued.**

| Occupational categories | Included occupations | SOC2010 Code (2012) |
|---|---|---|
| Managers and proprietors in health and care services | Health care practice managers and residential, day and domiciliary care managers and proprietors. | 124 |
| Teaching and educational professionals | Higher education teaching professionals; further education teaching professionals; secondary education teaching professionals; primary and nursery education teaching professionals; special needs education teaching professionals; senior professionals of educational establishments; education advisers and school inspectors; and teaching and other educational professionals. | 231 |
| *Other occupations* | | All other codes |

The two comparison occupational groupings were:

*Teaching and educational professionals,*

while the final group contained *all other occupations not included in groups one and two.*

Teachers were selected as a comparison group to show that the difference in health outcomes identified in the study are due to the work itself because of the similarity between other determinants. There are six main similarities between teachers and nurses. First, the qualification level required to practice as a qualified teacher and nurse are similar with both professions (General Teaching Council for Scotland, 2012; Nursing and Midwifery Council, 2015). Second, both teachers and nurses tend to remain in the profession for life. Third, both teaching and nurses are classed as vocational occupations. Fourth, both occupations generally draw people from a similar social background. Fifth, teaching and nursing professionals have a similar pay level (£22,500 to £59,000 [National Careers Service, 2016] and £21,909 to £41,373 [RCN, 2015] respectively). Finally, teachers are also a highly stressed group.

Despite these similarities there is one main difference between nurses and teachers. Teachers typically work normal business hours Monday to Friday whereas nurses are required to work round the clock, seven days a week to meet demands.

*Other occupations* provided a comparison group to contextualise the findings.

*Demographics*

Age was measured in whole years and coded into ten-year intervals: 17–29, 30–39, 40–49, 50–59 and 60–69 years. Ethnic status was measured using nine outcomes and coded into white and other. Other was formed of mixed/multiple ethnic groups, Indian, Pakistani, Bangladeshi, Chinese, any other Asian background, Black/African/Caribbean/Black British, and other ethnic groups.

**Statistical methods**

Descriptive statistics of health measures were generated to examine the distribution of poor health of health workers relative to teachers and the general population. Next, descriptive statistics of the effect of health on work and satisfaction with life were presented by each occupational group. Finally, logistic regression analysis was used to calculate the potential association between several determinants of health and the occurrence of poor health by occupation. Logistic regression was used because the dependent variables were dichotomous which violates the assumption of linearity in normal regression. The assumptions of the absence of multicollinearities and no outliers in the data were met. Odds ratios were used to identify what occupation was more damaging for health in relation to specific groups, such as 40–49 year old women.

In the first stage, the risk of having a current disability was investigated by occupation with adjustment for gender, age, and working hours. In the second stage, the risk of reporting a health problem lasting more than a year was investigated by occupation with adjustment for gender, age and working hours. In the third stage, the risk of having a health problem that affected the amount of work defined by respondents was investigated by occupation with adjustment for gender, age and working hours. In the fourth stage, the risk of reporting a health problem that affected the kind of work defined by respondents was investigated by occupation with adjustment for gender, age and working hours. Finally, in the fifth stage, dichotomous satisfaction with life score was investigated by occupation with adjustment for gender, age and working hours. The accepted level of significance was taken as the 5 percent level.

**Data checking**

Data in the LFS required an extensive amount of data checking in order to conduct the analysis outlined above. All variables included in the analysis were checked to ensure there were no problems evident with the coding or reporting of variables. A child indicator was not used in this study because of incomplete coding within the dataset. Information on the number of people in the sample who reported not to have any dependents was missing. Manually coding people who did not report to have a dependent child as not having any children could produce misleading results as the figure would include those who did not answer this question. Therefore, this variable was omitted from the analysis. This was an important and time-consuming phase in study two.

### 4.6.3 Study 3

**Research questions, objectives and hypotheses**

The research questions and objectives are shown in Chapter 1, sections 1.7 and 1.8.

**Methods**

*Study design, setting and participants*

The study design, setting and participants have been described in detail on page 128 The LFS provides an estimated sample size of 40,000 people and a response rate of 51 percent.

*Variables*

*Outcome variables*

The outcome variables for health problems possibly incurred by work was informed by previous literacy which has linked different health outcomes to type of employment ([Alamgir et al., 2008; Costa et al., 2013; Jorm et al., 1998; Marmot Review, 2010; Najimi et al., 2012] see Chapters 1 and 2). Conditions include: back and neck injury (Callison and Nussbaum, 2012; Da Costa et al., 2012; Luttmann et al., 2003; Ngan et al., 2010; Nia et al., 2013; Ramond et al., 2011; Smedley et al., 1995; Trinkoff et al., 2003; van der Noordt et al., 2014); heart, blood pressure or circulation problems (Brown, James, Nordloh and Jones, 2003; Cavalheiro, Moura and Lopes, 2008; Kivimäki et al., 2012; Kivimäki et al., 2015; Marmot et al., 1978; van der Noordt et al., 2014); diabetes mellitus (de Almeida, Zanetti and Damasceno, 2011; Poulsen et al., 2014; Stahl et al., 2014; The Information Centre, 2008); 'depression or bad nerves' (Costigliola et al., 2012; HSE, 2016b; Fan et al., 2012; Santin et al., 2009; van der Noordt et al., 2014); and progressive illness (van der Noordt et al., 2014). Therefore, it was of interest to see if this relationship was also evident in the LFS and how this differed between the different health occupations.

Back or neck problems were measured by means of self-reporting, with respondents indicating either their presence or absence. A similar response method was used to collect data on (i) heart, blood pressure or circulation problems, (ii) diabetes mellitus, (iii) 'depression or bad nerves', and (iv) progressive illness. Musculoskeletal conditions such as back or neck problems are one of the main known causes of sickness absence among health workers (Ritchie, Macdonald, Gilmour and Murray, 1999). Cardiovascular diseases (e.g. heart, blood pressure or circulation problems) and diabetes mellitus are two of the main types of non-communicable diseases which have been linked to health behaviours such as tobacco smoking, physical inactivity, excess alcohol consumption and unhealthy diet (WHO, 2017a; WHO, 2017b). Almost half of all long-term absences from work are due to mental health problems (e.g. 'depression or bad nerves') (Fit for Work, 2017).

*Control variables*

Consistent with APS, eight SOC codes were used to categorise respondents by occupational group based on skill specification and level with a focus on health occupations. Table 4.3 shows the occupational groups used in this study.

*Demographics*

The study demographics are the same as that used in the APS and have been described in detail on page 136.

**Statistical methods**

Descriptive statistics of six health conditions were generated to examine the proportion of poor health reported by health workers in relation to specific health conditions. Next, five logistic regression models were created to display odds ratios to investigate whether health workers are more susceptible to health problems possibly incurred by their work than other similar workers, such as teachers. Logistic regression models were used to describe the data and explain the relationship between the dichotomous dependent variables and predictor variables among workers. The constant effect of the predictor variable on the likelihood of the outcome occurring was provided by means of odds ratios.

In the first stage, the risk of having back or neck problems were investigated by occupation with adjustment for gender, age and working hours. In the second stage, the risks of reporting heart, blood pressure, circulation problems, were investigated by occupation with adjustment for gender, age and working hours. In the third stage, the risk of reporting the presence of diabetes mellitus was investigated by occupation with adjustment for gender, age and working hours. In the fourth stage, the risk of self-reporting ‘depression, bad nerves or anxiety’, was investigated by occupation with adjustment for gender, age and working hours. In the fifth stage, the risk of reporting a progressive illness was investigated by occupation with adjustment for gender, age and working hours. Finally, in the sixth stage, the risk of reporting more than one health condition was investigated by occupation with adjustment for gender, age and working hours.

**Data cleaning**

Data in the APS required an extensive amount of data checking and cleaning in order to conduct the analysis outlined above. While checking the data it was noted that an empty variable had been included in the dataset on the presence of a current limiting health problem preventing its use in our analysis.

### 4.6.4 Study 4

**Research questions, objectives and hypotheses**

The research questions and objectives are shown in Chapter 1, sections 1.7 and 1.8.

## Methods

### *Study design, setting and participants*

A quantitative cross-sectional design was used in this study to investigate the health of workers in five occupational groups in Scotland using routinely collected data taken from the SHeS. The SHeS was designed and commissioned by the Scottish Government to provide a detailed picture of health in private households and contribute to the monitoring of health in Scotland using a nationally representative sample. Specifically, the SHeS enables the prevalence of health outcomes and associated risk factors, such as health behaviours, to be estimated.

The SHeS used a clustered stratified multi-stage sample design. This type of design has larger standard errors compared to simple random sample design. To account for the clustered stratified design, weighting provided with the dataset to adjust for this was applied. First Primary Sampling Units (PSU) were collated (e.g. postcodes). Second, addresses in each PSU were selected. Third, several PSUs were over sampled due to low response rates and, from 2008, health boards were given the option to boost the sample in their area beyond that funded centrally to allow them to examine the health of people in their area in greater detail. PSUs were based on five geographical data zones and intermediate geographies. A full description of data zones and intermediate geographies methodology is provided by the Office of the Chief Statistician (2004) and Office of the Chief Statistician (2005).

Most of the questions in the survey were asked by an interviewer using computer-assisted personal interviewing. However, questions of a more sensitive nature were asked via a self-completed booklet, for example drinking experiences and recent general health. Detailed descriptions of the setting, sampling framework and data collection methods employed by the SHeS have been provided elsewhere (ScotPHO, 2014). Briefly, the SHeS samples households from the Postcode Address File which contains every address that the Royal Mail delivers to within Scotland. Adults aged 16 or above in the household were eligible for interview. This provided an individual response rate ranging from 54 to 56 percent and a household response rate between 61 and 66 percent.

Respondents, who participated in the SHeS between 2012 and 2015, were economically active and aged between 17 and 69 were included in the study. As previously mentioned, analysis was restricted to cover the working age population.

*Variables*

*Outcome variables*

Self-assessed health

Respondents were asked, "In general how would you rate your health?" using a five-point scale – 'very good', 'good', 'fair', 'bad' or 'very bad'. Due to small numbers, these categories were aggregated to form two single categories for analysis: 'very good, good and fair' or 'bad and very bad'. This measure has been shown to be a valid, reliable and powerful predictor of mortality (Miilunpalo et al., 1997; Singh-Manoux et al., 2006), morbidity, and health service use (Miilunpalo et al., 1997), providing a good proxy for health. People reporting poor health are less likely to be employed, remain in employment, or transition from unemployment to employment, particularly full-time employment (Webber et al., 2015). Furthermore, people reporting poor physical or mental health are significantly more likely to move from full to part-time employment, often on low pay (Webber et al., 2015).

Long-standing illness and limiting long-standing illness

The measure asks respondents whether they had a physical or mental health condition or illness lasting or expected to last 12 months or more with responses coded 'yes' or 'no'. Respondents were asked if their long-standing illness limited their activities in any way. Using this information, a derived variable was created by Scottish Government analysts to indicate whether someone had any limiting long-standing illnesses: 'yes limiting long-standing illness', 'no limiting long-standing illness', or 'no long-term illness'.

Mental health conditions

Participants who reported to have a long-standing illness were asked what was wrong with them with over 42 conditions listed. One of these conditions, mental illness including 'anxiety, depression and nerves', was used in this analysis: 'yes' or 'no'.

Life satisfaction

The Satisfaction with Life Scale is discussed in section 4.5.1.

Tobacco smoking

Of those who indicated that they had smoked a cigarette, cigar or pipe previously, interviewers asked participants whether they smoked cigarettes nowadays: 'yes' or 'no'.

Physical activity

Respondents were asked about their physical activity habits including type, length of time in minutes and frequency by the interviewer. Scottish Government analysts then used this information to create a derived variable to indicate the number of days per week any activities for 30 minutes or more were undertaken with ten to 29-minute sessions included. Due to small numbers, one category was collapsed to provide four categories for analysis: ‘none’, ‘less than once to twice a week’, ‘three or four times a week’, or ‘five or more times a week’.

Another component of physical activity measured in the survey was sedentary time. Nurses typically do not work to the standard nine to five Monday to Friday pattern and thus comparing sedentary weekday and weekend time between occupational groups separately would likely have provided misleading results. As such, a single combined variable for weekday and weekend sedentary time was created. Sedentary time was measured in minutes and grouped in five categories based on equal numbers of participants: 0–270 minutes, 275–360 minutes, 370–480 minutes, 485–720 minutes or 740–2460 minutes.

Alcohol consumption

Respondents were asked a range of questions about their alcohol drinking habits including type, amount and frequency of alcohol consumption in an average a week. Using this data, Scottish Government analysts created a derived variable based on weekly units of alcohol consumed, including ‘none’, ‘moderate’ or ‘hazardous or harmful’ drinker. Participants were categorised as non-drinkers if they consumed zero units, moderate was 14 units or less in females and 21 units or less in males, and hazardous or harmful if 15 units or more in females and 22 units or more in males.

Fruit and vegetable consumption

Respondents were asked a question on the type, size and amount of fruit and vegetables consumed. From this information, Scottish Government analysts created a derived variable indicating the grouped number of portions of fruit (including fruit juice) and vegetables consumed yesterday: ‘none’, ‘less than five portions’, ‘five portions or more’. The WHO (2005ii) recommends that adults consume at least five varied portions (80g) of fruit and vegetables a day.

**Table 4.4 Factor Analysis Correlations.**

| | | Frequency of drinking (non-diet) soft drinks | Frequency of eating cakes | Frequency of eating biscuits | Confectionary |
|---|---|---|---|---|---|
| | Pearson Correlation | 1 | .041** | .049** | .168** |
| Frequency of drinking (non-diet) soft drinks | Sig. (2-tailed) | | .006 | .001 | .000 |
| | N | 4498 | 4498 | 4498 | 4498 |
| | Pearson Correlation | .041** | 1 | .303** | .276** |
| Frequency of eating cakes | Sig. (2-tailed) | .006 | | .000 | .000 |
| | N | 4498 | 4498 | 4498 | 4498 |
| | Pearson Correlation | .049** | .303** | 1 | .232** |
| Frequency of eating biscuits | Sig. (2-tailed) | .001 | .000 | | .000 |
| | N | 4498 | 4498 | 4498 | 4498 |
| | Pearson Correlation | .168** | .276** | .232** | 1 |
| Confectionary | Sig. (2-tailed) | .000 | .000 | .000 | |
| | N | 4498 | 4498 | 4498 | 13802 |

**. Correlation is significant at the 0.01 level (2-tailed).

Sugary food and drink

Respondents were asked a range of dietary questions, such as the number of times per day they consumed confectionary, cakes, biscuits and non-diet soft drinks. In the present study, these questions were factor analysed to create a single combined variable for analysis shown in Table 4.4. Factor analysis was used to combine multiple observed variables that had similar patterns of response and were not easily measured directly. Factor analysis enabled the variables of confectionary, cakes, biscuits and non-diet soft drinks to be collapsed into a couple of interpretable underlying factors.

The factorability of the four sugary foods and drink was examined. First, all four items were correlated by at least 0.4 with at least one other item, indicating reasonable factorability (Saleh and Almasri, 2014). Second, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.61 and Bartlett's Test of Sphericity was significant ($X^2$ (6) = 1037.51, $p<0.001$). Finally, the communalities were all over 0.5, confirming that each item shared a common variance with one other item. The identity matrix diagonal elements are over 0.5. Given these findings, factorability was assumed and factor analysis suitable for all four sugary food and drink items.

A principal component factor analysis was conducted as the purpose was to identify and compute composite scores for the factors underlying sugary food and drink items. Initial Eigenvalues showed that confectionary explained 39.5 percent, non-diet soft drinks 25.1 percent, cakes 18.4 percent and biscuits 17.0 percent of the variance. Varimax rotation showed that the two factors – sugary food and drink -

explained 64.6 percent of the variance and these were used in the analysis. Two items, cakes and biscuits, were removed as they did not contribute to the structure.

**Table 4.5 Occupational Classification.**

| Occupational categories | Occupations included | SOC2010 Code |
|---|---|---|
| Nurses | District nurses; health visitors; mental health practitioners; nurses; practice nurses; psychiatric nurses; staff nurses; and student nursse. | 2231 |
| Other health professionals | Medical practitioners; psychologists; pharmacists; ophthalmic opticians; dental practitioners; medical radiographers; podiatrists; physiotherapists; occupational therapists; speech and language therapists; therapy professionals; and midwives. | 2211-2215, 2217, 2218, 2221-2223, 2229, 2232 |
| Care workers | Nursing auxiliaries and assistants; care workers and home carers; support workers; and senior care workers. | 6141, 6145, 6146 |
| Teachers | Higher education teaching professionals; further education teaching professionals; secondary education teaching professionals; primary and nursery education teaching professionals; special needs education teaching professionals; senior professionals of educational establishments; education advisers and school inspectors; and teaching and other educational professionals. | 2311, 2312, 2314 |
| *Other occupations* | | All other codes |

*Control variables*

Respondents were categorised using SOC2010 into five occupational groups based on the skill specification and level of their main occupation. Occupational groups are presented in Table 4.5 and include nurses, other health professionals, care workers, teachers and those in *other occupations* not classified elsewhere.

*Demographics*

Age was measured in whole years and coded into ten-year intervals, 17–29, 30–39, 40–49, 50–59 and 60–69 years. Coding age into ten-year intervals enables comparison between age bands, an area of interest in this thesis. The commonly used National Statistics Socio-Economic Classification was not used in this study because it is an occupation-based classification system and analysis was conducted by occupational group.

**Statistical methods**

Descriptive statistics for demographic variables were calculated for each group separately by gender and age band. Estimates of the prevalence of health outcomes and health risk behaviours reported by each group were then calculated to provide simple summaries on workers' health. Next, three binary logistic regression models were constructed to compare the odds of reporting each of the four health outcomes of interest. These models were used to describe the data and explain the relationship between the dichotomous dependent variable and the independent demographic variables. Demographic variables were entered into the model simultaneously, then occupation followed by each health behaviour to assess the extent to which demographics, occupation and health risk behaviours explained differences between health outcomes (yes versus no). There was no evidence of collinearity between variables entered into the models. Respondents with data missing on the variable of interest were removed from the appropriate section of analysis. Data were analysed using weighted variables provided by Scottish Government analysts in SPSS 20.

**Data checking**

Data in the SHeS required an extensive amount of data checking and cleaning in order to conduct the analysis outlined above. While checking the data, it was noted that long-term illness had been coded the wrong way round in the dataset and required recoding prior to analysis.

### 4.6.4 Study 5

**Research questions, objective and hypotheses**

The research questions, objectives and hypotheses are presented in Chapter 1, sections 1.7 and 1.8.

**Methods**

*Study design, setting and participants*

A longitudinal study design was used to quantify the percentage of workers in five occupational groups in the UK that left the workforce over a 13-year period using routinely collected data from the British Household Panel Survey (BHPS) and Understanding Society. The BHPS is a panel survey of people resident at private addresses in the UK. The main purpose of the survey was to gain a better understanding of social and economic changes at an individual and household level in order to identify, model and forecast changes, their causes and consequences.

The BHPS undertaken between 1991 and 2009 covered 8,167 addresses in Wave 1 drawn from an equal-probability clustered sample of Postcode Address Files south of the Caledonian Canal. Further details on sampling strategy has been provided elsewhere by Lynn (2006). This gives a longitudinal sample size between 2002 and 2009 ranging from 8,264 to 9,118 people. Data was collected by means of face-to-face interviews. The response rate ranged between 87 to 91 percent.

In 2009, respondents in the BHPS were asked if they would consider participating in the new larger survey, Understanding Society. Around 6,700 of the 8,000 respondents in the BHPS agreed. The first Understanding Society interviews were conducted in 2010–2011. The study follows 40,000 households, interviewing the same people in the household each year to build up a picture of their lives and how this changes over time. The study collected information by means of a questionnaire on topics such as family, education, finance, employment, health and wellbeing. A full description of the Understanding Society study can be found on their website (www.understanding society.ac.uk).

Respondents who participated in the BHPS between 2003 and 2009 or Understanding Society between 2010 and 2016, were economically active and aged between 17 and 65 for females and between 17 and 69 for males. Respondents aged below 17, women over 65 and males over 69 were excluded as we assumed that people below 17 were generally in full-time education and those over the upper limit would typically be retired. While applying this assumption certainly has limitations, given the complexity of defining working age at an individual level, we considered this to be the best available criteria to enable comparisons to be drawn and meaningful findings to emerge.

*Variables*

*Outcome variables*

Self-assessed health

Respondents in the BHPS and Understanding Society surveys were asked about their general health. In BHPS, respondents were asked to think back over the last 12 months about how their health had been and rate their health using a five-point scale – 'excellent', 'good', 'fair', 'poor' or 'very poor'. More specifically, the survey asked respondents to rate their health compared to people their own age. In Understanding Society, respondents were asked, in general, would you say your health is 'excellent', 'very good', 'good', 'fair' or 'poor'. The potential implications of this change in wording will be discussed in Chapter 9. Due to small numbers, these categories were aggregated to form two single categories for analysis: 'excellent, good and fair' or 'poor and very poor' for BHPS and 'excellent, very good and good' or 'fair and poor' for Understanding Society.

Satisfaction with life

The BHPS asked respondents how satisfied or dissatisfied they were with their life overall using a seven-point scale where one equals not satisfied at all and seven completely satisfied.

Smokers

Respondents in the BHPS and Understanding Society were asked whether they smoke cigarettes – 'yes' or 'no'. The questionnaire made no specification about whether this question related to currently or across their life course, however, it is assumed given the questions which follow this one in the questionnaire that the question relates to currently smoking cigarettes.

<u>Whether left workforce</u>

Employment was recorded using occupational classifications of occupations of interest – nurses, care workers and teachers. The precise series of questions which were asked in the survey which led to the question on main job last week is shown in Figure 4.2. The wording of the question "did you have a job you were away from last week" may have led to under-reporting by participants. However, the risk of this is considered low and thus is unlikely to obscure findings. The responses to each of the questions outlined in Figure 4.2 were used to group respondents by whether they left the workforce or not. For example, in the BHPS, respondents who remained in the same occupational group, changed occupations but within the same larger occupational group (e.g. nurse who changed occupations but remained within a health associate professional group) or changed occupations outwith the larger occupational group but subsequently returned to their previous occupational group were classified as remained. All other respondents were classified as left by the study.

*<u>Control variables</u>*

Respondents were categorised using SOC2000 into five occupational groups based on the skill specification and level of their main occupation. Occupational groups are shown in Table 4.6 and include health associate professionals, therapists, healthcare related personal services, and teaching professionals.

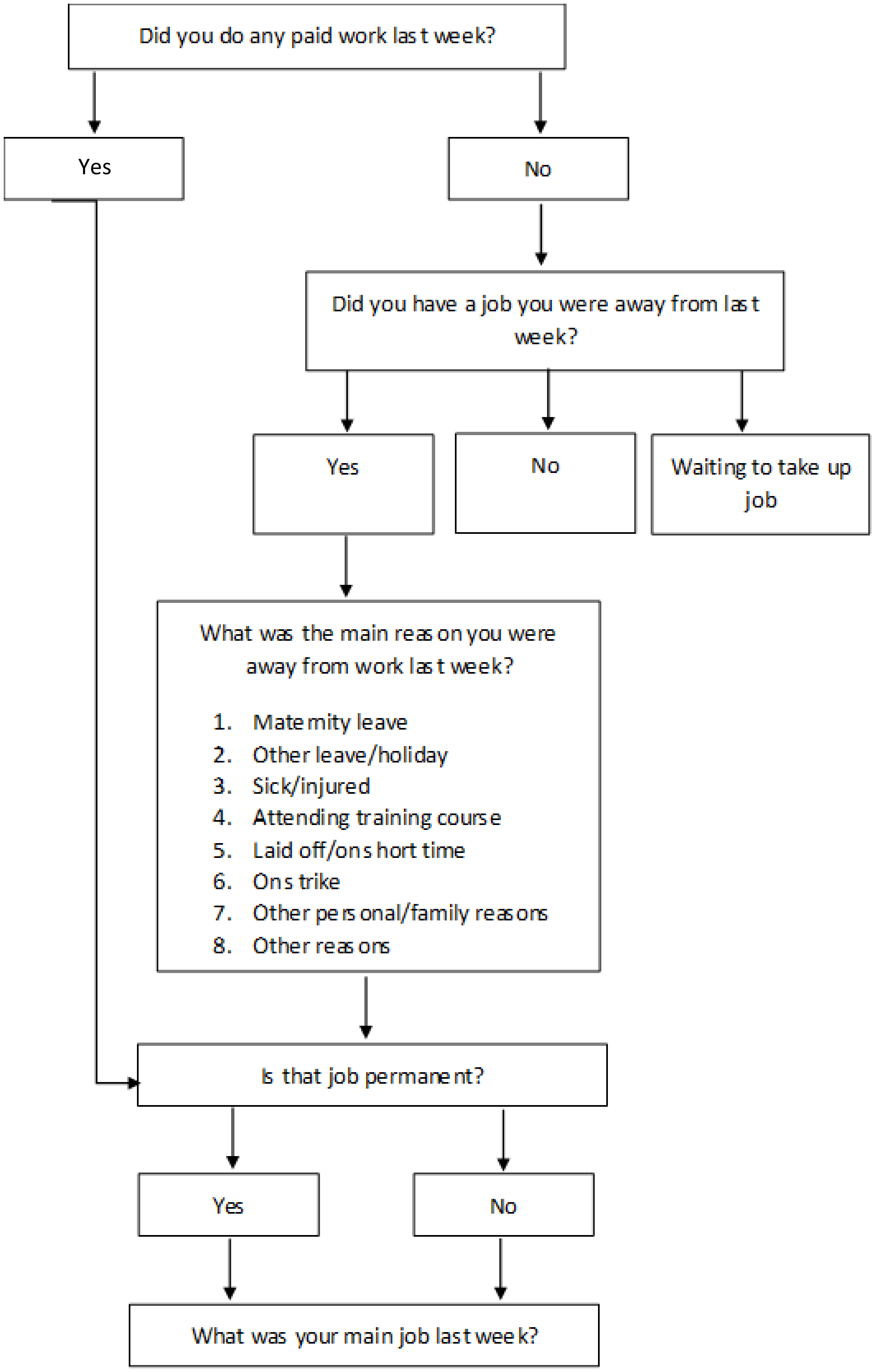



**Figure 4.2 Flow Diagram for Employment Questions.**

**Table 4.6 Occupational Classification.**

| | Occupations included | SOC2000 Codes |
|---|---|---|
| **BHPS** | | |
| Nurses | Health visitors; nurses; staff nurses; state enrolled nurses; state registered nurses; ward sisters. | 3211 |
| Nursing auxiliaries and assistants | Assistant nurses; nursing assistants; nursing auxiliaries; occupational therapy helpers; operating department assistants; phlebotomists; physiotherapy helpers; ward assistants; ward orderlies. | 6111 |
| Care assistants and home carers | Care assistants; home care assistants; night care assistants; residential social workers. | 6115 |
| Secondary education teaching professionals | Head teachers (secondary school); secondary school teachers; teachers (secondary school). | 2314 |
| Primary and nursery education teaching professionals | Head teachers (primary/middle school); infant teachers; junior school teachers; nursery school teachers; primary school teachers. | 2315 |

**Table 4.6 Occupational Classification Continued.**

| | Occupations included | SOC2000 Codes |
|---|---|---|
| **Understanding Society** | | |
| Health associate professionals | Nurses; midwives; paramedics; medical radiographers; chiropodists; dispensing opticians; pharmaceutical dispensers; medical and dental technicians. | 321 |
| Healthcare related personal services | Nursing auxiliaries and assistants; ambulance staff (excluding paramedics); dental nurses; house-parents and residential wardens; care assistants and home carers. | 611 |
| Teaching professionals | Higher educational teaching professionals; further education teaching professionals; education officers, school inspectors; secondary education teaching professionals; primary and nursery education teaching professionals; special needs education teaching professionals; registrars and senior administrators of educational establishments; teaching professionals not elsewhere classified. | 231 |

*Demographics*

Age was measured by year of birth and was used as a continuous variable in models. Age was coded into three categories based on year of birth to report descriptive statistics: 17–29, 30–49 and 50–69 years. Coding age into a categorical variable for the presentation of the descriptive statistics allowed age bands to be compared and more meaningful findings to emerge in relation to young, middle-aged and older workers. The commonly used National Statistics Socio-Economic Classification was not used in this study because it is an occupation-based classification system and analysis was conducted by occupational group.

**Statistical methods**

Descriptive statistics for demographic variables were calculated for each group separately by age group to provide straightforward summaries of the data. Estimates of workforce exit, self-assessed health and overall job satisfaction reported by each group were then calculated. Next, five Cox proportional hazards models were constructed to calculate the association between self-assessed health/smoking status/overall job satisfaction and workforce exit by occupational group. One additional Cox proportional hazards model was constructed to estimate the association between occupation/self-assessed health/smoking status/overall job satisfaction and workforce exit. Cox proportional hazards models were used to investigate the effect of several variables on workforce exit. Demographic variables were entered into the model simultaneously followed by self-assessed health, smoking status and overall job satisfaction to assess the extent to which demographics, health, smoking status and overall job satisfaction explained differences between workforce exit by occupational group. There was no evidence of collinearity between variables entered into the models. Respondents with data missing on the variable of interest were removed from the analysis of that variable. Data were analysed using weighted variables provided by Scottish Government analysts in SPSS 23.0 (IBM® SPSS® Statistics 23.0).

**Data cleaning**

Data in the BHPS and Understanding Society databases required data checking and recoding of variables in order to conduct the analysis outlined above. This was an important and time-consuming phase in study five.

## 4.7 Literature review on databases used

*Annual Population Survey*

The APS has been widely used by health researchers (Conti-Ramsden et al. 2016, Weyman et al. 2016).

*Labour Force Survey*

The LFS has been widely used by health researchers (Curnock, Leyland and Popham, 2014; Davies, Jones and Lloyd-Williams, 2014).

*Scottish Health Survey*

The SHeS has been widely used by health researchers (O'Donovan, Lee, Hamer and Stamatakis, 2017; Kyle, Neall and Atherton, 2016). The quality and reliability of the SHeS has come under scrutiny, particularly in relation to alcohol consumption. Smith and Foxcroft (2009) suggested that there was an under-representation of young single adults in the survey – a group for which alcohol consumption is often higher. Heavy drinkers were also suggested to be under-represented potentially due to difficulty in contacting them. Furthermore, Smith and Foxcroft (2009) suggested that there was an under-reporting of alcohol consumption among individuals potentially due to guilt or embarrassment, or a subconscious desire to underestimate rather than overestimate the amount of alcohol they consume. Another factor which can contribute to inaccurate reporting is a variation in glass sizes dependent on location (e.g. home or licensed establishment) and alcohol strength between brands (Gill, Donaghy, Guise and Warner, 2006). Official recorded consumption may be under-reported by approximately 20 percent based on tax-based sales according to Smith and Foxcroft (2009).

*BHPS and Understanding Society*

The BPHS and Understanding Society has been widely used by health researchers (Alcock, White, Wheeler, Fleming and Depledge, 2014; Jokela, Batty, Vahtera, Elovainio and Kivimäki, 2013; Martin, Panter, Suhrcke and Ogilvie, 2015).

## 4.8 Summary

To summarise, Table 4.7 provides an overview of the research questions and datasets used to address each question.

**Table 4.7 Research Question with Dataset Used.**

| Question | | Dataset used | | | |
|---|---|---|---|---|---|
| | | APS | LFS | SHeS | BHPS Understanding Society |
| 2 | What is the percentage of nursing and midwifery professionals compared to other professions and occupations in the UK, who report a current disability or health problem that affects the amount or kind of work undertaken, and low satisfaction with life associated with disability or health problems? | ✓ | | | |
| 3 | What role do demographics and work variables play in explaining the answer to research question two? | ✓ | | | |
| 4 | What is the prevalence of: back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; 'depression or bad nerves'; and progressive illness among nursing and midwifery professionals compared to other professions and occupations? | | ✓ | | |
| 5 | What is the association with demographic and work variables and the occurrence of: back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; 'depression or bad nerves'; and progressive illness among nursing and midwifery professionals compared to other work groups? | | ✓ | | |
| 6 | What percentage of: nurses; other health professionals; care workers; teachers; and *other occupations* in Scotland self-report to smoke tobacco, engage in physical activity, and consume alcohol and fruit and vegetables | | | ✓ | |

**Table 4.7 Research Question with Dataset Used Continued.**

| | Question | APS | LFS | SHeS | BHPS Understanding Society |
|---|---|---|---|---|---|
| | | Dataset used | | | |
| 7 | What is the association between health behaviours, demographics and (i) self-assessed health, (ii) the presence of a long-term illness, (iii) the presence of a mental health condition and (iv) satisfaction with life among nurses compared to other occupational groups in Scotland? | | | ✓ | |
| 8 | What percentage of nursing and midwifery professionals who reported poor health left the workforce between 2003 and 2016 compared to other occupational groups? | | | | ✓ |
| 9 | How do demographic and behavioural variables and life satisfaction relate to early workforce exit of nurses and midwives compared to other occupational groups? | | | | ✓ |

Having provided a detailed description and justification of the approach and methods employed, the remaining chapters report the findings of each of the 4 remaining studies.

# Chapter 5 Study Two: Annual Population Survey analysis

This chapter focusses on reporting the findings from the question: What is the percentage of nursing and midwifery professionals compared to other professions and occupations in the UK who report a current disability, health problem that affects the amount or kind of work undertaken, and low satisfaction with life associated with disability or health problems? What role do demographics and work variables play in explaining the answer to Q2?

## 5.1 Introduction

Across many countries in the industrialised world, the population is ageing, largely due to lower fertility and increased life expectancy. Despite this rise in life expectancy, improved living conditions, and better health, the average time people spend in paid employment is decreasing. Many countries are developing policies and focusing initiatives to encourage older workers to remain in the labour market for longer and delay retirement. The success of these policies will depend on a better understanding of workers, and extent to which occupation can impair health in different occupational groups.

It was established from the literature review in Chapters 2 and 3 that there are good theoretical reasons to suspect that the health of nurses is problematic. Poor health among nurses can negatively impact on the individual's wellbeing, patient safety and thus the sustainability of the health system. Thus, by not investing in the health of nurses, health systems will find it difficult to meet the growing demands for care from an ageing population, further impinging on society's health and strengthening health inequalities.

In this chapter, the health status of males and females in the age group 17–69 are examined according to their occupation, with a specific focus on health occupations. Occupations investigated include: health professionals, therapy professionals, nursing and midwifery professionals, caring personal services, health and social services managers and directors, managers and proprietors in health and care services, teaching and educational professionals, and *other occupations*. The aim of this study was to assess the health status of health literate occupational groups in relation to satisfaction with life, current disability, past health problems lasting more than one year, and whether health problems affect the amount and/or kind of work. In doing so, the health status of health workers in different occupational groups are examined.

## 5.2 APS demographic characteristics

The subjects were participants in the Annual Population Survey (APS). As mentioned in Chapter 4, the APS is a cross-sectional survey that aims to provide estimates between censuses on key social and labour market variables at a local area level. Details of this are provided in Chapter 4. Between January and March 2016, the APS collected data on 197,867 people aged 17–69 who reported to be in work at the time of the survey, half of whom were female (52.6%). There were 3,241 nursing and midwifery professionals, 2,222 health professionals, 588 therapy professionals, 6,319 caring personal services, 387 health and social services managers and directors, 392 managers and proprietors in health and care services, 6,755 teaching and educational professionals, and 177,693 respondents in *other occupations*. We excluded those aged below 17 or over 69, since we assumed that people below 17 are typically in full-time education and those over 69 would normally have retired.

Shown in Table 5.1 is the distribution of respondents according to age and gender within each occupational group. The proportion of females differed among occupations, ranging from 49.9% in *other occupations* to 90.3% in nursing and midwifery professionals. The average age of workers across occupations ranged from 42.81 (*SD* = 0.47) in therapy professionals to 48.38 (*SD* = 0.52) in managers and proprietors in health and care services.

**Table 5.1 Demographic Characteristics.**

| | Female | | Male | | Mean age | *SD* | Total N | % |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | | | | |
| Nursing and Midwifery Professionals | 2927 | 90.3 | 314 | 9.7 | 44.46 | 0.19 | 3241 | 100 |
| Health Professionals | 1287 | 57.1 | 935 | 42.1 | 43.07 | 0.24 | 2222 | 100 |
| Therapy Professionals | 493 | 83.8 | 95 | 16.2 | 42.81 | 0.47 | 588 | 100 |
| Caring Personal Services | 5233 | 82.8 | 1086 | 17.2 | 43.02 | 0.16 | 6319 | 100 |
| Health and Social Services Managers and Directors | 270 | 69.8 | 117 | 30.2 | 48.10 | 0.45 | 387 | 100 |
| Managers and Proprietors in Health and Care Services | 327 | 83.4 | 65 | 16.6 | 48.38 | 0.52 | 392 | 100 |
| Teaching and Educational Professionals | 4702 | 69.6 | 2053 | 30.4 | 43.64 | 0.14 | 6755 | 100 |
| Other Occupations | 88874 | 49.9 | 89089 | 50.1 | 44.90 | 0.04 | 177963 | 100 |
| Total | 104113 | 52.6 | 93754 | 47.4 | 44.776 | 0.03356 | 197867 | 100 |

## 5.3 Analysis

Descriptive statistics of health measures were generated to examine the prevalence of poor health of nursing and midwifery professionals relative to health professionals, therapy professionals, caring personal services, health and social services managers and directors, managers and proprietors in health and care services, teaching and educational professionals, and *other occupations.* Next, descriptive statistics of the association of health on work and satisfaction with life were generated, presented by each occupational group. Finally, logistic regression analysis was used to identify the relationship between individual characteristics, occupation and working hours. Findings were presented by estimates of odds ratios.

The analysis proceeded through five stages: firstly, current disability is examined and then the risk of reporting a health problem lasting more than a year was investigated. In the third stage, the focus is on the risk of having a health problem that affects the amount of work and in the fourth stage, the risk of reporting a health problem that affects the kind of work was investigated. Finally, in stage five the attention is on the risk of reporting low satisfaction with life. At each stage, control was made for other potentially affecting factors including gender, age band, ethnic origin, occupation type and working hours. The model is using a cut of 0.5 for group assignment based on Hosmer-Lemeshow test.

## 5.4 Results

### 5.4.1 Individuals' health profile

**Descriptors on prevalence of current disability reported**

Data on 0.7% (n=1,289) of the sample were missing and were removed from all analyses of current disability status. Current disability was defined as the presence or absence of a disability in accordance with the GSS Harmonised Standard (Office of

National Statistics, 2010) and Equality Act 2010. Females reported a higher prevalence (21.1%, $t(944)=123.98$) of current disability than males (17.3%, $t(413)=90.23$, $p<0.001$). The percentage of the sample reporting a current disability increased with age group (12.2% in 17–29-year olds, 13.5% 30–39, 18.5% 40–49, 24.9% 50–59, and 32.7% 60–69). ANOVA showed that the effect of age band was significant, $F(1, 42652282)=1358208.71$, $p<0.001$. Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significantly lower in <29 year olds than 60–69 year olds ($t(5)=36.42$, $F(135204, 45688)=5043.39$, $p<0.001$).

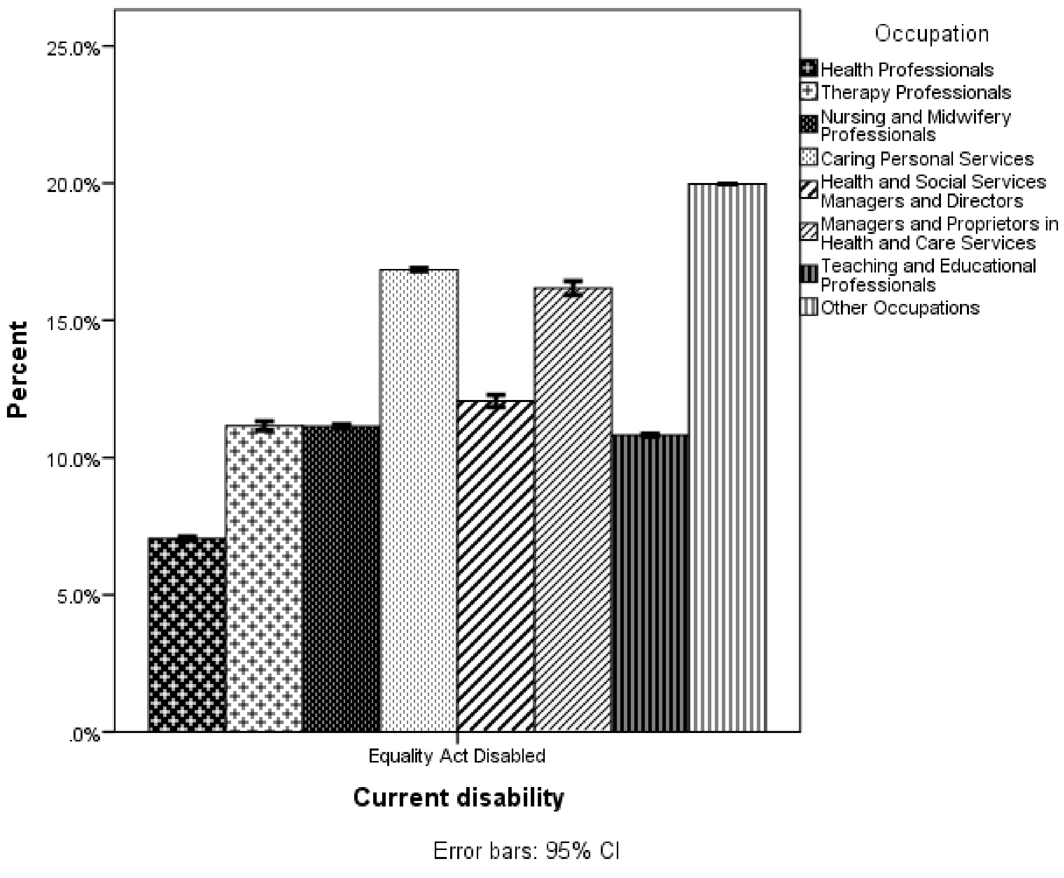



**Figure 5.1 Error Bar Chart for Current Disability by Occupation.**

Current disability by occupation

The distribution of self-reported disability in the sample, shown in Figure 5.1, differed by occupational group but the reason for this difference is not fully known. For example, 11.1 percent (95% CI 11.0, 11.2) of nursing and midwifery professionals, 7.1 percent (95% CI 6.9, 7.1) of health professionals, 11.1 percent (95% CI 11.0, 11.3) of therapy professionals, 16.8 percent (95% CI 16.7, 16.9) of caring personal service workers, 12.1 percent (95% CI 11.9, 12.3) of health and social services managers and directors, 16.2 percent (95% CI 15.6, 16.8) of managers and proprietors in health and care services, 10.8 percent (95% CI 10.8, 10.9) of teaching and educational professionals, and 25.1 percent (95% CI 20.0, 30.1) of *other occupations* reported a disability. Differences in occupational prevalence are potentially due to physical demands of the role (Ngan et al., 2010; Smedley et al., 1995; Trinkoff et al., 2003).

Current disability by occupation, stratified by gender and age band

For disability status characteristics by occupational group stratified by gender and age band, see Appendix ix Table 5.2. Disability differed by gender among occupational groups. Current disability was reported by 11.1 percent (95% CI 11.0, 11.2) of female and 11.4 percent (95% CI 11.2, 11.6) of male nursing and midwifery professionals. The highest percentage of disability reported in comparator groups was reported by females (22.4%, 95% 22.4, 22.4) and males (17.7%, 95% CI 17.7, 17.7) in *other occupations.* Male (5.0%, 95% CI 4.9, 5.1) and female (8.7%, 95% CI 8.6, 8.8) health professionals reported the lowest prevalence of current disability. Self-reported disability was generally shown to increase between age bands in each occupation of interest. For example, the prevalence of disability by age band increased as age rose in nursing and midwifery professionals (17–29 years [12.2%, $t(5)=44.60$, $p<0.001$], 30–39 [13.5%, $t(5)=47.60$, $p<0.001$], 40–49 [18.5%, $t(5)=32.17$, $p<0.001$], 50–59 [24.6%, $t(5)=57.58$, $p<0.001$], 60–69 [32.7%, $t(5)=66.28$, $p<0.001$]). The prevalence of current disability was not shown to increase in health professionals aged 30–39, managers and proprietors in health and care services aged 50–59, and caring personal services aged 60–69 where fewer of the sample reported one or more current disabilities. Differences may be explained by premature exit from the workforce into a different occupation, sickness incapacity or early retirement.

ANOVA showed that the effect of gender, age band and gender by age band was significant in all the occupations included in the analysis. The statistics were as follows: among nursing and midwifery professionals, gender $F(1, 665299)=117.01$, $p<0.001$, age band $F(4, 665299)=663.05$, $p<0.001$ and gender by age band $F(4, 665299)=433.51$, $p<0.001$; health professionals, gender $F(1, 517071)=2350.59$, $p<0.001$, age band $F(4, 517071)=1782.25$, $p<0.001$ and gender by age band $F(4, 517071)=453.89$, $p<0.001$; therapy professionals, gender $F(1, 130555)=249.05$, $p<0.001$, age band $F(4, 130555)=349.63$, $p<0.001$ and gender by age band $F(4, 130555)=24.32$, $p<0.001$; caring personal services, gender $F(1, 1289013)=806.14$, $p<0.001$, age band $F(4, 1289013)=1767.01$, $p<0.001$ and gender by age band $F(4, 1289013)=324.40$, $p<0.001$; health and social services managers and directors, gender $F(1, 84383)=64.32$, $p<0.001$, age band $F(4, 84383)=353.09$, $p<0.001$ and gender by age band $F(4, 84383)=207.41$, $p<0.001$; managers and proprietors in health and care services, gender $F(1, 82715)=725.64$, $p<0.001$, age band $F(4, 82715)=1249.01$, $p<0.001$ and gender by age band $F(4, 82715)=388.14$, $p<0.001$;

teaching and educational professionals, gender $F(1, 1515020)=553.00$, $p<0.001$, age band $F(4, 1515020)=2645.72$, $p<0.001$ and gender by age band $F(4, 1515020)=306.91$, $p<0.001$; and *other occupations*, gender $F(1, 38368220)=123609.13$, $p<0.001$, age band $F(4, 38368220)=347706.00$, $p<0.001$ and gender by age band $F(4, 38368220)=4429.20$, $p<0.001$.

**Descriptors of health problems lasting more than one year reported**

Distribution of health problems lasting more than one year reported by the sample was examined. Those with missing data on this variable were removed from all analysis of this variable (n=131, 0.1%). 10.0 percent (95% CI 10.0, 10.0) of females and 9.1 percent (95% CI 9.0, 9.1) of males reported a health problem with a year's minimal duration. As age increased, the percentage of people reporting a health problem lasting more than one year rose (17–29 years [7.0%, 95% CI 7.0, 7.0], 30–39 [7.2%, 95% CI 7.2, 7.2], 40–49 [8.9%, 95% CI 8.9, 8.9], 50–59 [10.7%, 95% CI 10.7, 10.7], 60–69 [13.8%, 95% CI 13.8, 13.8]). ANOVA showed that the effect of age band was not significant, $F(1, 15627032)=110389.47$, $p<0.001$.

Health problems lasting more than one year by occupation

The presence of a health problem lasting more than one year differs by occupation, see Figure 5.2. In the sample, 8.5 percent (95% CI 8.4, 8.6) of nursing and midwifery professionals, 3.8 percent (95% CI 3.8, 3.9) of health professionals, 8.5 percent (95% CI 8.4, 8.6) of therapy professionals, 9.7 percent (95% CI 9.6, 9.8) of caring personal service workers, 12.3 percent (95% CI 11.9, 12.7) of health and social services managers and directors, 11.1 percent (95% CI 10.7, 11.5) of managers and proprietors in health and care services, 7.7 percent (95% CI 7.6, 7.8) of teaching and educational professionals and 9.7 percent (95% CI 9.7, 9.7) of *other occupations*.

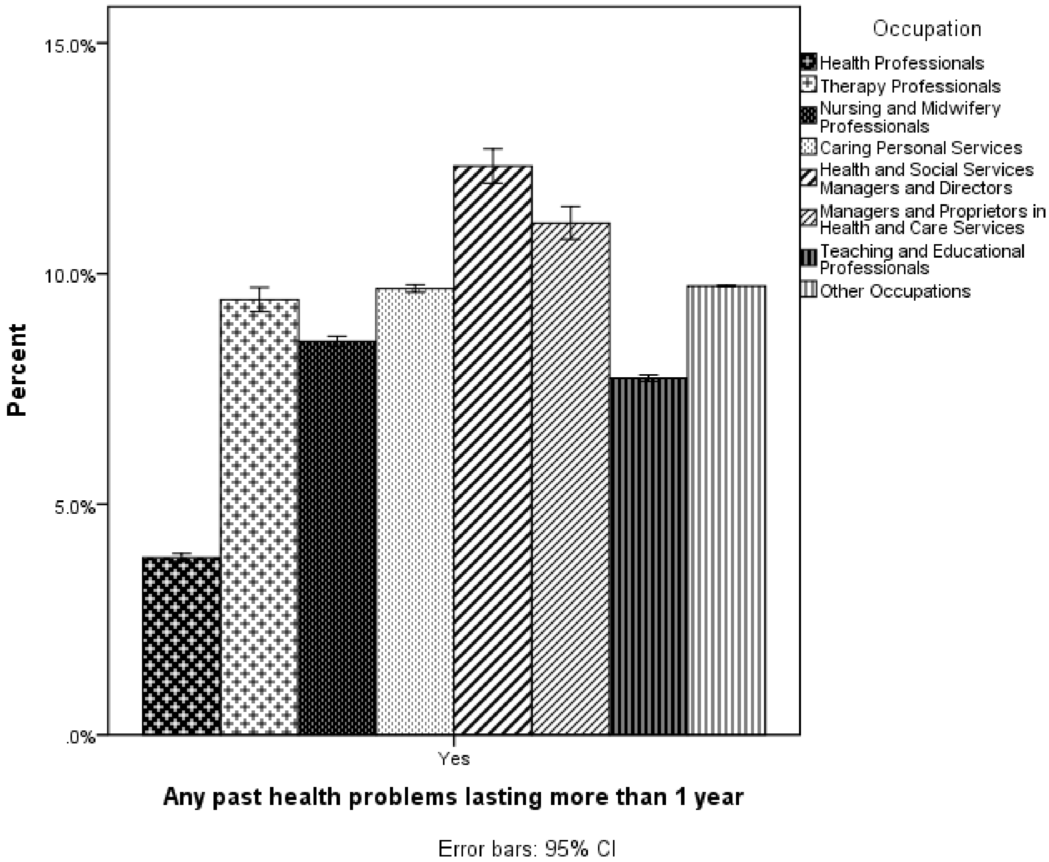



**Figure 5.2 Error Bar Chart for Health Problems Lasting More Than One Year by Occupation.**

<u>Current health problems lasting more than one year by occupation, stratified by gender and age band</u>

Characteristics of the prevalence of health problems lasting more than one year of the sample are summarised in Appendix ix Table 5.3. For example, in nursing and midwifery professionals, 8.8 percent (95% CI 7.9, 8.1) of females and 6.1 percent (95% CI 5.8, 6.4) of males reported a health problem extending beyond a year. The percentage reported to meet this criterion for health problems in the comparator sample for females was highest in *other occupations* (10.2%, 95% CI 10.2, 10.2) and lowest in health professionals (3.7%, 95% CI 3.6, 3.8)*;* among males, the highest percentage was reported by therapy professionals (14.0%, 95% CI 13.3, 14.7) and lowest in health professionals (4.0%, 95% CI 3.9, 4.1). The percentage of the sample reporting a health problem lasting over a year generally increased as age rose. For example, the prevalence reported by each age band in nursing and midwifery professionals was as follows: 4.4% 17–29 years, 7.9% 30–39 ($t(5)=38.48$, $p<0.001$), 10.3% 40–49 ($t(5)=72.19$, $p<0.001$), 8.1% 50–59 ($t(5)=46.55$, $p<0.001$), and 15.2% 60–69 ($t(5)=78.93$, $p<0.001$). Differences may potentially be explained by working hours (e.g. full-time and part-time), premature exit from the workforce into a different occupation, sickness incapacity or early retirement.

ANOVA showed that the effect of gender, age band and gender by age band was significant in all the occupations included in the analysis. The statistics were as follows: among nursing and midwifery professionals, gender $F(1, 20816)=39.17$, $p<0.001$, age band $F(4, 20816)=291.45$, $p<0.001$ and gender by age band $F(4, 20816)=42.85$, $p<0.001$; health professionals, gender $F(1, 7076)=1174.81$, $p<0.001$, age band $F(4, 7076)=200.03$, $p<0.001$ and gender by age band $F(4, 7076)=231.91$, $p<0.001$; therapy professionals, gender $F(1, 4096)=3176.36$, $p<0.001$, age band $F(4, 4096)=1095.38$, $p<0.001$ and gender by age band $F(4, 4096)=159.37$, $p<0.001$; caring personal services, gender $F(1, 48342)=113.12$, $p<0.001$, age band $F(4, 48342)=346.61$, $p<0.001$ and gender by age band $F(4, 48342)=159.11$, $p<0.001$; health and social services managers and directors, gender $F(1, 3708)=217.72$, $p<0.001$, age band $F(3, 3708)=614.28$, $p<0.001$ and gender by age band $F(1,$

3708)=68.33, $p<0.001$; managers and proprietors in health and care services, gender $F(1, 3310)=143.51$, $p<0.001$, age band $F(3, 3310)=658.61$, $p<0.001$ and gender by age band $F(1, 3310)=143.51$, $p<0.001$; teaching and educational professionals, gender $F(1, 41269)=33.40$, $p<0.001$, age band $F(4, 41269)=66.16$, $p<0.001$ and gender by age band $F(4, 41269)=82.20$, $p<0.001$; and *other occupations*, gender $F(1, 1340561)=3288.75$, $p<0.001$, age band $F(4, 1340561)=2437.64$, $p<0.001$ and gender by age band $F(4, 1340561)=396.53$, $p<0.001$.

### 5.4.2 Health and work

**Descriptors on the prevalence of health problems that affect the amount of work reported**

Data on 0.2 percent (n=341) of the sample were missing and were removed from all analysis of the question on the presence of a health problem that affects the amount of work an individual can do. Females reported a higher prevalence (47.1%, 95% CI 47.1, 47.1) than males (42.3%, 95% CI 42.3, 42.3). The percentage of the sample reporting a health problem that affects the amount of work they are able to undertake increased with age group (17–29 years [42.0%, 95% CI 41.9, 42.1], 30–39 [42.6%, 95% CI 42.5, 42.7], 40–49 [44.8%, 95% CI 44.7, 44.9], 50–59 [46.3%, 95% CI 46.2, 46.4], 60–69 [47.0%, 95% CI 46.9, 47.1]). ANOVA showed that the effect of age band was significant, $F(4, 12300026)=4422.96$, $p<0.001$. Post hoc analysis using the Scheffé post hoc criterion for significance indicated that the effect of age band was significantly lower in <29 year olds ($t(5)=77.60$) than 60–69 year olds ($t(5)=42.32$, $F(1, 12300029)=17054.36$, $p<0.001$).

Presence of a health problem that affects the amount of work by occupation

The distribution of the sample reporting that their health problem affected the amount of work they were able to undertake differed by occupational group, see Figure 5.3. For example, 24.7 percent (95% CI 24.4, 24.9) of nursing and midwifery professionals, 12.3 percent (95% CI 11.9, 12.7) of health and social service managers and directors and 46.7 percent (95% CI 46.6, 46.7) of those in *other occupations.* Differences in the prevalence reported between occupational groups may potentially be due to differences in specific health conditions experienced (e.g. musculoskeletal problems (Callison and Nussbaum, 2012) and diabetes (Poulsen et al., 2014).

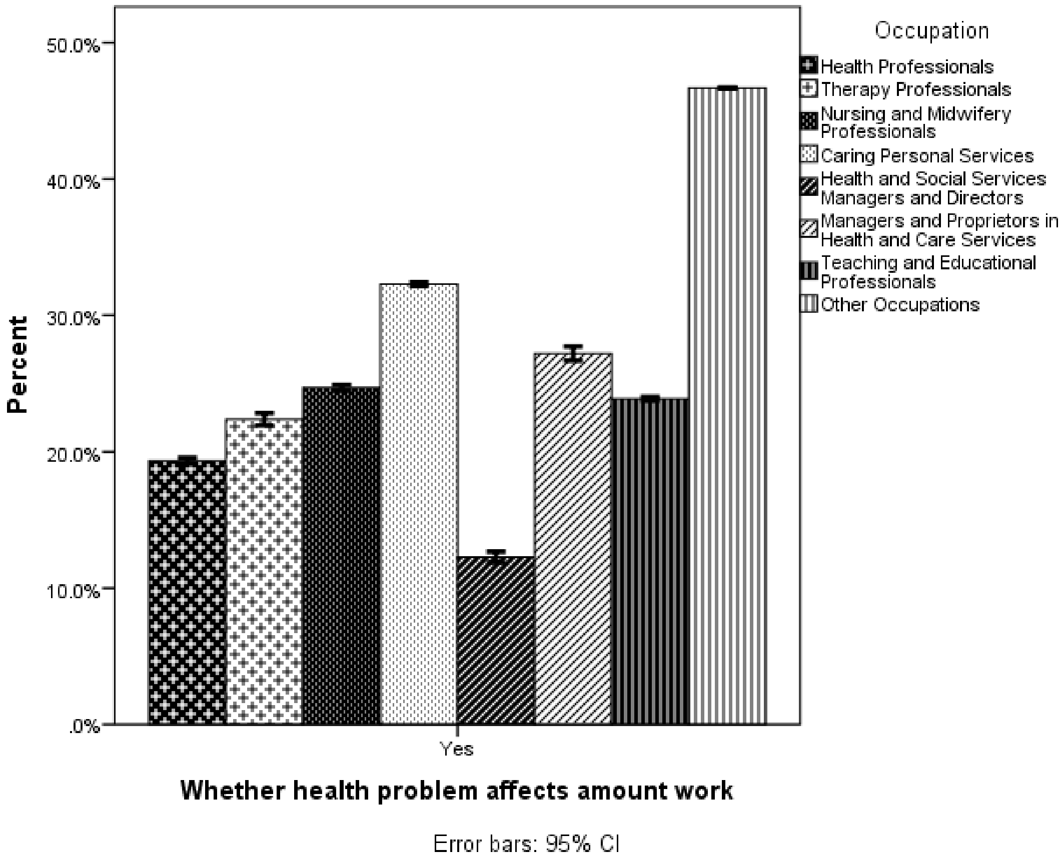



**Figure 5.3 Error Bar Chart for Health Problem Affecting Amount of Work by Occupation.**

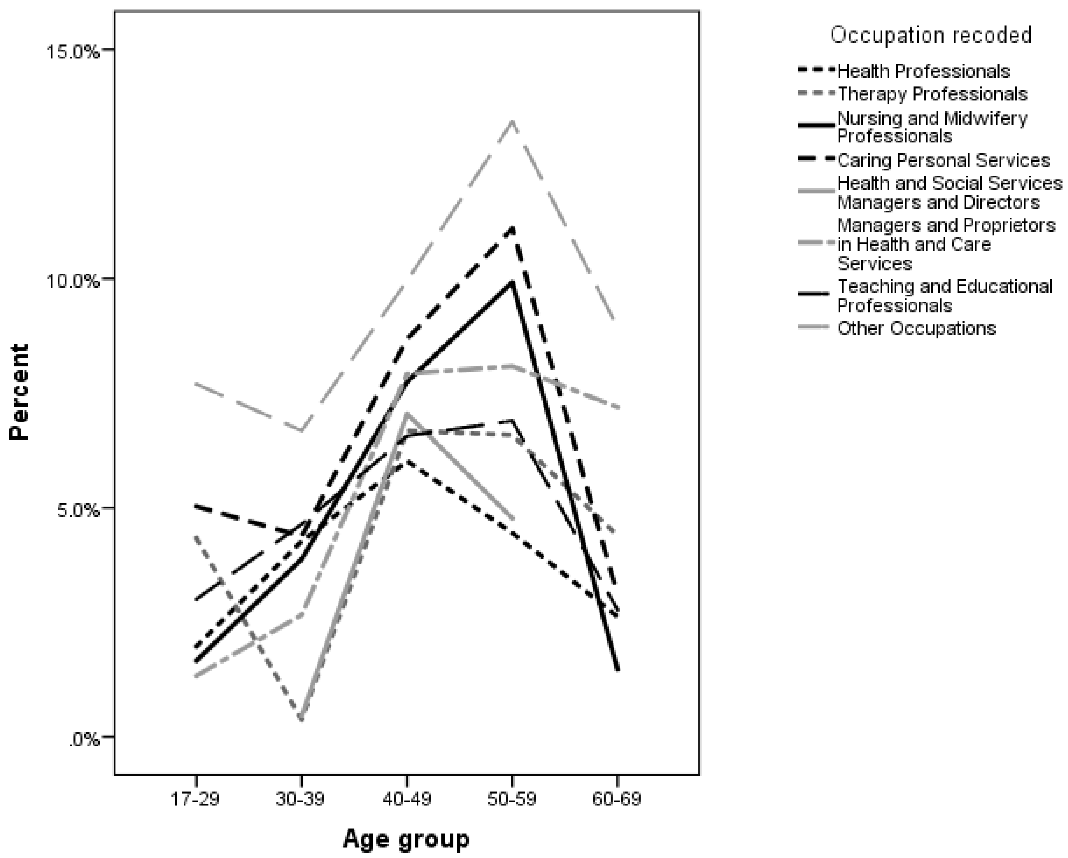



**Figure 5.4 Line Chart for Percentage of People Reporting a Health Problem That Affects Amount of Work by Occupation and Age Group.**

<u>Health problems that affect the amount of work by occupation, stratified by gender and age band</u>

Characteristics on the presence of a health problem that affects the amount of work an individual is able to do by gender and age band is presented in Appendix ix Table 5.4. 25.4 percent (95% CI 25.2, 25.6) of female and 19.1 percent (95% CI 18.6, 19.6) of male nursing and midwifery professionals reported experiencing a health problem that affects the amount of work they are able to do. Among comparator groups, the highest percentage was reported by females (49.9%, 95% CI 49.9, 49.9) and males (43.4%, 95% CI 43.4, 43.4) in *other occupations.* Female (14.6%, 95% CI 14.1, 15.1) and male (8.0%, 95% CI 7.5, 8.6) health and social services managers and directors reported the lowest percentage of health problems that affect the amount of work they are able to undertake. The presences of a health problem that affects the amount of work individuals are able to do generally increases with age until the age of 50–59 after which it seems ability to do work decreases, see Table 5.4 in Appendix ix and Figure 5.4. For example, the prevalence of a health problem that affects the amount of work reported by nursing and midwifery professionals was as follows: 15.8 percent in 17–29 years ($t(5)=77.60$, $p<0.001$), 24.8 percent 30–39 ($t(5)=54.01$, $p<0.001$), 26.3 percent 40–49 ($t(5)=52.52$, $p<0.001$), 26.3 percent 50–59 ($t(5)=71.80$, $p<0.001$), 21.9 percent 60–69 ($t(5)=42.32$, $p<0.001$).

ANOVA showed that the effect of gender, age band and gender by age band was significant in all the occupations included in the analysis. The statistics were as follows: among nursing and midwifery professionals, gender $F(1, 170321)=477.45$, $p<0.001$, age band $F(4, 170321)=214.32$, $p<0.001$ and gender by age band $F(4, 170321)=91.67$, $p<0.001$; health professionals, gender $F(1, 111978)=2363.57$, $p<0.001$, age band $F(4, 111978)=299.35$, $p<0.001$ and gender by age band $F(4, 111978)=296.32$, $p<0.001$; therapy professionals, gender $F(1, 33375)=218.69$, $p<0.001$, age band $F(4, 33375)=645.85$, $p<0.001$ and gender by age band $F(4, 33375)=528.73$, $p<0.001$; caring personal services, gender $F(1, 401749)=1309.94$, $p<0.001$, age band $F(4, 401749)=188.95$, $p<0.001$ and gender by age band $F(4, 401749)=412.98$, $p<0.001$; health and social services managers and directors, gender $F(1, 26039)=36.02$, $p<0.001$, age band $F(4, 26039)=485.01$, $p<0.001$ and gender by age band $F(4, 26039)=14.82$, $p<0.001$; managers and proprietors in health and care services, gender $F(1, 28306)=453.34$, $p<0.001$, age band $F(4, 28306)=115.04$, $p<0.001$

and gender by age band $F(4, 28306)=48.57$, $p<0.001$; teaching and educational professionals, gender $F(1, 365289)=1009.16$, $p<0.001$, age band $F(4, 365289)=50.18$, $p<0.001$ and gender by age band $F(4, 365289)=510.58$, $p<0.001$; and *other occupations*, gender $F(1, 11162966)=38298.53$, $p<0.001$, age band $F(4, 11162966)=4819.41$, $p<0.001$ and gender by age band $F(4, 11162966)=5182.05$, $p<0.001$.

**Descriptors on the prevalence of health problems that affect the kind of work reported**

Data on the prevalence of individuals reporting a health problem that affected the kind of work they were able to do was missing on 0.1 percent (n=255) of respondents in the sample and these cases were removed in the analysis of this variable. The question was only asked of those reporting a health problem they expected to last longer than a year earlier in the survey, which is reflected in a large percentage of missing cases. The term 'kind of work' was not defined in the survey with respondents applying their own interpretation of the meaning. 50.3 percent of females and 48.7 percent of males self-reported a health problem that affected the kind of work. Our analysis found no clear relationship between self-reporting a health problem affecting kind of work and age group ($p>0.05$). ANOVA showed that the age band was significant, $F(1, 12322535)=1888.75$, $p<0.001$, but post hoc analysis using the Scheffé post hoc criterion for significance indicated that the effect of age band was significantly lower in <29 year olds ($t(5)=42.52$) than 60–69 year olds ($t(5)=42.32$, $F(1, 12322535)=1888.75$, $p<0.001$).

Health problems affecting type of work by occupation

The proportion of respondents in each occupation self-reporting the presence of a health problem affecting the kind of work they were able to do differed between occupation, see Figure 5.5. Nursing and midwifery professionals (27.0%, 95% CI 26.8, 27.2), therapy professionals (27.3%, 95% CI 26.8, 27.8), managers and proprietors in health and care services (25.9% 95% CI 25.4, 26.4), and teaching and educational professionals (28.6%, 95% CI 28.5, 28.8) have similar percentages of individuals reporting a health problem that affects the kind of work they are able to do. A larger percentage was reported by those of workers in *other occupations* (51.5%, 95% CI 51.5, 51.5).

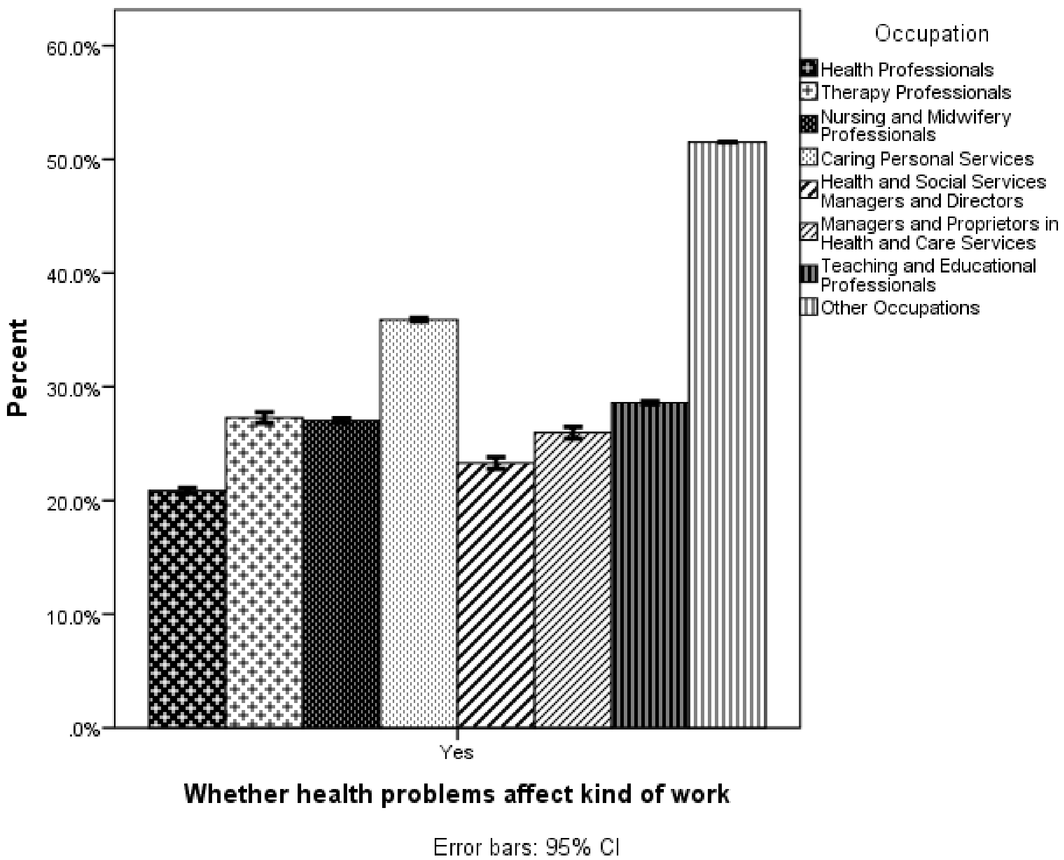



**Figure 5.5 Error Bar Chart for Health Problems Affecting Kind of Work by Occupation.**

Health problems affecting kind of work by occupation, stratified by gender and age band

Presented in Appendix ix Table 5.5 is the proportion of respondents self-reporting a health problem that affects the kind of work they are able to do by gender and age, nested within occupation. The percentage of workers reporting a health problem that affects the kind of work they are able to do differs between gender and occupation. 27.8 percent (95% CI 27.4, 28.2) of female and 21.6 percent (95% CI 21.0, 22.2) of male nursing and midwifery professionals reported the presence of this. The percentage reported by females in comparator groups was highest in *other occupations* (53.2%) and lowest in health professionals (26.0%, 95% CI 25.7, 26.4). Differences were also seen in males, ranging from 49.8 percent in *other occupations* to 14.5 percent (95% CI 14.2, 14.8) in health professionals.

The relationship between self-reporting a health problem affecting kind of work by occupation, stratified by age, is displayed in Figure 5.6. Due to small numbers, only five occupational groups are presented. Three different prevalence patterns were observed. First, the percentage reported by nurses and midwifery professionals, caring personal services, and teaching and educational professionals increased as age increased until the age of 50–59 where it declined. Second, the percentage in *other occupations* declined between the ages of 17–29 and 30–39 before rising until the age of 50–59 where it declined. Third, the percentage of people in the health professional occupational group reporting a health problem affecting the kind of work increased with age until the age of 40–49 where it began to decline.

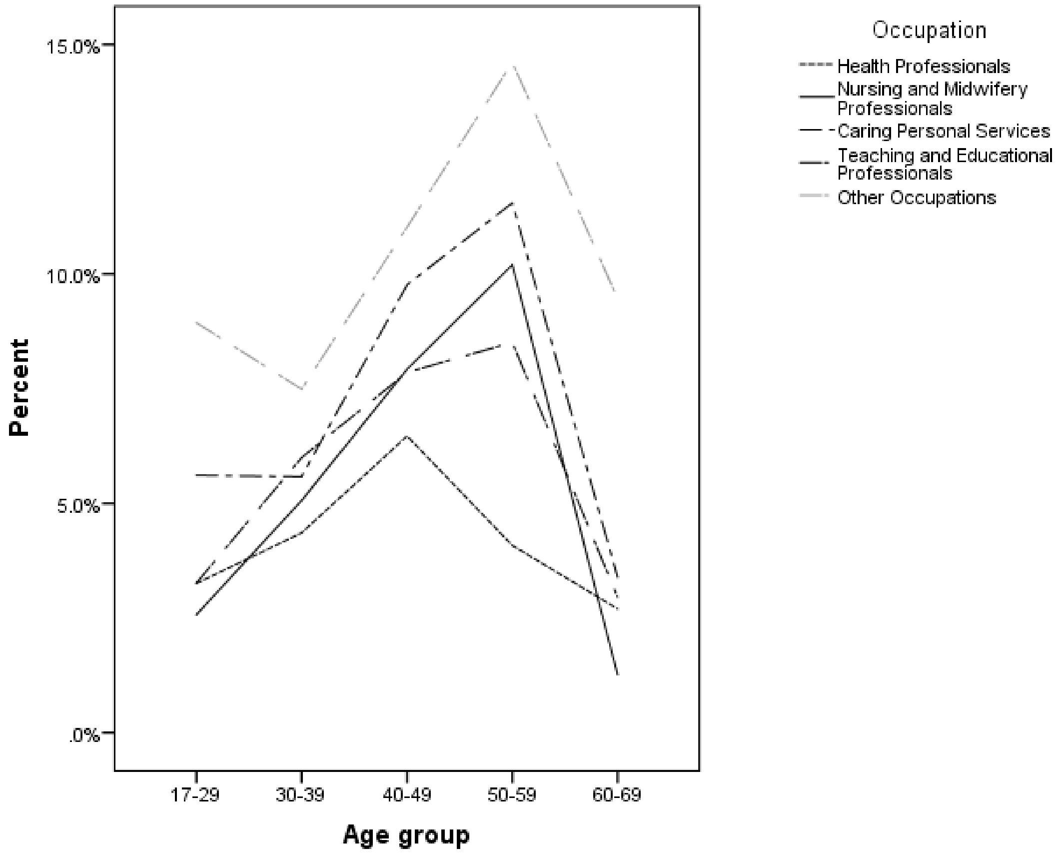



**Figure 5.6 Line Chart for Health Problems Affecting Kind of Work by Occupation and Age Group.**

ANOVA showed that the effect of gender, age band and gender by age band was significant in all the occupations included in the analysis. The statistics were as follows: among nursing and midwifery professionals, gender $F(1, 170117)=330.57$, $p<0.001$, age band $F(4, 170117)=205.82$, $p<0.001$ and gender by age band $F(4, 170117)=145.64$, $p<0.001$; health professionals, gender $F(1, 112102)=2774.61$, $p<0.001$, age band $F(4, 112102)=425.33$, $p<0.001$ and gender by age band $F(4, 112102)=592.35$, $p<0.001$; therapy professionals, gender $F(1, 33290)=136.15$, $p<0.001$, age band $F(4, 33290)=293.62$, $p<0.001$ and gender by age band $F(4, 33290)=89.65$, $p<0.001$; caring personal services, gender $F(1, 402487)=35.09$,

$p<0.001$, age band $F(4, 402487)=242.18$, $p<0.001$ and gender by age band $F(4, 402487)=142.27$, $p<0.001$; health and social services managers and directors, gender $F(1, 26039)=8.16$, $p<0.001$, age band $F(4, 26039)=409.99$, $p<0.001$ and gender by age band $F(4, 26039)=105.63$, $p<0.001$; managers and proprietors in health and care services, gender $F(1, 28407)=399.19$, $p<0.001$, age band $F(4, 28407)=100.83$, $p<0.001$ and gender by age band $F(4, 28407)=38.16$, $p<0.001$; teaching and educational professionals, gender $F(1, 365085)=125.41$, $p<0.001$, age band $F(4, 365085)=278.82$, $p<0.001$ and gender by age band $F(4, 365085)=735.39$, $p<0.001$; and *other occupations*, gender $F(1, 11185002)=8358.56$, $p<0.001$, age band $F(4, 11185002)=1301.78$, $p<0.001$ and gender by age band $F(4, 11185002)=7130.69$, $p<0.001$.

**Descriptors on satisfaction with life scores reported**

Data for satisfaction with life on 0.4 percent (n=852) of the sample were missing and they were removed from all analyses of this variable. Subjective satisfaction with life (see Chapter 4) reflects a cognitive, judgemental process made by an individual on how satisfied they are with their present state of affairs based on an internally imposed set of standards unique to that individual. Findings indicate that females and males rate their satisfaction with life similarly ($M = 7.63$, $SD = 1.78$, $M = 7.56$, $SD = 1.72$). A general decline in average satisfaction with life was seen as age increased, with those aged 17–29 years reporting 7.72 ($SD = 1.58$) and 50–59-year olds reporting 7.41 ($SD = 1.91$). A decline was not seen in those aged 60–69 ($M = 7.80$, $SD = 1.79$). ANOVA showed that the effect of age band was significant, $F(9, 27036930)=15574.46$, $p<0.001$.

Satisfaction with life by occupation

The average life satisfaction for nursing and midwifery professionals was 7.88 (*SD* = 1.45), higher than caring personal services (*M* = 7.53, *SD* = 1.76) and *other occupations* (*M* = 7.57, *SD* = 1.78), similar to teaching and educational professionals (*M* = 7.87, *SD* = 1.35), and lower than health professionals (*M* = 7.93, *SD* = 1.36) and therapy professionals (*M* = 8.03, *SD* = 1.22). Differences might be explained by gender, age, variations in role responsibility, level of job satisfaction and hours worked.

Satisfaction with life by occupation, stratified by gender and age band

The mean satisfaction with life score reported by each occupation differed by gender and age band, see Appendix ix Table 5.6. The average satisfaction with life reported by nursing and midwifery professionals was 7.89 (*SD* = 1.45) in females and 7.80 (*SD* = 1.45) in males. Female therapy professionals (*M* = 8.06, *SD* = 1.25) and male teaching professionals (*M* = 7.78, *SD* = 1.31) were the most satisfied with life. Female (*M* = 7.54, *SD* = 1.75) and male caring personal service workers (*M* = 7.48, *SD* = 1.81) were the least satisfied with life. For mean satisfaction of life reported by each occupation by age band, see Figure 5.7. There were rises and continued declines in mean satisfaction with life as age increased, differing slightly by occupation. For example, among nursing and midwifery professionals the average life satisfaction reported by 17–29-year olds was 8.18 (*SD* = 1.39), 30-39 8.01 (*SD* = 1.23), 40–49 7.85 (*SD* = 1.42), 50–59 7.71 (*SD* = 1.61), and 60–69 7.80 (*SD* = 1.57).

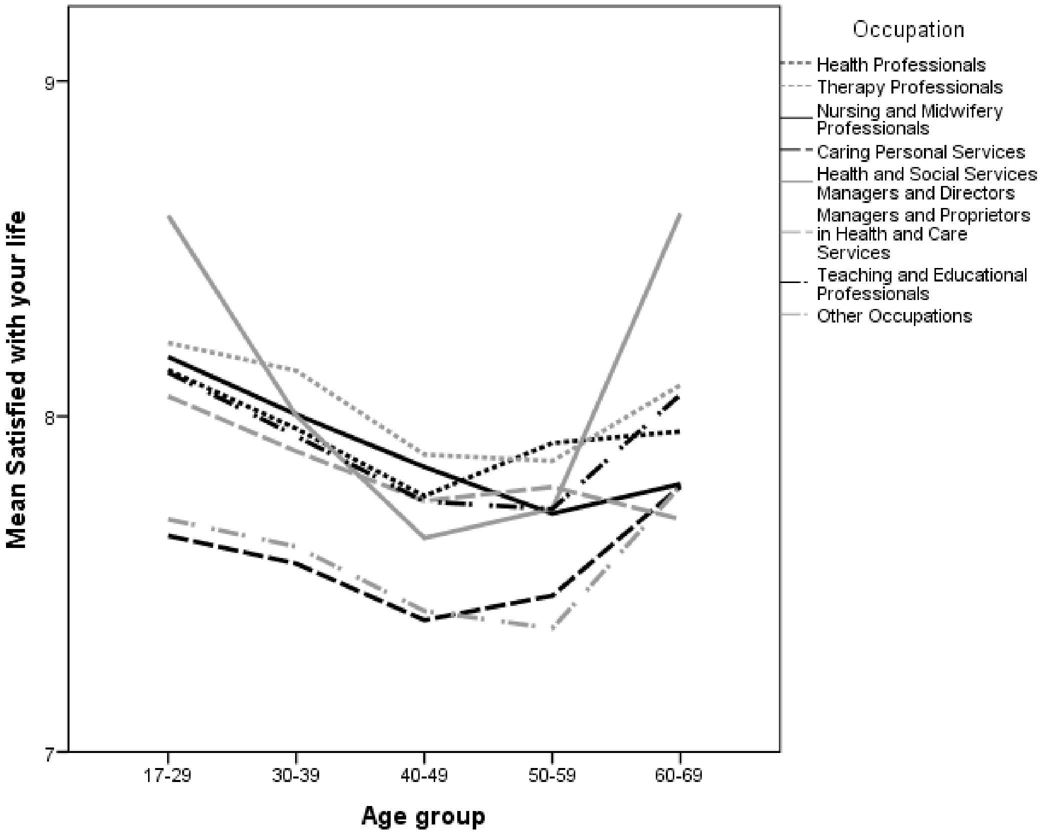



**Figure 5.7 Mean Satisfaction with Life Nowadays by Occupation and Age Group.**

ANOVA showed that the effect of gender, age band and gender by age band was significant in all the occupations included in the analysis. The statistics were as follows: among nursing and midwifery professionals, gender $F(1, 482433)=470.49$, $p<0.001$, age band $F(4, 482443)=174.10$, $p<0.001$ and gender by age band $F(4, 482443)=246.21$, $p<0.001$; health professionals, gender $F(1, 330865)=464.82$, $p<0.001$, age band $F(4, 330865)=244.61$, $p<0.001$ and gender by age band $F(4, 330865)=561.89$, $p<0.001$; therapy professionals, gender $F(1, 91816)=86.06$, $p<0.001$, age band $F(4, 91816)=331.80$, $p<0.001$ and gender by age band $F(4, 91816)=109.52$, $p<0.001$; caring personal services, gender $F(1, 900456)=1112.12$, $p<0.001$, age band $F(4, 900456)=603.86$, $p<0.001$ and gender by age band $F(4, 900456)=714.06$, $p<0.001$; health and social services managers and directors, gender

$F(1, 62496)=442.09$, $p<0.001$, age band $F(4, 62496)=334.29$, $p<0.001$ and gender by age band $F(4, 62496)=252.37$, $p<0.001$; managers and proprietors in health and care services, gender $F(1, 55911)=550.08$, $p<0.001$, age band $F(4, 55911)=229.60$, $p<0.001$ and gender by age band $F(4, 55911)=532.66$, $p<0.001$; teaching and educational professionals, gender $F(1, 1043845)=1119.59$, $p<0.001$, age band $F(4, 1043845)=2040.82$, $p<0.001$ and gender by age band $F(4, 1043845)=111.46$, $p<0.001$; and *other occupations*, gender $F(1, 24069100)=8669.14$, $p<0.001$, age band $F(4, 24069100)=38177.31$, $p<0.001$ and gender by age band $F(4, 24069100)=1041.29$, $p<0.001$.

## 5.5 Modelling disability, health problems, health problems affecting amount and type of work, and low satisfaction with life

The bivariate analysis reported above appears to indicate that health, including current disability in accordance with Equality Act Disabled and health problems that lasted more than one year are unevenly distributed across occupational groups. The findings from this study suggest a relationship between health and work, specifically in relation to amount and type of work, varying widely between occupational groups. To examine the risk of reporting poor health of nurses relative to other occupations, by age bands, gender, ethnicity and working hours, multivariate analysis was conducted. Five binary logistic regression models were developed one for each dependent variable - current disability (see Table 5.7), health problem that lasted more than one year (see Table 5.8), health problem that affected amount of work (see Table 5.9), health problem that affected type of work (see Table 5.10), and satisfaction with life (recoded into 1 for dissatisfied [score 0-7] and 0 for satisfied [8–10], see Table 5.11). Descriptive analysis on average satisfaction with life reported by the study found that across all occupational groups in the sample, the sample mean satisfaction with life was 7.59 (*SD* = 1.75). This mean score was used as a cut off point to categorise individuals as either dissatisfied or satisfied with life for the purpose of modelling whether an individual is satisfied or dissatisfied by occupation.

### 5.5.1 Modelling disability, health problem, health problem affecting amount and type of work, and low satisfaction with life using five logistic regression models

**Modelling the presence of a current disability**

Baseline predictors of current disability

The baseline predictors used in the model to predict the odds of reporting a current disability were: (i) age band 40–49-year olds, being female, and being of white ethnic origin; (ii) being a nurse; and (iii) the hours worked being full-time, see Table 5.7. Age band ($b$ = 0.18, $t(5)$ = 77.01, $p$<0.001), gender ($b$ = 0.05, $t(2)$ = 20.19, $p$<0.001) and ethnic origin ($b$ = -0.01, $t(2)$ = -4.14, $p$<0.001) significantly predicted current disability. Compared to 40–49-year olds, those aged < 29 (OR = 0.61, 95% CI 0.59, 0.64, $p$ < 0.001) and 30–39 (OR = 0.69, 95% CI 0.67, 0.72, $p$ < 0.001) had a lower risk of reporting a current disability. A higher risk was seen in those aged 50–59 (OR = 1.42, 95% CI 1.37, 1.47, $p$ < 0.001) and 60–69 (OR = 2.10, 95% CI 2.03, 2.17, $p$ < 0.001)

## Table 5.7 Modelling Current Disability by Baseline Characteristics, Occupation and Working Hours.

| Variables in the Equation | | Odds Ratio | 95% CI Lower | 95% CI Upper | - 2 Log likelihood | Cox & Snell $R^2$ | Nagelkerke $R^2$ | Percentage correctly predicted |
|---|---|---|---|---|---|---|---|---|
| **Model 1** | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .611[a] | .587 | .635 | | | | |
| | 30 - 39 | .692[a] | .665 | .719 | | | | |
| | 50 - 59 | 1.417[a] | 1.370 | 1.465 | | | | |
| | 60 - 69 | 2.101[a] | 2.031 | 2.173 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .789[a] | .771 | .807 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other | .934[b] | .898 | .972 | | | | |
| | **Constant** | .267[a] | | | 185735.66 | .034 | .053 | 79.3 |
| **Model 2** | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .587[a] | .564 | .610 | | | | |
| | 30 - 39 | .689[a] | .662 | .716 | | | | |
| | 50 - 59 | 1.410[a] | 1.364 | 1.458 | | | | |
| | 60 - 69 | 2.003[a] | 1.936 | 2.072 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .750[a] | .733 | .767 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other | .941[b] | .905 | .979 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | | | | | | | |
| | Health professionals | .772[b] | .641 | .930 | | | | |
| | Therapy professionals | .957 | .722 | 1.270 | | | | |
| | Caring personal services | 1.592[a] | 1.403 | 1.806 | | | | |
| | Health and social service managers and directors | 1.092 | .799 | 1.494 | | | | |
| | Managers and proprietors in health and care services | 1.251 | .930 | 1.682 | | | | |
| | Teaching and educational professionals | .956 | .837 | 1.091 | | | | |
| | *Other occupations* | 2.195[a] | 1.970 | 2.446 | | | | |
| | **Constant** | .134[a] | | | 184656.22 | .037 | .062 | 79.3 |
| **Model 3** | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .614[a] | .586 | .644 | | | | |
| | 30 - 39 | .724[a] | .692 | .757 | | | | |
| | 50 - 59 | 1.336[a] | 1.286 | 1.389 | | | | |
| | 60 - 69 | 1.812[a] | 1.739 | 1.888 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .835[a] | .810 | .860 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other | .940[c] | .895 | .988 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [a] | | | | | | |
| | Health professionals | .751[b] | .623 | .905 | | | | |
| | Therapy professionals | 0.907 | .683 | 1.204 | | | | |
| | Caring personal services | 1.552[a] | 1.368 | 1.761 | | | | |
| | Health and social service managers and directors | 1.157 | .846 | 1.582 | | | | |
| | Managers and proprietors in health and care services | 1.324 | .985 | 1.781 | | | | |
| | Teaching and educational professionals | .947 | .829 | 1.081 | | | | |
| | *Other occupations* | 1.566[a] | 1.405 | 1.746 | | | | |
| | **Working hours (Baseline = full-time)** | | | | | | | |
| | Part-time | 1.354[a] | 1.313 | 1.396 | | | | |
| | **Constant** | .121[a] | | | 137176.55 | .026 | .045 | 83.8 |

[a] $p < 0.001$, [b] $p < 0.005$, [c] $p < 0.05$.

compared to 40–49-year olds. Males also had a lower risk factor than females (OR = 0.79, 95% CI 0.77, 0.81, $p$ < 0.001). Sample respondents categorised as other ethnic origin had a slightly lower risk factor for current disability (OR = 0.93 95% CI 0.90, 0.97, $p$ < 0.005). Age band, gender and ethnicity also explained a significant proportion of variance in current disability, Cox and Snell $R^2 = 0.034$, $F(3, 188613) = 2171.85$, $p<0.001$.

Baseline characteristics and occupation predictors of current disability

All baseline characteristics and occupation were a significant predictor of disability: age band ($b$ = 0.18, $t(5)$ = 76.92, $p$<0.001), gender ($b$ = 0.06, $t(2)$ = 23.96, $p$<0.001), ethnic origin ($b$ = -0.07, $t(2)$ = -3.16, $p$ = 0.002) and occupation ($b$ = 0.59, $t(8)$ = 25.99, $p$<0.001). For example, the risk of reporting a current disability was higher among caring personal services (OR = 1.59, 95% CI 1.40, 1.81, $p$ < 0.001) and lower among health professionals (OR = 0.77, 95% CI 0.64, 0.93, $p$ < 0.005) compared to nursing and midwifery professionals. Age band, gender, ethnicity and occupation also explained a significant proportion of variance in current disability, Cox and Snell $R^2$ = 0.037, $F(4, 188612) = 1803.59$, $p$<0.001.

Baseline characteristics, occupation and working hours predictors of current disability

All baseline characteristics, occupation and working hours were a significant predictor of disability: age band ($b$ = 0.14, $t(5)$ = 54.62, $p$<0.001), gender ($b$ = 0.03, $t(2)$ = 11.46, $p$<0.001), ethnic origin ($b$ = -0.07, $t(2)$ = -2.97, $p$ = 0.003), occupation ($b$ = 0.31, $t(8)$ = 12.44, $p$<0.001) and working hours ($b$ = 0.06, $t(2)$ = 21.50, $p$<0.001). For example, the risk of reporting a current disability was higher in part-time workers compared to full-time workers (OR = 1.35, 95% CI 1.31, 1.40, $p$ < 0.001). Age band, gender, ethnicity and occupation also explained a significant proportion of variance in current disability, Cox and Snell $R^2 = 0.026$, $F(5, 159760) = 819.20$, $p<0.001$. Despite some of the individual variables being related to the dependent variable as shown in the odds ratios and confidence intervals – the model as whole is not a good fit indicated by Hosmer-Lemeshow being < 0.05.

**Modelling the presence of a past health problem lasting more than one year**

Baseline predictors of a health problem lasting more than one year

The same baseline predictors used in the above model on current health problems was used in the model to predict the odds of reporting a health problem lasting more than one year. Age band ($b$ = 0.18, $t(5)$ = 747.84, $p<0.001$), gender ($b$ = 0.05, $t(2)$ = 12.39, $p<0.001$) and ethnic origin ($b$ = -0.02, $t(2)$ = -3.88, $p<0.001$) significantly predicted current disability. Consistent with findings on current disability, the risk of reporting a health problem lasting more than one year was lower in < 29 (OR = 0.75, 95% CI 0.68, 0.82, $p$ < 0.001) and 30–39 (OR = 0.78, 95% CI 0.71, 0.85, $p$ < 0.001), and higher in 50–59 (OR = 1.21, 95% CI 1.12, 1.31, $p$ < 0.001) and 60–69 (OR = 1.55, 95% CI 1.44, 1.67, $p$ < 0.001) compared to 40–49-year olds. Similarly, males also had a lower risk factor than females (OR = 0.89, 95% CI 0.85, 0.94, $p$ < 0.001). Sample respondents who were categorised as other ethnic origin had a lower risk factor for the presence of a health problem lasting more than one year, 0.64 (95% CI 0.58, 0.71, $p$ < 0.005). Age band, gender and ethnicity also explained a significant proportion of variance in a health problem lasting more than one year, Cox and Snell $R^2 = 0.009$, $F(3, 68029) = 833.69$, $p<0.001$.

## Table 5.8 Modelling a Past Health Problem Lasting More Than One Year.

| Variables in the Equation | | Odds Ratio | 95% CI Lower | 95% CI Upper | - 2 Log likelihood | Cox & Snell $R^2$ | Nagelkerke $R^2$ | Hosmer and Lemeshow | % correctly predicted | % correctly predicted no problem | % correctly predicted problem |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | **Age bands (years)** | [a] | | | | | | | | | |
| | < 29 | .746[a] | .679 | .820 | | | | | | | |
| | 30 - 39 | .779[a] | .713 | .852 | | | | | | | |
| | 50 - 59 | 1.211[a] | 1.119 | 1.310 | | | | | | | |
| | 60 - 69 | 1.552[a] | 1.443 | 1.670 | | | | | | | |
| | **Gender (Baseline = female)** | | | | | | | | | | |
| | Male | .894[a] | .850 | .941 | | | | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | | | | |
| | Other | .639[a] | .576 | .710 | | | | | | | |
| | **Constant** | .110[a] | | | 43704.99 | .009 | .019 | 0.78 | 90.0 | 100 | 0 |
| **Model 2** | **Age bands (years)** | [a] | | | | | | | | | |
| | < 29 | .741[a] | .674 | .814 | | | | | | | |
| | 30 - 39 | .781[a] | .714 | .854 | | | | | | | |
| | 50 - 59 | 1.209[a] | 1.117 | 1.308 | | | | | | | |
| | 60 - 69 | 1.535[a] | 1.426 | 1.652 | | | | | | | |
| | **Gender (Baseline = female)** | | | | | | | | | | |
| | Male | .888[a] | .843 | .935 | | | | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | | | | |
| | Other | .645[a] | .580 | .717 | | | | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | | | | | | | | | | |
| | Health professionals | .558[c] | .372 | .837 | | | | | | | |
| | Therapy professionals | 1.137 | .679 | 1.905 | | | | | | | |
| | Caring personal services | 1.180 | .922 | 1.510 | | | | | | | |
| | Health and social service managers and directors | 1.160 | .630 | 2.135 | | | | | | | |
| | Managers and proprietors in health and care services | 1.148 | .635 | 2.075 | | | | | | | |
| | Teaching and educational professionals | 1.047 | .813 | 1.347 | | | | | | | |
| | *Other occupations* | 1.174 | .953 | 1.446 | | | | | | | |
| | **Constant** | .096[a] | | | 43679.26 | .009 | .020 | 0.96 | 90.0 | 100 | 0 |
| **Model 3** | **Age bands (years)** | [a] | | | | | | | | | |
| | < 29 | .761[a] | .687 | .844 | | | | | | | |
| | 30 - 39 | .783[a] | .712 | .861 | | | | | | | |
| | 50 - 59 | 1.183[a] | 1.086 | 1.288 | | | | | | | |
| | 60 - 69 | 1.461[a] | 1.344 | 1.589 | | | | | | | |
| | **Gender (Baseline = female)** | | | | | | | | | | |
| | Male | .929[c] | .873 | .989 | | | | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | | | | |
| | Other | .652[a] | .578 | .735 | | | | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [c] | | | | | | | | | |
| | Health professionals | .555[b] | .370 | .832 | | | | | | | |
| | Therapy professionals | 1.114 | .665 | 1.867 | | | | | | | |
| | Caring personal services | 1.164 | 0.909 | 1.490 | | | | | | | |
| | Health and social service managers and directors | 1.188 | .645 | 2.186 | | | | | | | |
| | Managers and proprietors in health and care services | 1.173 | .649 | 2.121 | | | | | | | |
| | Teaching and educational professionals | 1.040 | .808 | 1.339 | | | | | | | |
| | *Other occupations* | 1.093 | 0.886 | 1.347 | | | | | | | |
| | **Working hours (Baseline = full-time)** | | | | | | | | | | |
| | Part-time | 1.141[a] | 1.070 | 1.216 | | | | | | | |
| | **Constant** | .092[a] | | | 35097.046 | .008 | .017 | 0.54 | 90.7 | 100 | 0 |

[a] $p < 0.001$, [b] $p < 0.005$, [c] $p < 0.05$.

Baseline characteristics and occupation predictors of a health problem lasting more than one year

All baseline characteristics and occupation were significant predictors of a health problem lasting more than one year: age band ($b$ = 0.18, $t(5)$ = 47.14, $p$<0.001), gender ($b$ = 0.06, $t(2)$ = 14.64, $p$<0.001), ethnic origin ($b$ = -0.01, $t(2)$ = -3.10, $p$ = 0.002) and occupation ($b$ = 0.62, $t(8)$ = 16.15, $p$<0.001). For example, compared to nursing and midwifery professionals, the risk of reporting a health problem lasting more than one year was higher in all occupations included in the analysis except for health professionals. Health professionals were found to have an odds ratio of 0.56 (95% CI 0.37, 0.84). Age band, gender, ethnicity and occupation also explained a significant proportion of variance in a health problem lasting more than one year, Cox and Snell $R^2$ = 0.009, $F(4, 68028)$ = 692.87, $p$<0.001.

Baseline characteristics, occupation and working hours as predictors of a health problem lasting more than one year

All baseline characteristics, occupation and working hours were significant predictors of any past health problem lasting more than one year: age band ($b$ = 0.13, $t(5)$ = 31.36, $p$<0.001), gender ($b$ = 0.04, $t(2)$ = 8.21, $p$<0.001), ethnic origin ($b$ = -0.11, $t(2)$ = -2.65, $p$ = 0.008), occupation ($b$ = 0.36, $t(8)$ = 8.65, $p$<0.001) and working hours ($b$ = 0.04, $t(2)$ = 10.09, $p$<0.001). The risk of reporting a health problem lasting more than one year in part-time workers was 1.14 (95% CI 1.07, 1.22), higher than in full-time workers. Age band, gender, ethnicity and occupation also explained a significant proportion of variance in a health problem lasting more than one year, Cox and Snell $R^2$ = 0.008, $F(5, 57293)$ = 273.14, $p$<0.001. While this model was a good fit – Hosmer-

Lemeshow ≥ 0.5 – the amount that the model predicts a health problem lasting more than one year was low. This is confirmed by Nagelkerke $R^2$ and Cox and Snell $R^2$ both being small. As a result the classification table never reached the original 90.7%.

**Modelling the presence of a health problem that affects the amount of work an individual is able to do**

<u>Baseline predictors of a health problem that affects the amount of work an individual can do</u>

Using the same baseline predictors as the previous models, age band ($b$ = 0.05, $t$(5) = 12.07, $p$ < 0.001), gender ($b$ = 0.05, $t$(2) = 12.94, $p$<0.001) and ethnic origin ($b$ = 0.04, $t$(2) = 8.49, $p$<0.001) were shown to be significant predictors of the presence of a health problem that affects the amount of work an individual is able to do. Consistent with the findings in the other models presented above, a lower risk was shown in younger age groups (< 29 [OR = 088, 95% CI 0.83, 0.93, $p$ < 0.001] and 30–39 [OR = 0.89, 95% CI 0.84, 0.94, $p$ < 0.001]), and a higher risk factor in age bands older then the reference group (50–59 [OR = 1.10, 95% CI 1.05, 1.15, $p$ < 0.001] and 60–69 [OR = 1.16, 95% CI 1.10, 1.22, $p$ < 0.001]). Males also had a lower risk factor then females (OR = 0.81, 95% CI 0.78, 0.83, $p$ < 0.001) and sample respondents who were categorised as other ethnic origin had a higher risk factor for having a health problem that affects the amount of work they are able to do (OR = 1.29, 95% CI 1.22, 1.37, $p$ < 0.005). Age band, gender and ethnicity also explained a significant proportion of variance in the prevalence of reporting a health problem that affects the amount of work an individual can do, Cox and Snell $R^2$ = 0.006, $F$(3, 57403) = 120.17, $p$<0.001.

## Table 5.9 Modelling a Health Problem that Affects the Amount of Work an Individual is able to do.

| Variables in the Equation | | Odds Ratio | 95% CI Lower | 95% CI Upper | - 2 Log likelihood | Cox & Snell $R^2$ | Nagelkerke $R^2$ | Percentage correctly predicted |
|---|---|---|---|---|---|---|---|---|
| **Model 1** | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .875[a] | .826 | .926 | | | | |
| | 30 - 39 | .890[a] | .841 | .941 | | | | |
| | 50 - 59 | 1.096[a] | 1.046 | 1.148 | | | | |
| | 60 - 69 | 1.157[a] | 1.100 | 1.217 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .804[a] | .777 | .831 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other | 1.292[a] | 1.218 | 1.370 | | | | |
| | **Constant** | .896[a] | | | 78835.729 | .006 | .008 | 54.7 |
| **Model 2** | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .834[a] | .787 | .883 | | | | |
| | 30 - 39 | .879[a] | .830 | .931 | | | | |
| | 50 - 59 | 1.084[b] | 1.034 | 1.136 | | | | |
| | 60 - 69 | 1.097[a] | 1.043 | 1.155 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .747[a] | .722 | .772 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other | 1.298[a] | 1.223 | 1.377 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [a] | | | | | | |
| | Health professionals | .830 | .636 | 1.083 | | | | |
| | Therapy professionals | .970 | .642 | 1.464 | | | | |
| | Caring personal services | 1.503[a] | 1.256 | 1.799 | | | | |
| | Health and social service managers and directors | .540[c] | .323 | .902 | | | | |
| | Managers and proprietors in health and care services | 1.059 | .691 | 1.624 | | | | |
| | Teaching and educational professionals | .973 | .803 | 1.178 | | | | |
| | *Other occupations* | 2.973[a] | 2.547 | 3.469 | | | | |
| | **Constant** | .346[a] | | | 77803.279 | .024 | .032 | 56.5 |
| **Model 3** | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .834[a] | .777 | .894 | | | | |
| | 30 - 39 | .911[c] | .854 | .973 | | | | |
| | 50 - 59 | 1.021 | .967 | 1.077 | | | | |
| | 60 - 69 | 1.013 | .954 | 1.076 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .864[a] | .828 | .902 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other | 1.325[a] | 1.233 | 1.424 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [a] | | | | | | |
| | Health professionals | .787 | .602 | 1.029 | | | | |
| | Therapy professionals | .916 | .605 | 1.385 | | | | |
| | Caring personal services | 1.451[a] | 1.211 | 1.737 | | | | |
| | Health and social service managers and directors | .585[c] | .350 | .977 | | | | |
| | Managers and proprietors in health and care services | 1.152 | .751 | 1.768 | | | | |
| | Teaching and educational professionals | .957 | .790 | 1.160 | | | | |
| | *Other occupations* | 1.885[a] | 1.613 | 2.203 | | | | |
| | **Working hours (Baseline = full-time)** | | | | | | | |
| | Part-time | 1.536[a] | 1.471 | 1.605 | | | | |
| | **Constant** | .298[a] | | | 57655.46 | .021 | .029 | 63.7 |

[a] $p < 0.001$, [b] $p < 0.005$, [c] $p < 0.05$.

Baseline characteristics and occupation predictors of a health problem that affects the amount of work an individual can do

Age band ($b$ = 0.05, $t(5)$ = 11.754, $p$>0.001), gender ($b$ = 0.07, $t(2)$ = 16.46, $p$<0.001), ethnic origin ($b$ = 0.04, $t(2)$ = 8.98, $p$<0.001) and occupation ($b$ = 0.11, $t(8)$ = 25.96, $p$<0.001) were significant predictors of a health problem that affects the amount of work an individual is able to do. The risk of reporting a health problem that affects the amount of work an individual is able to do was significantly higher in caring personal services (OR = 1.50, 95% CI 1.26, 1.80, $p$<0.001) and *other occupations* (OR = 2.97, 95% CI 2.55, 3.47, $p$<0.001) than for nursing and midwifery professionals. A lower risk was seen in health and social services managers and directors, 0.54 (95% CI 0.32, 0.90, $p$<0.05). Age band, gender, ethnicity and occupation also explained a significant proportion of variance in the prevalence of reporting a health problem affecting the amount of work an individual is able to do, Cox and Snell $R^2$ = 0.024, $F$(4, 57402) = 259.672, $p$<0.001.

Baseline characteristics, occupation and working hours predictors of a health problem that affects the amount of work an individual can do

All baseline characteristics, occupation and working hours were a significant predictor of any past health problem that affects the amount of work an individual is able to do: age band ($b$ = 0.03, $t(5)$ = 6.05, $p$<0.001), gender ($b$ = 0.03, $t(2)$ = 6.59, $p$<0.001), ethnic origin ($b$ = 0.04, $t(2)$ = 7.94, $p$<0.001), occupation ($b$ = 0.06, $t(8)$ = 13.41, $p$<0.001) and working hours ($b$ = 0.10, $t(2)$ = 19.76, $p$<0.001). Part-time workers are at increased risk of reporting a health problem lasting more than one year, 1.54 (95% CI 1.47, 1.61). Age band, gender, ethnicity and occupation also explained a significant proportion of variance in individuals reporting a health problem that affects the amount of work they are able to do, Cox and Snell $R^2 = 0.021$, $F(5, 44714) = 162.87$, $p<0.001$. Despite some of the individual variables being related to the dependent variable as shown in the odds ratios and confidence intervals – the model as whole is not a good fit indicated by Hosmer-Lemeshow being < 0.05.

**Modelling the presence of a health problem that affects the type of work an individual is able to do**

<u>Baseline predictors of a health problem that affects the type of work an individual can do</u>

Using the same baseline predictors, age band ($b = 0.02$, $t(5) = 5.48$, $p < 0.001$), gender ($b = 0.02$, $t(2) = 5.40$, $p<0.001$) and ethnic origin ($b = 0.03$, $t(2) = 6.76$, $p<0.001$) were shown to be significant predictors of the presence of a health problem that affects the type of work an individual is able to do. The risk of reporting a health problem was lower in 30–39-year olds (OR = 0.92, 95% CI 0.87, 0.97) and higher in the older age groups (50–59 [OR = 1.06, 95% CI 1.02, 1.12], 60-69 [OR = 1.06, 1.11]). Males were found to have a lower risk (OR = 0.91, 95% CI 0.88, 0.94) compared to females and those of other ethnic origin a higher risk (OR = 1.23, 95% CI 1.16, 1.30) of a health problem that affects the type of work an individual is able to do. Age band, gender and ethnicity also explained a significant proportion of variance in the prevalence of reporting a health problem that affects the type of work an individual can do, Cox and Snell $R^2 = 0.002$, $F(3, 57487) = 32.75$, $p<0.001$.

## Table 5.10 Modelling a Health Problem that Affects the Type of Work an Individual is able to do.

| Variables in the Equation | | Odds Ratio | 95% CI Lower | 95% CI Upper | - 2 Log likelihood | Cox & Snell $R^2$ | Nagelkerke $R^2$ | Percentage correctly predicted |
|---|---|---|---|---|---|---|---|---|
| **Model 1** | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .967 | .914 | 1.023 | | | | |
| | 30 - 39 | .916[b] | .866 | .968 | | | | |
| | 50 - 59 | 1.070[b] | 1.022 | 1.120 | | | | |
| | 60 - 69 | 1.057[c] | 1.005 | 1.111 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .913[a] | .883 | .944 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other | 1.228[a] | 1.158 | 1.302 | | | | |
| | **Constant** | 1.024 | | | 79585.03 | .002 | .003 | 51.9 |
| **Model 2** | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .921[c] | .870 | .976 | | | | |
| | 30 - 39 | .905[b] | .855 | .958 | | | | |
| | 50 - 59 | 1.057[c] | 1.009 | 1.108 | | | | |
| | 60 - 69 | 1.00 | .950 | 1.052 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .849[a] | .821 | .878 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other | 1.235[a] | 1.164 | 1.311 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [a] | | | | | | |
| | Health professionals | .748[c] | .576 | .972 | | | | |
| | Therapy professionals | 1.072 | .723 | 1.588 | | | | |
| | Caring personal services | 1.557[a] | 1.307 | 1.854 | | | | |
| | Health and social service managers and directors | .833 | .538 | 1.290 | | | | |
| | Managers and proprietors in health and care services | .973 | .638 | 1.482 | | | | |
| | Teaching and educational professionals | 1.039 | .864 | 1.249 | | | | |
| | *Other occupations* | 3.031[a] | 2.608 | 3.524 | | | | |
| | **Constant** | .389[a] | | | 78527.302 | .020 | .027 | 53.7 |
| **Model 3** | **Age bands (years)** | [c] | | | | | | |
| | < 29 | .929[c] | .868 | .994 | | | | |
| | 30 - 39 | .958 | .899 | 1.020 | | | | |
| | 50 - 59 | 1.006 | .954 | 1.060 | | | | |
| | 60 - 69 | .933[c] | .880 | .990 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .974 | .935 | 1.015 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other | 1.232[a] | 1.147 | 1.322 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [a] | | | | | | |
| | Health professionals | .720[c] | .554 | .936 | | | | |
| | Therapy professionals | 1.025 | .691 | 1.520 | | | | |
| | Caring personal services | 1.510[a] | 1.267 | 1.799 | | | | |
| | Health and social service managers and directors | .878 | .567 | 1.360 | | | | |
| | Managers and proprietors in health and care services | 1.033 | .677 | 1.575 | | | | |
| | Teaching and educational professionals | 1.017 | .845 | 1.224 | | | | |
| | *Other occupations* | 1.983[a] | 1.705 | 2.308 | | | | |
| | **Working hours (Baseline = full-time)** | | | | | | | |
| | Part-time | 1.375[a] | 1.318 | 1.436 | | | | |
| | **Constant** | .348[a] | | | 60049.399 | .014 | .019 | 58.9 |

[a] $p < 0.001$, [b] $p < 0.005$, [c] $p < 0.05$.

Baseline characteristics and occupation predictors of a health problem that affects the type of work an individual can do

Age band (*b* = 0.02, *t*(5) = 5.12, *p*>0.001), gender (*b* = 0.04, *t*(2) = 9.06, *p*<0.001), ethnic origin (*b* = 0.03, *t*(2) = 7.27, *p*<0.001) and occupation (*b* = 0.11, *t*(8) = 26.85, *p*<0.001) were significant predictors of a health problem that affects the type of work an individual is able to do. Compared to nursing and midwifery professionals, health professionals had a lower risk (OR = 0.75, 95% CI 0.58, 0.97), and caring personal services (OR = 1.56, 95% CI 1.31, 1.85) and *other occupations* a higher risk (OR = 3.03, 95% CI 2.61, 3.52) of reporting a health problem that affects the type of work they are able to do. Age band, gender, ethnicity and occupation also explained a significant proportion of variance in the prevalence of reporting a health problem affecting the type of work an individual is able to do, Cox and Snell $R^2$ = 0.020, *F*(4, 57486) = 205.042, *p*<0.001.

Baseline characteristics, occupation and working hours predictors of a health problem that affects the type of work an individual can do

The baseline characteristics, ethnic origin (*b* = 0.03, *t*(2) = 5.97, *p*<0.001), occupation (*b* = 0.07, *t*(8) = 14.73, *p*<0.001) and working hours (*b* = 0.07, *t*(2) = 14.79, *p*<0.001) were significant predictors of any health problem that affects the type of work an individual is able to do. Age band (*b* = 0.03, *t*(5) = 0.60, *p*>0.05) and gender (*b* = 0.01, *t*(2) = 1.09, *p*>0.05) were not significant predictors of health problems that affects the type of work an individual is able to do. Part-time workers had a risk factor of 1.38 (95% CI 1.71, 2.31) compared to full-time workers. Age band, gender, ethnicity and occupation also explained a significant proportion of variance in individuals reporting a health problem that affects the type of work they are able to do, Cox and Snell $R^2 = 0.014$, $F(5, 44758) = 99.33$, $p<0.001$. Despite some of the individual variables being related to the dependent variable as shown in the odds ratios and confidence intervals – the model as whole is not a good fit indicated by Hosmer-Lemeshow being < 0.05.

**Modelling low satisfaction with life**

Baseline predictors of a low satisfaction with life

Using the same baseline predictors, age band ($b = -0.03$, $t(5) = -9.48$, $p < 0.001$), gender ($b = -0.02$, $t(2) = -7.81$, $p<0.001$) and ethnic origin ($b = 0.03$, $t(2) = 12.15$, $p<0.001$) were shown to be significant predictors of low satisfaction with life. Three of the four age bands had significantly lower odds of reporting low satisfaction with life, <29 year olds 0.83 (95% CI 0.80, 0.86), 30–39 year olds 0.85 (95% CI 0.82, 0.88) and 60–69 year olds 0.66 (95% CI 0.64, 0.69). Being male and being of other ethnic origin increased the risk of reporting low satisfaction with life. Age band, gender and ethnicity also explained a significant proportion of variance in reports of low satisfaction with life, Cox and Snell $R^2 = 0.008$, $F(3, 127660) = 110.845$, $p<0.001$.

Baseline characteristics and occupation predictors of low satisfaction with life

Age band ($b = -0.03$, $t(5) = -9.81$, $p>0.001$), gender ($b = -0.02$, $t(2) = -6.65$, $p<0.001$), ethnic origin ($b = 0.04$, $t(2) = 12.50$, $p<0.001$) and occupation ($b = 0.02$, $t(8) = 7.37$, $p<0.001$) were significant predictors of low satisfaction with life. Caring personal services were 1.50 (95% CI 1.35, 1.67) times more likely to report poor satisfaction with life and *other occupations* 1.41 times (95% CI 1.23, 1.54) compared to nursing

## Table 5.11 Modelling Low Satisfaction with Life.

| Variables in the Equation | | Odds Ratio | 95% CI Lower | 95% CI Upper | - 2 Log likelihood | Cox & Snell $R^2$ | Nagelkerke $R^2$ | Percentage correctly predicted |
|---|---|---|---|---|---|---|---|---|
| **Model 1** | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .828[a] | .796 | .861 | | | | |
| | 30 - 39 | .848[a] | .818 | .879 | | | | |
| | 50 - 59 | .988 | .956 | 1.022 | | | | |
| | 60 - 69 | .662[a] | .640 | .685 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | 1.101[a] | 1.076 | 1.127 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other | 1.266[a] | 1.217 | 1.317 | | | | |
| | **Constant** | .667[a] | | | 168387.327 | .008 | .011 | 62.1 |
| **Model 2** | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .815[a] | .783 | .847 | | | | |
| | 30 - 39 | .847[a] | .817 | .878 | | | | |
| | 50 - 59 | .984 | .951 | 1.017 | | | | |
| | 60 - 69 | .647[a] | .625 | .670 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | 1.083[a] | 1.058 | 1.109 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other | 1.273[a] | 1.224 | 1.325 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [a] | | | | | | |
| | Health professionals | .895 | .776 | 1.031 | | | | |
| | Therapy professionals | .976 | .781 | 1.218 | | | | |
| | Caring personal services | 1.501[a] | 1.352 | 1.667 | | | | |
| | Health and social service managers and directors | .936 | .720 | 1.216 | | | | |
| | Managers and proprietors in health and care services | .995 | .757 | 1.307 | | | | |
| | Teaching and educational professionals | 1.022 | .920 | 1.136 | | | | |
| | *Other occupations* | 1.414[a] | 1.295 | 1.543 | | | | |
| | **Constant** | .491[a] | | | 168129.857 | .010 | .013 | 62.1 |
| **Model 3** | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .866[a] | .830 | .904 | | | | |
| | 30 - 39 | .862.[a] | .829 | .895 | | | | |
| | 50 - 59 | .955[c] | .921 | .990 | | | | |
| | 60 - 69 | .625[a] | .601 | .650 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | 1.102[a] | 1.072 | 1.132 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other | 1.339[a] | 1.282 | 1.399 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [a] | | | | | | |
| | Health professionals | .882 | .765 | 1.016 | | | | |
| | Therapy professionals | .971 | .778 | 1.212 | | | | |
| | Caring personal services | 1.495[a] | 1.346 | 1.660 | | | | |
| | Health and social service managers and directors | .946 | .728 | 1.230 | | | | |
| | Managers and proprietors in health and care services | 1.008 | .767 | 1.324 | | | | |
| | Teaching and educational professionals | 1.021 | .918 | 1.135 | | | | |
| | *Other occupations* | 1.291[a] | 1.183 | 1.410 | | | | |
| | **Working hours (Baseline = full-time)** | | | | | | | |
| | Part-time | 1.008 | .980 | 1.038 | | | | |
| | **Constant** | .486[a] | | | 141874.362 | .010 | .014 | 63.7 |

[a] $p < 0.001$, [b] $p < 0.005$, [c] $p < 0.05$.

and midwifery professionals. Age band, gender, ethnicity and occupation also explained a significant proportion of variance in the prevalence of low satisfaction with life, Cox and Snell $R^2 = 0.010$, $F(4, 127659) = 96.743$, $p<0.001$.

Baseline characteristics, occupation and working hours predictor of low satisfaction with life

The baseline characteristics, age band ($b = -0.04$, $t(2) = -1156$, $p<0.001$), gender ($b = -0.02$, $t(8) = -5.78$, $p<0.001$), ethnic origin ($b = 0.04$, $t(2) = 13.76$, $p<0.001$) and occupation ($b = 0.01$, $t(5) = 4.14$, $p<0.001$) were significant predictors of low satisfaction with life. Working hours was not a significant predictor of low satisfaction with life ($b = -0.01$, $t(5) = -1.51$, $p>0.05$). Age band, gender, ethnicity and occupation also explained a significant proportion of variance in individuals reporting low satisfaction with life, $R^2 = 0.004$, $F(5, 109088) = 86.15$, $p<0.001$. and midwifery professionals. Age band, gender, ethnicity and occupation also explained a significant proportion of variance in the prevalence of low satisfaction with life, Cox and Snell $R^2 = 0.010$, $F(4, 127659) = 96.743$, $p<0.001$.

## 5.6 Summary

There were two main aspects to the APS analysis presented in this chapter. First, to enumerate the percentage of nursing and midwifery professionals compared to caring personal services, health and social service managers and directors, managers and proprietors in health and care services, teaching and educational professionals, and *other occupations* in the UK, reporting a current disability, health problem affecting the amount or kind of work, and low satisfaction with life. Second, to investigate where there was an association between demographics (gender, age and working hours) and the occurrence of reporting a current disability, health problem affecting the amount or kind of work, and low satisfaction with life by nursing and midwifery professionals compared to caring personal services, health and social service managers and directors, managers and proprietors in health and care services, teaching and educational professionals, and *other occupations* in the UK.

There are four main finding from this study. First, the percentage of people who reported a current health problem was generally higher in females, older age bands, caring personal service workers and *other occupations*. Second, the distribution of the percentage of individuals in the sample who reported a health problem that affected the amount and type of work increased with age and was generally higher in *other occupations*. Third, compared to nursing and midwifery professionals, caring personal services and *other occupations* were statistically more likely to report many of the health outcomes examined in this study. Fourth, compared to nursing and midwifery professionals, health professionals and therapy professionals were less likely to report some of the health outcomes examined.

The findings from this study should be interpreted in the context of several considerations. There were vast differences in the number of workers in each occupation included in the analysis due to the number of people employed in each of these occupations. This meant that there are small numbers in a few occupational groups with the potential to obscure results. Nonetheless, it was assumed that this had little impact on findings and was reflective of the real world given the dataset used was from a large government study which had been tested for rigour, reliability and generalisability. In addition, despite the model looking like a good fit, the amount the model actually predicts is very small – Nagelkerke $R^2$ and Cox and Snell $R^2$ are generally small. As a result, the classification tables generally never get above the original percentage.

The findings from this study have important implications for health workforce policy. Identifying conditions prevalent in specific occupations can enable resources to be targeted where they are most needed.

Overall, the findings on the prevalence of health conditions is generally lower among workers in health occupations than those in *other occupations*. The association between health problems and work both at a demographic and occupational level is unclear and further research is needed.

The following chapter focusses on the Labour Force Survey and explores more specific outcomes.

# Chapter 6 Study Three: Labour Force Survey analysis

This chapter draws on a sample and data from the Labour Force Survey in order to address two of the thesis' research questions: What is the prevalence of: back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; 'depression or bad nerves'; and progressive illness among nursing and midwifery professionals compared to other professions and occupations? What is the association with demographics and work variables and the occurrence of; back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; 'depression or bad nerves'; and progressive illness among nursing and midwifery professionals compared to other work groups?

## 6.1 Introduction

In order to maintain the size of the nursing workforce necessary to meet growing demands from an ageing population with increased care needs, the prevention of early workforce exit is needed. Poor health is one reason for early exit from paid employment irrespective of occupation. There are good theoretical reasons to believe that the health of nurses and other public health sector workers is currently problematic (see Chapter 1). Yet the extent to which health status varies between occupations in the health sector in the UK is unclear.

The aim of this study was to quantify the prevalence of: back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; 'depression or bad nerves'; and; progressive illness self-reported by, and the association between these outcomes, nursing and midwifery professionals compared to: caring personal services; health and social service managers and directors; managers and proprietors in health and care services; teaching and educational professionals; and *other occupations* in the UK. In doing so, one can begin to determine whether nursing and midwifery professionals are at greater risk of specific health conditions compared to other public health sector workers.

There are two main reasons for drawing on the Labour Force Survey (LFS) to address the research aims. First, the LFS provides a representative sample of the UK population at point of survey. Second, the survey collected data on respondents' health and the presence of specific health conditions.

## 6.2 LFS demographic characteristics

The study population comprised of workers in the UK who had participated in the LFS between January and March 2016. The LFS is a panel survey that aims to collect occupational, health and personal characteristic data on a representative sample of population in the UK labour market. Between January and March 2016, the LFS collected data on 61,921 people aged 17–69 who reported to be in work at the time of the survey – with a total of 43,845,642 people when individual weights were applied – over half of whom were female (50.5%). Weights were applied to the analysis due to over and under representation of geographical areas. More specifically, there were 634,955 nursing and midwifery professionals, 280,878 health professionals, 94,504 therapy professionals, 1,043,625 caring personal services, 56,724 health and social services managers and directors, 70,238 managers and proprietors in health and care services, 1,090,071 teaching and educational professionals, and 18,853,332 respondents in the group *other occupations*. Similar to the APS, respondents aged below 17 or over 69 were excluded from the analysis due to the assumption that people below 17 are typically in full-time education and those over 69 would normally have retired. Despite the limitations associated with this approach, complexities in defining working age at an individual level meant it was considered the best available criteria to enable comparisons to be drawn and for meaningful findings to emerge.

**Table 6.1 Demographic Characteristics.**

| | Mean age | 95% CI | Female | | Total N | % |
|---|---|---|---|---|---|---|
| | | | N | % | | |
| Nursing and Midwifery Professionals | 43.15 | 43.12, 43.18 | 634955 | 90.2% | 703981 | 100% |
| Health Professionals | 41.19 | 41.16, 41.22 | 280878 | 52.5% | 534718 | 100% |
| Therapy Professionals | 40.48 | 40.42, 40.54 | 94504 | 79.2% | 119393 | 100% |
| Caring Personal Services | 41.53 | 41.51, 41.55 | 1043625 | 81.0% | 1287984 | 100% |
| Health and Social Services Managers and Directors | 48.52 | 48.46, 48.58 | 56724 | 68.3% | 83092 | 100% |
| Managers and Proprietors in Health and Care Services | 48.44 | 48.37, 48.50 | 70238 | 87.4% | 80372 | 100% |
| Teaching and Educational Professionals | 42.73 | 42.72, 42.75 | 1090071 | 68.5% | 1592172 | 100% |
| Other Occupations | 42.43 | 42.42, 42.43 | 18853332 | 47.8% | 39443930 | 100% |

Presented in Table 6.1 is the distribution of respondents according to mean age and gender within each occupational group. The proportion of females in each occupation differed strongly, ranging from 47.8 percent in *other occupations* to 90.2 percent in nursing and midwifery professionals. Similarly, the mean age of workers in each occupation differed strongly, ranging from 40.48 years (95% CI 40.42, 40.54) in therapy professionals to 48.52 years (95% CI 48.46, 48.58) in health and social services managers and directors.

## 6.3 Analysis

Descriptive statistics of six health conditions (back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; 'depression or bad nerves'; and progressive illness) were generated to examine the percentage of nursing and midwifery professionals compared to: caring personal services; health and social service managers and directors; managers and proprietors in health and care services; teaching and educational professionals; and *other occupations* in the UK. Next, five logistic regression models were created to display odds ratios to investigate whether nurses are more likely to experience one of the aforementioned health problems compared to the comparator groups. All models included the variables of gender, age band, ethnicity, child dependent, occupation, and working hours. All models used a cut value in the classification table of 0.5 except for back and neck problems which used 0.1. These were all informed by the Hosmer-Lemeshow test.

## 6.4 Results

**Descriptors of back and neck problems reported**

There were no data missing for respondents in the sample for back or neck problems and thus all respondents were included in the analysis of this variable. Females reported a higher prevalence of back or neck problems than males (9.3% and 6.7% respectively). The percentage of the sample reporting a back or neck problem increased with age, rising from 2.6 percent in 17–29-year olds to 15.8 percent in

60–69-year olds, 7.9 percent in 40–49-year olds and 12.1 percent in 50–59-year olds. ANOVA showed that the effect of age band was significant, $F(1, 43845640)=1397943.83$, $p<0.001$. Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significantly lower in <29-year olds than 60–69-year olds ($t(5)=-59.08$, $F(-59.08, -60.17)=191.45$, $p<0.001$).

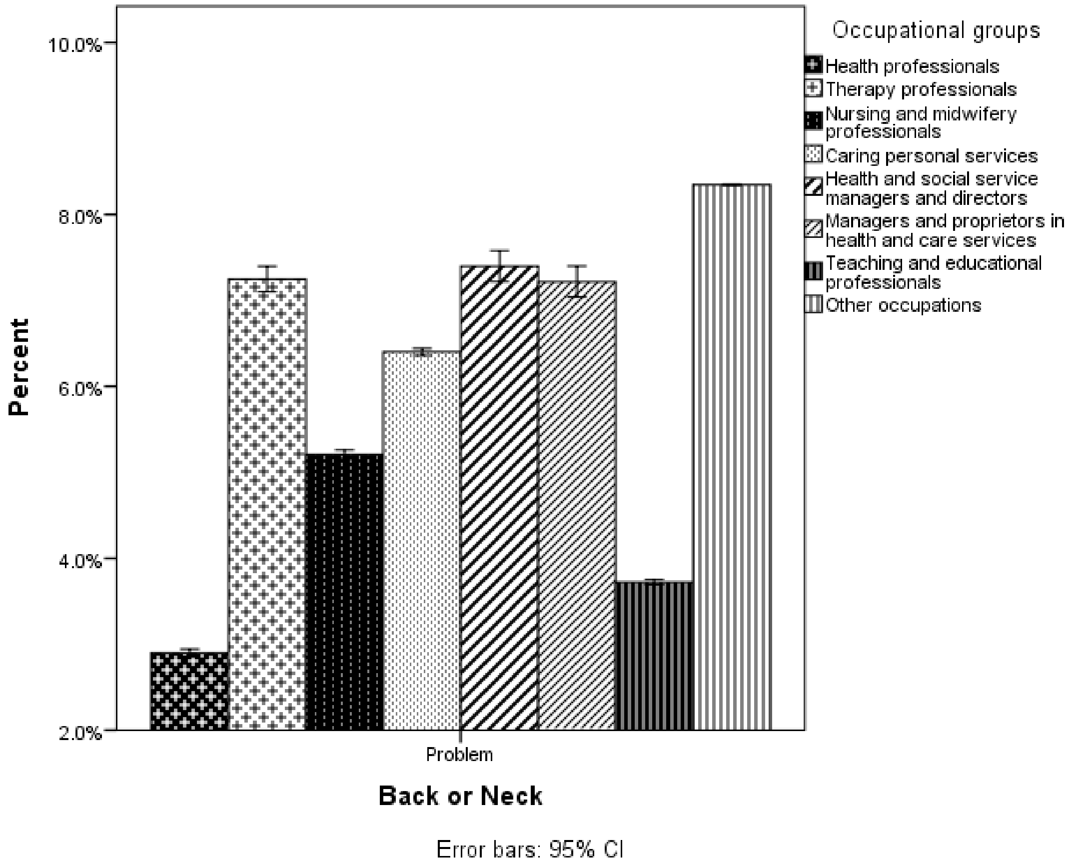



**Figure 6.1 Error Bar Chart for Back or Neck Problems by Occupation.**

<u>Back or neck problems by occupation</u>

The distribution of a back or neck problem differs between occupational group in the sample, graphically shown in Figure 6.1. The prevalence of a back or neck problem was 2.9 percent in nursing and midwifery professionals, 7.2 percent (95% CI 7.1, 7.4) in health professionals, 5.2 percent (95% CI 5.2, 5.3) in therapy professionals, 6.4

percent in caring personal services, 7.4 percent (95% CI 7.2, 7.6) in health and social service managers and directors, 7.2 percent (95% CI 7.0, 7.4) in managers and proprietors in health and care services, 3.7 percent (95% CI 3.7, 3.8) in teaching and educational professionals and 8.3 percent (95% CI 8.3, 8.4) in *other occupations.*

<u>Back or neck problems by occupation, stratified by gender and age band</u>

Table 6.2 in Appendix x shows the distribution of respondents self-reporting a back or neck problem within each occupation, stratified by age and gender. The percentage of the sample reporting a back or neck problem varied between females and males in each occupation. For example, in nursing and midwifery professionals, 5.2 percent (95% CI 5.2, 5.3) of females and 5.4 percent (95% CI 5.2, 5.6) of males reported a back or neck problem. Among females in comparator groups, the lowest prevalence was reported by teachers and educational professionals (4.1%, 95% CI 4.1, 4.1) and the highest *other occupations* (10.0%, 95% CI 10.0, 10.0). Among males in comparator groups, the lowest prevalence was reported by teaching and educational professionals (2.9%, 95% CI 2.9, 2.10) and the highest by *other occupations* (6.8%, 95% CI 6.8, 6.8). The percentage of workers reporting a back or neck problem generally increased with age. For example, in nursing and midwifery professional, 1.6 perent (95% CI 1.5, 1.7) of those aged 17–29 reported a back or neck problem, 3.4 percent (95% CI 3.3, 3.5) 30–39, 5.4 percent (95% CI 5.3, 5.5) 40–49, 8.1 percent (95% CI 8.0, 8.2) 50–59 and 7.1 percent (95% 6.8, 7.4) 60–69-year olds.

ANOVA showed that the effect of gender, age band and gender by age band was significant in all the occupations included in the analysis. The statistics were as follows: among nursing and midwifery professionals, gender $F(1, 534717)=11174.70$, $p<0.001$, age band $F(4, 534717)=1491.26$, $p<0.001$ and gender by age band $F(4, 534717)=1798.37$, $p<0.001$; health professionals, gender $F(1, 119392)=434.56$, $p<0.001$, age band $F(4, 119392)=2162.79$, $p<0.001$ and gender by age band $F(4, 119392)=1617.07$, $p<0.001$; therapy professionals, gender $F(1, 703980)=68.28$, $p<0.001$, age band $F(4, 703980)=890.67$, $p<0.001$ and gender by age band $F(4, 703980)=507.25$, $p<0.001$; caring personal services, gender $F(1, 1287983)=3967.15$, $p<0.001$, age band $F(4, 1287983)=3476.60$, $p<0.001$ and gender by age band $F(4, 1287983)=234.61$, $p<0.001$; health and social services managers and directors, gender $F(1, 83091)=150.46$, $p<0.001$, age band $F(4, 83091)=406.55$, $p<0.001$ and gender by age band $F(4, 83091)=485.44$, $p<0.001$; managers and proprietors in health and care services, gender $F(1, 80371)=36.12$, $p<0.001$, age band $F(4, 80371)=1220.84$, $p<0.001$ and gender by age band $F(4, 80371)=378.30$, $p<0.001$; teaching and educational professionals, gender $F(1, 1592171)=492.55$, $p<0.001$, age band $F(4, 1592171)=4699.60$, $p<0.001$ and gender by age band $F(4, 1592171)=325.00$, $p<0.001$; and *other occupations*, gender $F(1, 39443929)=127346.08$, $p<0.001$, age band $F(4, 39443929)=336803.82$, $p<0.001$ and gender by age band $F(4, 39443929)=10274.47$, $p<0.001$.

**Descriptors of heart, blood pressure and circulation problems reported**

The proportion of respondents self-reporting heart, blood pressure or circulation problems was higher among males than females (9.4% [95% CI 9.4, 9.4] and 7.9% [95% CI 7.9, 7.9] respectively). The proportion of workers reporting one of these conditions differed between age bands, rising from 1.4 percent in 17–29-year olds to

2.4 percent in 30–39-year olds, 6.1 percent in 40–49, 13.6 percent in 50–59 and 24.3 percent in 60–69-year olds. The biggest increase was between the age bands 50–59 and 60–69 years. ANOVA showed that the effect of age band was significant, $F(1, 43845640)=3528866.54$, $p<0.001$.

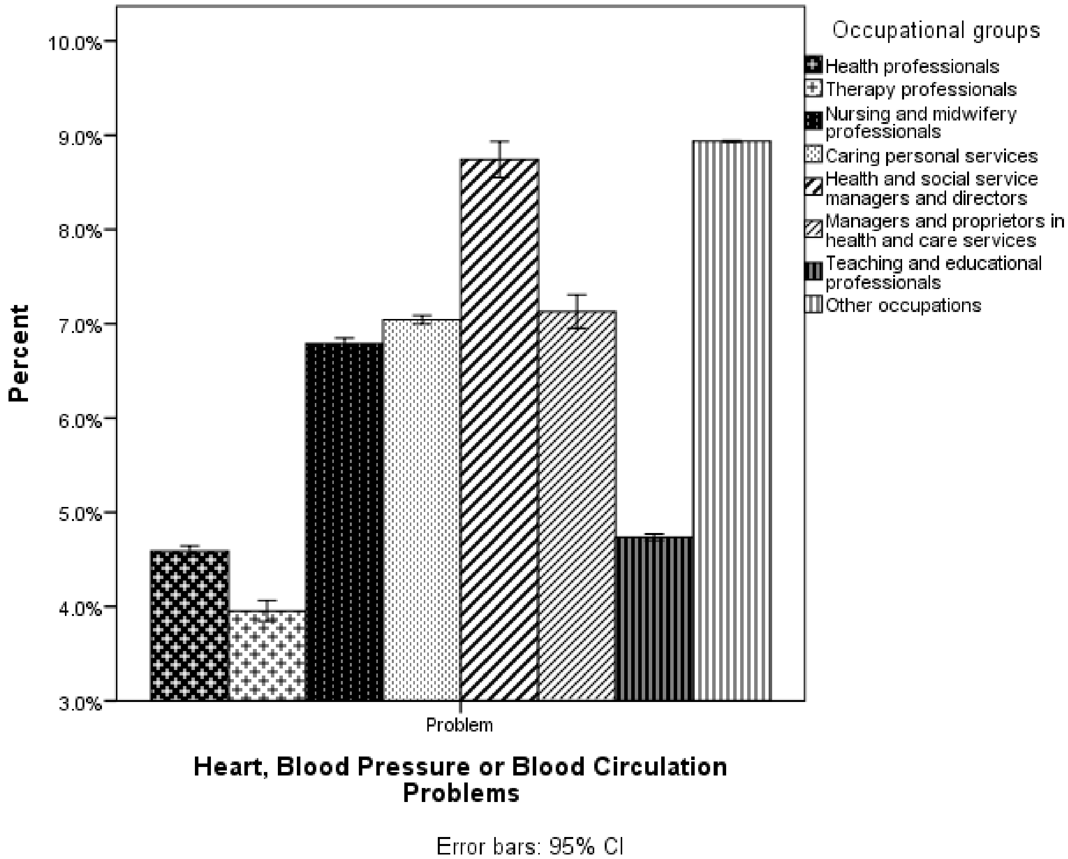



**Figure 6.2 Error Bar Chart for Heart, Blood Pressure or Circulation Problems by Occupation.**

<u>Heart, blood pressure or circulation problems by occupation</u>

The proportion of the sample self-reporting a heart, blood pressure or circulation problem differs by occupation, see Figure 6.2. In this sample, 4.6 percent (95% CI 4.5, 4.7) of nursing and midwifery professionals, 4.0 percent (95% CI 3.9, 4.1) of health professionals, 6.8 percent (95% CI 6.7, 6.9) of therapy professionals, 7.0

percent (95% CI 7.0, 7.0) of caring personal services, 8.7 percent (95% CI 8.5, 8.9) of health and social services managers and directors, 7.1 percent (95% CI 6.9, 7.3) of proprietors in health and care services, 4.7 percent (95% CI 4.7, 4.7) of teaching professionals and 8.9 percent (95% CI 8.9, 8.9) of *other occupations* reported a heart, blood pressure or circulation problem.

Heart, blood pressure or circulation problems by occupation, stratified by gender and age band

Characteristics of the prevalence of heart, blood pressure or circulation problems in the sample are summarised in Appendix x Table 6.3. For example, in nursing and midwifery professionals, 6.5 percent (95% CI 6.4, 6.6) of females and 9.6 percent (95% CI 9.4, 9.8) of males reported a heart, blood pressure or circulation problem. Among females in comparator groups, the lowest prevalence was reported by health professionals (3.7%, 95% CI 3.6, 3.8) and the highest by *other occupations* (8.3%, 95% CI 8.2, 8.4). Among males in comparator groups, the proportion reporting one of these health problems was lowest in therapy professionals (4.2%, 95% CI 4.0, 4.5) and the highest in *other occupations* (9.5%, 95% CI 9.5, 9.5). The percentage of nursing and midwifery professionals reporting one of the conditions increased with age, 3.0 percent (95% CI 2.9, 3.1) 17–29, 3.3 percent (95% CI 3.3, 3.3) 30–39, 6.1 percent (95% CI 6.0, 6.2) 40–49, 10.3 percent (95% CI 10.2, 10.4) 50–59, 17.3 percent (95% CI 16.9, 17.7) 60–69-year olds.

ANOVA showed that the effect of gender, age band and gender by age band was significant in all the occupations included in the analysis. The statistics were as follows: among nursing and midwifery professionals, gender $F(1, 534717)=943.34$,

$p<0.001$, age band $F(4, 534717)=3088.76$, $p<0.001$ and gender by age band $F(4, 534717)=223.46$, $p<0.001$; health professionals, gender $F(1, 119392)=378.63$, $p<0.001$, age band $F(4, 119392)=2791.51$, $p<0.001$ and gender by age band $F(4, 119392)=1862.96$, $p<0.001$; therapy professionals, gender $F(1, 703980)=744.29$, $p<0.001$, age band $F(4, 703980)=2401.45$, $p<0.001$ and gender by age band $F(4, 703980)=353.27$, $p<0.001$; caring personal services, gender $F(1, 1287983)=2068.69$, $p<0.001$, age band $F(4, 1287983)=10612.34$, $p<0.001$ and gender by age band $F(4, 1287983)=551.29$, $p<0.001$; health and social services managers and directors, gender $F(1, 83091)=223.49$, $p<0.001$, age band $F(4, 83091)=874.39$, $p<0.001$ and gender by age band $F(4, 83091)=391.91$, $p<0.001$; managers and proprietors in health and care services, gender $F(1, 80371)=2658.94$, $p<0.001$, age band $F(4, 80371)=1831.96$, $p<0.001$ and gender by age band $F(4, 80371)=2782.76$, $p<0.001$; teaching and educational professionals, gender $F(1, 1592171)=2278.12$, $p<0.001$, age band $F(4, 1592171)=16378.54$, $p<0.001$ and gender by age band $F(4, 1592171)=1739.20$, $p<0.001$; and *other occupations*, gender $F(1, 39443929)=37834.47$, $p<0.001$, age band $F(4, 39443929)=952914.58$, $p<0.001$ and gender by age band $F(4, 39443929)=13258.02$, $p<0.001$.

**Descriptors of diabetes reported**

The presence of diabetes was reported by 3.6 percent (95% CI 3.6, 3.6) of the sample. This was unexpectedly low given that in the UK, over 4.5 million people are living with either type I or type II diabetes (Diabetes UK, 2016) in a population size of 65.6 million (ONS, 2016), equivalent to 6.9 percent of the UK population. Many of these people will likely be either white people over the age of 40 or other ethnic origin people over

25 for whom the risk of developing diabetes is higher (Diabetes UK, 2016). Of those in the sample reporting the presence of diabetes, 3.0 percent (95% CI 3.0, 3.0) were female and 4.3 percent (95% CI 4.3, 4.3) male. As age increased, the number of individuals in the sample reporting diabetes also rose, particularly among those older age groups, 0.6 percent (95% CI 0.5, 0.7) 17–29, 1.0 percent (95% CI 1.0, 1.0) 30–39, 2.9 percent (95% CI 2.8, 3.0) 40–49, 6.2 percent (95% CI 6.1, 6.3) 50–59 and 9.4 percent (95% CI 9.3, 9.5) 60–69-year olds. ANOVA showed that the effect of age band was significant, $F(1, 43845640)=1232588.083$, $p<0.001$. Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significant, $t(5)=-1110.22$, $F(43845640, 1809496)=575953.77$, $p<0.001$).

<u>Diabetes by occupation</u>

The prevalence of diabetes reported by the occupational groups included in the analysis is low, preventing descriptive statistics by occupation from being reported in full. Of those groups with sufficient numbers to report, 1.6 percent (95% CI 1.6, 1.6) of nursing and midwifery professionals, 3.1 percent (95% CI 3.1, 3.1) of therapy professionals, 3.6 percent (95% CI 3.6, 3.6) of caring personal services, 4.7 percent (95% CI 4.6, 4.8) of health and social services managers and directors, 2.0 percent (95% CI 2.0, 2.0) of teaching and educational professionals and 3.7 percent (95% CI 3.7, 3.7) of *other occupations* reported the presence of diabetes.

<u>Diabetes by occupation, stratified by gender and age band</u>

Diabetes differed by gender and age band among occupational groups, see Appendix x Table 6.4. For example, in nursing and midwifery professionals, 3.2 percent (95%

CI 3.2, 3.2) of females and 2.7 percent (95% CI 2.7, 2.7) of males reported the presence of diabetes. In comparator groups, the prevalence was 0.2 percent (95% CI 0.2, 0.2) in female and 3.1 percent (95% CI 3.0, 3.2) in male health professionals, 3.2 percent (95% CI 3.2, 3.2) in female and 5.2 percent (95% CI 5.1, 5.3) in male caring personal services, and 1.1 percent (95% CI 1.1, 1.1) in female and 4.0 percent (95% CI 4.0, 4.1) in male teaching and educational professionals. The prevalence of diabetes reported by nursing and midwifery professionals, health professionals and teaching and educational professionals fell between the ages of 17–29 and 30–39 years before increasing as age rose. For example, 2.3 percent (95% CI 2.2, 2.4) in 17–29-year olds, 1.8 percent (95% CI 1.8, 1.8) 30–39, 2.0 percent (95% CI 1.9, 2.1) 40–49, 4.6 percent (95% CI 4.5, 4.7) 50–59 and 8.1 percent (95% CI 7.8, 8.4) in 60–69-year olds.

ANOVA showed that the effect of gender, age band and gender by age band was significant in all the occupations included in the analysis. The statistics were as follows: among nursing and midwifery professionals, gender $F(1, 534717)=8744.88$, $p<0.001$, age band $F(4, 534717)=993.08$, $p<0.001$ and gender by age band $F(4, 534717)=1018.31$, $p<0.001$; therapy professionals, gender $F(1, 703980)=434.50$, $p<0.001$, age band $F(4, 703980)=172.77$, $p<0.001$ and gender by age band $F(4, 703980)=373.76$, $p<0.001$; caring personal services, gender $F(1, 1287983)=1843.14$, $p<0.001$, age band $F(4, 1287983)=4271.54$, $p<0.001$ and gender by age band $F(4, 1287983)=759.69$, $p<0.001$; health and social services managers and directors, gender $F(1, 83091)=23.62$, $p<0.001$, age band $F(4, 83091)=1862.31$, $p<0.001$ and gender by age band $F(4, 83091)=3380.82$, $p<0.001$; managers and proprietors in health and care services, gender $F(1, 80371)=148.60$, $p<0.001$, age band $F(4, 80371)=1335.52$, $p<0.001$ and gender by age band $F(3, 80371)=737.22$, $p<0.001$; teaching and educational professionals, gender $F(1, 1592171)=20347.25$, $p<0.001$, age band $F(4, 1592171)=5362.95$, $p<0.001$ and gender by age band $F(4, 1592171)=2953.95$, $p<0.001$; and *other occupations*, gender $F(1, 39443929)=56205.30$, $p<0.001$, age band $F(4, 39443929)=314114.82$, $p<0.001$ and gender by age band $F(4, 39443929)=15327.20$, $p<0.001$.

**Descriptors of 'depression, bad nerves or anxiety' reported**

Distribution of 'depression, bad nerves or anxiety' reported by the sample was 7.0 percent (95% CI 7.0, 7.0). This was unexpectedly low given it is estimated that one in four people in England will experience a mental health problem each year (McManus, Meltzer, Brugha, Bebbington and Jenkins, 2009). Differences may be explained by differences in measurements and definitions used. In the sample, 8.5 percent (95% CI 8.5, 8.5) of females and 5.3 percent (95% CI 5.2, 5.4) of males reported 'depression, bad nerves or anxiety'. The proportion of workers self-reporting to be affected increased slightly with age except in the last age band, 5.6 percent (95% CI 5.6, 5.6) 17–29, 6.0 percent (95% CI 5.9, 6.1) 30–39, 7.6 percent (95% CI 7.6, 7.6) 40–49, 8.8 percent (95% CI 8.8, 8.8) 50–59 and 7.1 percent (95% CI 7.1, 7.1) 60–69-year olds.

ANOVA showed that the effect of age band was significant, $F(1, 43845640)=52860.01$, $p<0.001$. Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significant, $t(5)=-229.91$, $F(43845640, 3552375)=4888.58$, $p<0.001$).

‘Depression, bad nerves or anxiety’ by occupation

The distribution of ‘depression, bad nerves or anxiety’ reported differed by occupation, see Appendix x Table 6.5. The presence of one of these conditions was reported by 1.4 percent (95% CI 1.4, 1.4) of nursing and midwifery professionals, 2.0 percent (95% CI 2.0, 2.0) of health professionals, 3.7 percent (95% CI 3.7, 3.7) of therapy professionals, 7.1 percent (95% CI 7.1, 7.1) of caring personal services, 4.6 percent (95% CI 4.5, 4.7) of health and social services managers and directors, 4.0 percent (95% CI 3.9, 4.1) of managers and proprietors in health and care services, 4.0 percent (95% CI 4.0, 4.1) of teaching and educational professionals and 7.2 percent (95% CI 7.2, 7.2) of *other occupations*.

‘Depression, bad nerves or anxiety’ by occupation, stratified by gender and age band

Displayed in Appendix x Table 6.5 is the distribution of respondents self-reporting ‘depression, bad nerves or anxiety’ by gender and age nested within occupation. The percentage reporting the presence of this in the sample differed between gender and age band for each occupation. Among nursing and midwifery professionals, 3.8 percent (95% CI 3.8, 3.9) of females and 2.7 percent (95% CI 2.7, 2.7) of males reported ‘depression, bad nerves or anxiety’. The prevalence was 1.8 percent (95% CI 1.8, 1.9) for female and 0.8 percent (95% CI 0.8, 0.8) for male health professionals, 7.7 percent (95% CI 7.7, 7.8) for female and 4.7 percent (95% CI 4.7, 4.8) for male caring personal services, and 4.6 percent (95% CI 4.6, 4.6) for female and 2.8 percent (95% CI 2.8, 2.9) for male teaching and educational professionals. There is no relationship between age and reporting ‘depression, bad nerves or anxiety’. For example, the prevalence among nursing and midwifery professional was 3.4 percent

(95% CI 3.3, 3.5) 17–29, 3.2 percent (95% CI 3.2, 3.2) 30–39, 5.2 percent (95% CI 5.1, 5.3) 40–49, 3.4 percent (95% CI 3.3, 3.5) 50–59 and 1.1 percent (95% CI 1.0, 1.2) 60–69-year olds. Differences in the prevalence reported by each age group might be explained by workers' ability to deal with different aspects of their role, which is widely accepted as stressful.

ANOVA showed that the effect of gender, age band and gender by age band was significant in all the occupations included in the analysis. The statistics were as follows: among nursing and midwifery professionals, gender $F(1, 534717)=2671.70$, $p<0.001$, age band $F(4, 534717)=1306.09$, $p<0.001$ and gender by age band $F(4, 534717)=1488.37$, $p<0.001$; health professionals, gender $F(1, 119392)=946.47$, $p<0.001$, age band $F(4, 119392)=336.38$, $p<0.001$ and gender by age band $F(4, 119392)=336.38$, $p<0.001$; therapy professionals, gender $F(1, 703980)=141.75$, $p<0.001$, age band $F(4, 703980)=643.43$, $p<0.001$ and gender by age band $F(4, 703980)=320.50$, $p<0.001$; caring personal services, gender $F(1, 1287983)=1788.83$, $p<0.001$, age band $F(4, 1287983)=773.03$, $p<0.001$ and gender by age band $F(4, 1287983)=951.02$, $p<0.001$; health and social services managers and directors, gender $F(1, 83091)=21.46$, $p<0.001$, age band $F(4, 83091)=362.23$, $p<0.001$ and gender by age band $F(3, 83091)=15.96$, $p<0.001$; managers and proprietors in health and care services, gender $F(1, 80371)=1423.35$, $p<0.001$, age band $F(4, 80371)=1038.26$, $p<0.001$ and gender by age band $F(3, 80371)=1807.79$, $p<0.001$; teaching and educational professionals, gender $F(1, 1592171)=2715.41$, $p<0.001$, age band $F(4, 1592171)=826.59$, $p<0.001$ and gender by age band $F(4, 1592171)=435.13$, $p<0.001$; and *other occupations*, gender $F(1, 39443929)=196196.68$, $p<0.001$, age band $F(4, 39443929)=28045.71$, $p<0.001$ and gender by age band $F(4, 39443929)=1714.89$, $p<0.001$.

**Descriptors on prevalence of progressive illness**

The proportion of respondents self-reporting the presence of a progressive illness differed by gender. Females reported a higher prevalence than males (2.2% [95% CI 2.2, 2.2] and 1.6% [95% CI 1.6, 1.6] respectively). As age increased, the proportion of respondents affected by a progressive illness rose (17–29 years [0.6%, 95% CI 0.6, 0.6], 30–39 [0.9%, 95% CI 0.9, 0.9], 40–49 [1.7%, 95% CI 1.7, 1.7], 50–59 [2.8%, 95% CI 2.8, 2.8], 60–69 [4.4%, 95% CI 4.4, 4.4]).

ANOVA showed that the effect of age band was significant, $F(1, 43845640)=383109.94$, $p<0.001$. Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was ($t(5)=-618.96$, $F(43845640, 878757)=62070.87$, $p<0.001$).

<u>Progressive illness by occupation</u>

The distribution of progressive illness self-reported by the sample differed by occupational group. For example, 0.8 percent (95% CI 0.8, 0.8) of nursing and midwifery professionals, 1.0 percent (95% CI 1.0, 1.0) of therapy professionals, 1.2 percent (95% CI 1.2, 1.2) of caring personal service workers, 2.5 percent (95% CI 2.4, 2.6) of health and social services managers and directors, 1.4 percent (95% CI 1.4, 1.4) teaching and educational professionals, and 2.0 percent (95% CI 2.0, 2.0) of *other occupations*.

Progressive illness by occupation, stratified by gender and age band

The prevalence of a progressive illness was low in the sample resulting in statistics not being reported for every occupational group or for every characteristic in the analysis, see Appendix x Table 6.6. Disability differed by gender among occupational groups. Progressive illness was reported by 1.1 percent (95% CI 1.1, 1.1) of female nursing and midwifery professionals. Among females in comparator groups, the lowest prevalence was reported by health professionals (0.9%, 95% CI 0.9, 0.9) and the highest by *other occupations* (2.3%, 95% CI 2.3, 2.3). Among males in comparator groups, the lowest prevalence was reported by health professionals (0.6%, 95% CI 0.6, 0.6) and caring personal services (0.6%, 95% CI 0.6, 0.6) and the highest by *other occupations* (1.7%, 95% CI 1.7, 1.7). The percentage of workers reporting a progressive illness did not generally increase with age. For example, in nursing and midwifery professional, 1.0 percent (95% CI 0.9, 1.1) of those aged 17–29 reported a progressive illness, 0.6 percent (95% CI 0.6, 0.6) 40–49, 1.8 percent (95% CI 1.7, 1.9) 50–59 and 1.8 percent (95% 1.7, 1.9) 60–69-year olds.

ANOVA showed that the effect of gender, age band and gender by age band was significant in all the occupations included in the analysis. The statistics were as follows: among nursing and midwifery professionals, gender $F(1, 534717)=30.11$, $p<0.001$, age band $F(4, 534717)=718.44$, $p<0.001$ and gender by age band $F(4, 534717)=82.76$, $p<0.001$; therapy professionals, gender $F(1, 703980)=517.58$, $p<0.001$, age band $F(4, 703980)=105.81$, $p<0.001$ and gender by age band $F(4, 703980)=105.81$, $p<0.001$; caring personal services, gender $F(1, 1287983)=376.19$, $p<0.001$, age band $F(4, 1287983)=2015.49$, $p<0.001$ and gender by age band $F$(4, 1287983)=962.76, $p<0.001$; health and social services managers and directors, gender $F(1, 83091)=962.82$, $p<0.001$, age band $F(4, 83091)=127.45$, $p<0.001$ and gender by age band $F(3, 83091)=164.49$, $p<0.001$; managers and proprietors in health and care services, gender $F(1, 80371)=23.65$, $p<0.001$, age band $F(4, 80371)=29.61$, $p<0.001$ and gender by age band $F(3, 80371)=36.64$, $p<0.001$; teaching and educational professionals, gender $F(1, 1592171)=47.78$, $p<0.001$, age band $F(4, 1592171)=854.56$, $p<0.001$ and gender by age band $F(4, 1592171)=727.93$, $p<0.001$; and *other occupations*, gender $F(1, 39443929)=16841.30$, $p<0.001$, age band $F(4, 39443929)=95391.03$, $p<0.001$ and gender by age band $F(4, 39443929)=2902.54$, $p<0.001$.

**Descriptors on the number of health problems reported**

The number of health problems reported by respondents in the sample ranged from zero to five in relation to back or neck problems, heart, blood pressure, or circulation problems, diabetes, 'depression, bad nerves or anxiety', and progressive illness. Among respondents reporting a health problem, the proportion of workers reporting one versus two or more was examined. Females reported a higher prevalence than males of two or more health problems than males (32.0% [95% CI 32.0, 32.0] and 30.2% [95% CI 30.2, 30.2] respectively). The proportion of workers reporting two or more health problems rose as age increased, from 15.8 percent (95% CI 15.7, 15.9) in 17–29-year olds to 37.8 percent (95% CI 37.7, 37.9) in 60–69-year olds. The greatest increase was seen between the age bands of 30–39 and 40–49 (20.5% [95% CI 20.4, 20.6] and 29.0% [95% CI 28.9, 29.1] respectively). ANOVA showed that the effect of age band was significant, $F(1, 898837)=241828.18$, $p<0.001$. Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significant ($t(5)=-491.76$, $F(898837, 634486)=316551.86$, $p<0.001$).

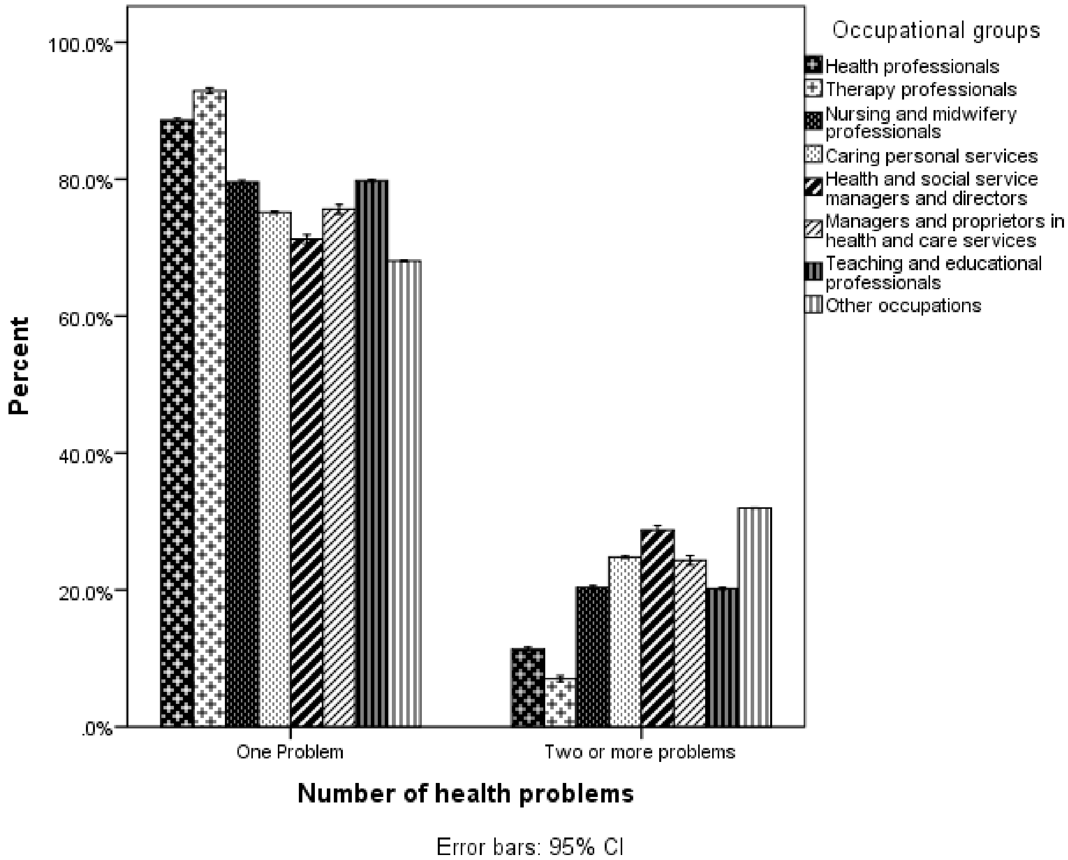



**Figure 6.3 Error Bar Chart for Number of Health Problems by Occupation.**

<u>Number of health problems reported by occupation</u>

The distribution of the sample self-reporting two or more health conditions varied by occupation, see Figure 6.3. For example, 11.4 percent (95% CI 11.1, 11.7) of nursing and midwifery professionals, 7.0 percent (95% CI 6.6, 7.4) of health professionals, 20.4 percent (95% CI 20.2, 20.6) of therapy professionals, 24.8 percent (95% CI 24.6, 25.0) of caring personal service workers, 28.7 percent (95% CI 28.0, 29.4) of health and social services managers and directors, 24.4 percent (95% CI 23.7, 25.1) of managers and proprietors in health and care services, 20.2 percent (95% CI 20.0, 20.4) teaching and educational professionals, and 32.0 percent (95% CI 32.0, 32.0) of *other occupations*.

<u>Two or more health conditions by occupation, stratified by gender and age band</u>

The proportion of respondents reporting two or more health problems was investigated by gender and age, nested within occupation, see Appendix x Table 6.7. Due to small numbers, therapy professionals, health and social services managers and directors, and managers and proprietors in health and care services, have been removed from Table 6.7 in Appendix x. Two or more health conditions were reported by 19.9 percent (95% CI 19.7, 20.1) of female and 25.7 percent (95% CI 24.8, 26.6) of male nursing and midwifery professionals. Among females in comparator groups, the lowest prevalence was reported by health professionals (17.9%, 95% CI 17.4, 18.4) and the highest by *other occupations* (33.2%, 95% CI 33.2, 33.2). Among males in comparator groups, the lowest prevalence was reported by teaching and educational professionals in health professionals (5.0%, 95% CI 4.7, 5.3) and highest by *other occupations* (30.7%, 95% CI 30.7, 30.7). The percentage of workers reporting two or more conditions did not increase consistently with age. For example, nursing and midwifery professionals experienced a decline in incidence from 28.6 percent (95% CI 27.6, 29.6) in 17–29-year olds to 8.6 percent (95% CI 8.2, 9.0) in 30–39-year olds. The proportion then increased between the age bands 30–39 and 40–49 (8.6% [95% CI 8.2, 9.0] and 24.3 percent% [95% CI 23.8, 24.8] respectively), decreased between 40–49 years and 50–59 years (24.3% [95% CI 23.8, 24.8] and 16.2% [95% CI 15.9, 16.5]), before increasing at 60–69 years (43.3% [95% CI 42.3, 44.3]). Moreover, nursing and midwifery professionals aged 60–69 bear the biggest burden of two or more health problems compared to all other occupational groups included in the analysis.

ANOVA showed that the effect of gender, age band and gender by age band was significant in all the occupations included in the analysis. The statistics were as follows: among nursing and midwifery professionals, gender $F(1, 53800)=2959.21$, $p<0.001$, age band $F(4, 53800)=786.46$, $p<0.001$ and gender by age band $F(4, 53800)=1076.67$, $p<0.001$; health professionals, gender $F(1, 14197)=1892.86$, $p<0.001$, age band $F(4, 14197)=996.75$, $p<0.001$ and gender by age band $F(3, 14197)=168.36$, $p<0.001$; therapy professionals, gender $F(1, 111051)=107.37$, $p<0.001$, age band $F(4, 111051)=513.68$, $p<0.001$ and gender by age band $F(3, 111051)=715.53$, $p<0.001$; caring personal services, gender $F(1, 253427)=1295.50$, $p<0.001$, age band $F(4, 253427)=1109.63$, $p<0.001$ and gender by age band $F(4, 253427)=58.89$, $p<0.001$; health and social services managers and directors, gender $F(1, 17640)=44.08$, $p<0.001$, age band $F(2, 17640)=2364.85$, $p<0.001$ and gender by age band $F(1, 17640)=44.08$, $p<0.001$; managers and proprietors in health and care services, gender $F(1, 14767)=4.40$, $p<0.001$, age band $F(4, 14767)=1539.31$, $p<0.001$ and gender by age band $F(3, 14767)=844.19$, $p<0.001$; teaching and educational professionals, gender $F(1, 206820)=42.40$, $p<0.001$, age band $F(4, 206820)=1341.57$, $p<0.001$ and gender by age band $F(4, 206820)=265.53$, $p<0.001$; and *other occupations*, gender $F(1, 8317129)=9379.52$, $p<0.001$, age band $F(4, 8317129)=60381.95$, $p<0.001$ and gender by age band $F(4, 8317129)=1881.48$, $p<0.001$.

**Summary of main findings**

There are three main findings from the descriptive analysis presented above:

i. Females bear the heaviest burden of many health conditions.
ii. Older people report higher numbers of health conditions.
iii. Those employed in *other occupations* report the highest prevalence of many health conditions.

## 6.5 Modelling the presence of different health conditions

The bivariate analysis reported above appears to indicate that health, including back or neck problems, heart, blood pressure or circulation problems, diabetes, 'depression, bad nerves or anxiety', and progressive illness are unevenly distributed across society, specifically in relation to occupation. The findings from this study suggest that there is a relationship between health and work, varying between occupational groups. To examine the risk of reporting each health problem across age bands, gender, occupation and working hours (full-time/part-time), multivariate regression analysis was conducted using six models: (i) back or neck problems (see Table 6.8); (ii) heart, blood pressure or circulation problems (see Table 6.9); (iii) diabetes (see Table 6.10); (iv) 'depression, bad nerves or anxiety' (see Table 6.11); and (v) progressive illness (see Table 6.12). The sixth model will investigate the risk of respondents reporting two or more health problems from the problems explored in each of the five models above (see Table 6.13). The following baseline categories are used: 40–49-year olds, being female, of white ethnic origin, working as a nurse or midwifery professional, and in full-time employment.

**Modelling the presence of back or neck problems**

<u>Baseline predictors of back or neck problems</u>

Age band ($b$ = 0.16, $t(5)$ = 37.67, $p$<0.001), gender ($b$ = 0.05, $t(2)$ = 12.17, $p$<0.001) and child dependents ($b$ = -0.003, $t(2)$ = -8.84, $p$<0.001) were significant predictors of back or neck problems but ethnic origin was not ($b$ = -0.003, $t(2)$ = -0.71, $p$>0.05). The risk of back or neck problems was lower in those aged < 29 (OR = 0.29, 95% CI 0.25, 0.33, $p$ < 0.001) and 30–39 (OR = 0.55, 95% CI 0.50, 0.62, $p$ < 0.001) than 40–49-year olds. Those aged 50–59 (OR = 1.41, 95% CI 1.29, 1.54, $p$ < 0.001) and 60–69 (OR = 1.83, 95% CI 1.67, 2.00, $p$ < 0.001) were at greater risk. Males were at lower risk of back and neck problems than females (OR = 0.70, 95% CI 0.66, 0.75, $p$ < 0.001). Age band, gender, ethnicity, and child dependent also explained a significant proportion of variance in back or neck problems, $R^2$ = 0.032, $F(4, 61832)$ = 517.14, $p$<0.001.

<u>Baseline characteristics and occupation predictors of back or neck problems</u>

Significant predictors in the model of back or neck problems were age band ($b$ = 0.16, $t(5)$ = 37.59, $p$<0.001), gender ($b$ = 0.05, $t(2)$ = 13.18, $p$<0.001), child dependent ($b$ = -0.04, $t(2)$ = -8.66, $p$<0.001), and occupation ($b$ = 0.03, $t(8)$ = 8.24, $p$<0.001). For example, health professionals (OR = 2.28, 95% CI 1.13, 4.61), caring personal services (OR = 1.87, 95% CI 1.19, 2.92) and *other occupations* (OR = 2.57, 95% CI 1.71, 3.88) were more likely to report a back or neck problem. Age band, gender, ethnicity, child dependent, and occupation also explained a significant proportion of variance in back or neck problems, $R^2$ = 0.033, $F(5, 61831)$ = 427.75, $p$<0.001.

# Table 6.8 Modelling Back or Neck Problems by Baseline Characteristics, Occupation and Working Hours.

| Variables in the Equation | | Odds Ratio | 95% CI Lower | 95% CI Upper | - 2 Log likelihood | Cox & Snell $R^2$ | Nagelkerke $R^2$ | Hosmer and Lemeshow | Overall % correctly predicted | % correctly predicted no problem | % correctly predicted problem |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model 1 | **Age bands (years)** | [a] | | | | | | | | | |
| | < 29 | .286[a] | .252 | .326 | | | | | | | |
| | 30 - 39 | .553[a] | .496 | .617 | | | | | | | |
| | 50 - 59 | 1.407[a] | 1.287 | 1.540 | | | | | | | |
| | 60 - 69 | 1.827[a] | 1.667 | 2.001 | | | | | | | |
| | **Gender (Baseline = female)** | | | | | | | | | | |
| | Male | .703[a] | .663 | .746 | | | | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | | | | |
| | Other ethnic origin | .965 | .870 | 1.070 | | | | | | | |
| | **Dependents (Baseline = none)** | | | | | | | | | | |
| | Yes | .722[a] | .665 | .785 | | | | | | | |
| | **Constant** | .119[a] | | | 33730.731 | .033 | .076 | 0.013 | 61.0 | 60.2 | 69.3 |
| Model 2 | **Age bands (years)** | [a] | | | | | | | | | |
| | < 29 | .277[a] | .244 | .315 | | | | | | | |
| | 30 - 39 | .551[a] | .494 | .615 | | | | | | | |
| | 50 - 59 | 1.403[a] | 1.283 | 1.535 | | | | | | | |
| | 60 - 69 | 1.748[a] | 1.595 | 1.916 | | | | | | | |
| | **Gender (Baseline = female)** | | | | | | | | | | |
| | Male | .673[a] | .635 | .714 | | | | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | | | | |
| | Other ethnic origin | .972 | .876 | 1.078 | | | | | | | |
| | **Dependents (Baseline = none)** | | | | | | | | | | |
| | Yes | .726[a] | .668 | .789 | | | | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [a] | | | | | | | | | |
| | Health professionals | 2.283[c] | 1.130 | 4.613 | | | | | | | |
| | Therapy professionals | 1.353 | .829 | 2.208 | | | | | | | |
| | Caring personal services | 1.868[c] | 1.194 | 2.923 | | | | | | | |
| | Health and social service managers and directors | 1.608 | .725 | 3.565 | | | | | | | |
| | Managers and proprietors in health and care services | 1.416 | .639 | 3.137 | | | | | | | |
| | Teaching and educational professionals | 1.049 | .661 | 1.664 | | | | | | | |
| | *Other occupations* | 2.571[a] | 1.705 | 3.876 | | | | | | | |
| | **Constant** | .051[a] | | | 33585.447 | .036 | .081 | 0.002 | 63.6 | 63.3 | 66.8 |
| Model 3 | **Age bands (years)** | [a] | | | | | | | | | |
| | < 29 | .301[a] | .258 | .351 | | | | | | | |
| | 30 - 39 | .581[a] | .514 | .657 | | | | | | | |
| | 50 - 59 | 1.305[a] | 1.175 | 1.449 | | | | | | | |
| | 60 - 69 | 1.567[a] | 1.400 | 1.754 | | | | | | | |
| | **Gender (Baseline = female)** | | | | | | | | | | |
| | Male | .740[a] | .685 | .799 | | | | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | | | | |
| | Other ethnic origin | .987 | .868 | 1.123 | | | | | | | |
| | **Dependents (Baseline = none)** | | | | | | | | | | |
| | Yes | .754[a] | .685 | .831 | | | | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [a] | | | | | | | | | |
| | Health professionals | 2.266[c] | 1.123 | 4.574 | | | | | | | |
| | Therapy professionals | 1.391 | .852 | 2.270 | | | | | | | |
| | Caring personal services | 1.908[b] | 1.220 | 2.985 | | | | | | | |
| | Health and social service managers and directors | 1.749 | .789 | 3.877 | | | | | | | |
| | Managers and proprietors in health and care services | 1.535 | .693 | 3.401 | | | | | | | |
| | Teaching and educational professionals | 1.067 | .673 | 1.693 | | | | | | | |
| | *Other occupations* | 1.997[b] | 1.324 | 3.011 | | | | | | | |
| | **Working hours (Baseline = full-time)** | | | | | | | | | | |
| | Part-time | 1.224[a] | 1.130 | 1.326 | | | | | | | |
| | **Constant** | .046[a] | | | 24234.641 | .022 | .057 | 0.263 | 79.2 | 82.3 | 35.8 |

[a] $p < 0.001$, [b] $p < 0.005$, [c] $p < 0.05$.

Baseline characteristics, occupation and working hours predictors of back or neck problems

The variables of age band ($b$ = 0.12, $t$(5) = 27.06, $p$<0.001), gender ($b$ = 0.04, $t$(2) = 7.75, $p$<0.001), child dependent ($b$ = -0.03, $t$(2) = -6.22, $p$<0.001), occupation ($b$ = 0.02, $t$(8) = 3.92, $p$<0.001) and working hours ($b$ = 0.03, $t$(2) = 5.31, $p$<0.001) were significant predictors of back or neck problems. For example, part-time workers were 1.22 times more likely to report a back or neck problem than full-time workers (95% CI 1.13, 1.33, $p$ < 0.001). Age band, gender, ethnicity, child dependent, and occupation also explained a significant proportion of variance in heart, blood pressure or circulatory problems, $R^2$ = 0.021, $F$(6, 52366) = 184.69, $p$<0.001. The model is a good fit indicated by Hosmer-Lemeshow being < 0.05.

**Modelling the presence of heart, blood pressure or circulatory problems**

Baseline predictors of heart, blood pressure or circulatory problems

Age band ($b$ = 0.25, $t$(5) = 62.03, $p$<0.001), gender ($b$ = -0.03, $t$(2) = -8.02, $p$<0.001), ethnic origin ($b$ = 0.02, $t$(2) = 4.54, $p$=0.001), and child dependent ($b$ = -0.05, $t$(2) = -12.63, $p$<0.001) significantly predicted heart, blood pressure or circulatory problems. Consistent with the other prediction models, age bands below 40–49-years were significantly less likely and those above were significantly more likely to report a heart, blood pressure or circulatory problem. Males (OR = 1.28, 95% CI 1.21, 1.36) and those of other ethnic origin (OR=1.34, 95% CI 1.21, 1.48) were at greater risk. Those with one or more child dependents had a lower risk of heart, blood pressure or circulatory problems (OR = 0.72, 95% CI 0.66, 0.79). Age band, gender, ethnicity,

## Table 6.9 Modelling Heart, Blood Pressure and Circulatory Problems by Baseline Characteristics, Occupation and Working Hours.

| Variables in the Equation | | Odds Ratio | 95% CI Lower | 95% CI Upper | - 2 Log likelihood | Cox & Snell $R^2$ | Nagelkerke $R^2$ | Percentage correctly predicted |
|---|---|---|---|---|---|---|---|---|
| Model 1 | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .205[a] | .174 | .242 | | | | |
| | 30 - 39 | .385[a] | .335 | .442 | | | | |
| | 50 - 59 | 2.144[a] | 1.949 | 2.358 | | | | |
| | 60 - 69 | 4.245[a] | 3.859 | 4.669 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | 1.280[a] | 1.210 | 1.355 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | 1.339[a] | 1.213 | 1.479 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .724[a] | .660 | .793 | | | | |
| | **Constant** | .065[a] | | | 33344.626 | .079 | .171 | 90.6 |
| Model 2 | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .202[a] | .171 | .238 | | | | |
| | 30 - 39 | .385[a] | .335 | .442 | | | | |
| | 50 - 59 | 2.140[a] | 1.946 | 2.354 | | | | |
| | 60 - 69 | 4.168[a] | 3.788 | 4.586 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | 1.259[a] | 1.188 | 1.333 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | 1.345[a] | 1.218 | 1.485 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .729[a] | .665 | .798 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [a] | | | | | | |
| | Health professionals | .986 | .421 | 2.309 | | | | |
| | Therapy professionals | 1.501 | .975 | 2.310 | | | | |
| | Caring personal services | 1.563[c] | 1.051 | 2.324 | | | | |
| | Health and social service managers and directors | 1.500 | .729 | 3.088 | | | | |
| | Managers and proprietors in health and care services | 1.102 | .508 | 2.392 | | | | |
| | Teaching and educational professionals | 1.061 | .710 | 1.586 | | | | |
| | *Other occupations* | 1.716[b] | 1.204 | 2.445 | | | | |
| | **Constant** | .040[a] | | | 33303.523 | .080 | .172 | 90.6 |
| Model 3 | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .197[a] | .161 | .241 | | | | |
| | 30 - 39 | .383[a] | .328 | .447 | | | | |
| | 50 - 59 | 2.129[a] | 1.914 | 2.369 | | | | |
| | 60 - 69 | 4.162[a] | 3.725 | 4.650 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | 1.398[a] | 1.299 | 1.503 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | 1.293[a] | 1.147 | 1.458 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .756[a] | .682 | .837 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [c] | | | | | | |
| | Health professionals | .999 | .427 | 2.341 | | | | |
| | Therapy professionals | 1.558c | 1.012 | 2.399 | | | | |
| | Caring personal services | 1.607[c] | 1.080 | 2.390 | | | | |
| | Health and social service managers and directors | 1.546 | .750 | 3.185 | | | | |
| | Managers and proprietors in health and care services | 1.153 | .531 | 2.506 | | | | |
| | Teaching and educational professionals | 1.070 | .716 | 1.600 | | | | |
| | *Other occupations* | 1.439[c] | 1.009 | 2.052 | | | | |
| | **Working hours (Baseline = full-time)** | | | | | | | |
| | Part-time | 1.071 | .990 | 1.158 | | | | |
| | **Constant** | .037[a] | | | 25279.259 | .067 | .158 | 92.1 |

[a] $p < 0.001$, [b] $p < 0.005$, [c] $p < 0.05$.

and child dependent also explained a significant proportion of variance in heart, blood pressure or circulatory problems, $R^2 = 0.076$, $F(4, 61832) = 1273.85$, $p<0.001$.

<u>Baseline characteristics and occupation predictors of heart, blood pressure or circulatory problems</u>

All baseline characteristics and occupation were a significant predictor of heart, blood pressure or circulatory problems: age band ($b = 0.25$, $t(5) = 61.99$, $p<0.001$), gender ($b = -0.03$, $t(2) = -7.24$, $p<0.001$), ethnic origin ($b = 0.02$, $t(2) = 4.77$, $p<0.001$), child dependent ($b = -0.05$, $t(2) = -12.52$, $p<0.001$), and occupation ($b = 0.02$, $t(8) = 5.14$, $p<0.001$). For example, caring personal service workers were at 1.56 times the risk (95% CI 1.05, 2.32) and *other occupations* at 1.72 times the risk (95% 1.20, 2.45) of heart, blood pressure or circulatory problems. Age band, gender, ethnicity, child dependent, and occupation also explained a significant proportion of variance in heart, blood pressure or circulatory problems, $R^2 = 0.077$, $F(5, 61831) = 1024.78$, $p<0.001$.

<u>Baseline characteristics, occupation and working hours predictors of heart, blood pressure or circulatory problems</u>

All baseline characteristics, occupation and working hours were a significant predictor of heart, blood pressure or circulatory problem: age band ($b = 0.23$, $t(5) = 51.63$, $p<0.001$), gender ($b = -0.04$, $t(2) = -9.71$, $p<0.001$), ethnic origin ($b = 0.01$, $t(2) = 2.91$, $p<0.005$), child dependent ($b = -0.05$, $t(2) = -10.84$, $p<0.001$), and working hours ($b = 0.02$, $t(2) = 4.65$, $p<0.001$). Age band, gender, ethnicity and occupation also explained a significant proportion of variance in heart, blood pressure or circulatory problems, $R^2 = 0.065$, $F(6, 52366) = 605.25$, $p<0.001$. Despite some of the individual variables being related to the dependent variable as shown in the odds ratios and confidence intervals – the model as whole is not a good fit indicated by Hosmer-Lemeshow being < 0.05.

**Modelling the presence of diabetes**

<u>Baseline predictors of diabetes</u>

Predictors of diabetes in the sample included age band ($b = 0.16$, $t(5) = 37.46$, $p<0.001$), gender ($b = -0.04$, $t(2) = -9.76$, $p<0.001$), ethnic origin ($b = 0.05$, $t(2) = 11.80$, $p<0.001$), and child dependent ($b = -0.03$, $t(2) = -7.19$, $p<0.001$). For example, young age bands were at lower risk and older age bands, being male and being of other ethnic origin, were at higher risk of reporting diabetes. The odds ratios and their 95% CI are presented in Table 6.10. Age band, gender, ethnicity, and child dependent also explained a significant proportion of variance in diabetes, $R^2 = 0.030$, $F(4, 61832) = 485.88$, $p<0.001$.

<u>Baseline characteristics and occupation predictors of diabetes</u>

All baseline characteristics and occupation were significant predictors of diabetes: age band ($b = 0.16$, $t(5) = 37.44$, $p<0.001$), gender ($b = -0.04$, $t(2) = -9.35$, $p<0.001$), ethnic origin ($b = 0.05$, $t(2) = 11.89$, $p<0.001$), child dependent ($b = -0.03$, $t(2) = 7.14$, $p<0.001$), and occupation ($b = 0.01$, $t(8) = 2.34$, $p < 0.05$). The risk of diabetes was over twice as high in all occupations, excluding health professionals and teaching and educational professionals, than for nursing and midwifery professionals. The corresponding odds ratios are shown in Table 6.9. Age band, gender, ethnicity, child

## Table 6.10 Modelling Diabetes by Baseline Characteristics, Occupation and Working Hours.

| Variables in the Equation | | Odds Ratio | 95% CI Lower | 95% CI Upper | - 2 Log likelihood | Cox & Snell $R^2$ | Nagelkerke $R^2$ | Percentage correctly predicted |
|---|---|---|---|---|---|---|---|---|
| Model 1 | **Age bands (years)** | $^a$ | | | | | | |
| | < 29 | .169$^a$ | .130 | .219 | | | | |
| | 30 - 39 | .342$^a$ | .277 | .422 | | | | |
| | 50 - 59 | 2.053$^a$ | 1.789 | 2.355 | | | | |
| | 60 - 69 | 3.236$^a$ | 2.816 | 3.720 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | 1.533$^a$ | 1.410 | 1.668 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | 2.346$^a$ | 2.078 | 2.648 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .729$^a$ | .638 | .833 | | | | |
| | **Constant** | .024$^a$ | | | 18258.462 | .033 | .117 | 96.1 |
| Model 2 | **Age bands (years)** | $^a$ | | | | | | |
| | < 29 | .167$^a$ | .129 | .217 | | | | |
| | 30 - 39 | .343$^a$ | .278 | .423 | | | | |
| | 50 - 59 | 2.047$^a$ | 1.784 | 2.349 | | | | |
| | 60 - 69 | 3.201$^a$ | 2.784 | 3.680 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | 1.528$^a$ | 1.403 | 1.664 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | 2.357$^a$ | 2.087 | 2.662 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .736$^a$ | .644 | .842 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | $^c$ | | | | | | |
| | Health professionals | <.001 | <.001 | <.001 | | | | |
| | Therapy professionals | 2.185$^c$ | 1.108 | 4.307 | | | | |
| | Caring personal services | 2.585$^b$ | 1.380 | 4.842 | | | | |
| | Health and social service managers and directors | 2.694 | .982 | 7.390 | | | | |
| | Managers and proprietors in health and care services | 2.702 | .984 | 7.420 | | | | |
| | Teaching and educational professionals | 1.457 | .763 | 2.781 | | | | |
| | *Other occupations* | 2.255$^c$ | 1.265 | 4.022 | | | | |
| | **Constant** | .011$^a$ | | | 18228.339 | .033 | .119 | 96.1 |
| Model 3 | **Age bands (years)** | $^a$ | | | | | | |
| | < 29 | .203$^a$ | .151 | .273 | | | | |
| | 30 - 39 | .332$^a$ | .261 | .422 | | | | |
| | 50 - 59 | 2.029$^a$ | 1.736 | 2.370 | | | | |
| | 60 - 69 | 3.065$^a$ | 2.602 | 3.611 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | 1.834$^a$ | 1.639 | 2.052 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | 2.204$^a$ | 1.899 | 2.556 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .742$^a$ | .638 | .863 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | $^c$ | | | | | | |
| | Health professionals | <.001 | <.001 | <.001 | | | | |
| | Therapy professionals | 2.348c | 1.190 | 4.634 | | | | |
| | Caring personal services | 2.715$^b$ | 1.448 | 5.088 | | | | |
| | Health and social service managers and directors | 2.806c | 1.022 | 7.708 | | | | |
| | Managers and proprietors in health and care services | 2.932c | 1.067 | 8.057 | | | | |
| | Teaching and educational professionals | 1.482 | .776 | 2.832 | | | | |
| | *Other occupations* | 1.849$^c$ | 1.036 | 3.301 | | | | |
| | **Working hours (Baseline = full-time)** | | | | | | | |
| | Part-time | 1.068 | .949 | 1.203 | | | | |
| | **Constant** | .010$^a$ | | | 13466.598 | .027 | .110 | 96.8 |

$^a$ $p < 0.001$, $^b$ $p < 0.005$, $^c$ $p < 0.05$.

dependent, and occupation also explained a significant proportion of variance in diabetes, $R^2 = 0.030$, $F(5, 61831) = 389.82$, $p<0.001$.

Baseline characteristics, occupation and working hours predictors of diabetes

Age band ($b = 0.14$, $t(5) = 30.00$, $p<0.001$), gender ($b = -0.05$, $t(2) = -10.60$, $p<0.001$), ethnic origin ($b = 0.04$, $t(2) = 8.85$, $p<0.001$), child dependent ($b = -0.07$, $t(2) = -6.34$, $p<0.001$), and working hours ($b = 0.01$, $t(2) = 2.00$, $p = 0.045$) were significant predictors of diabetes. Occupation was not shown to be a significant predictor of diabetes ($b < 0.001$, $t(8) = -0.07$, $p = 0.943$). Age band, gender, ethnicity and occupation also explained a significant proportion of variance in diabetes, $R^2 = 0.025$, $F(6, 52366) = 224.20$, $p<0.001$. Despite some of the individual variables being related to the dependent variable as shown in the odds ratios and confidence intervals – the model as whole is not a good fit indicated by Hosmer-Lemeshow being < 0.05.

**Modelling the presence of 'depression, bad nerves and anxiety'**

Baseline predictors of 'depression, bad nerves and anxiety'

'Depression, bad nerves and anxiety' was predicted by age band ($b = 0.01$, $t(5) = 2.26$, $p = 0.01$), gender ($b = 0.06$, $t(2) = 15.86$, $p<0.001$), ethnic origin ($b = -0.04$, $t(2) = -9.62$, $p<0.001$), and child dependent ($b = -0.04$, $t(2) = -9.35$, $p<0.001$). All age bands were significantly less likely to report 'depression, bad nerves and anxiety', except those aged 50–59 where the difference was not significant. Males, those of other ethnic origin, and those with a child dependent were also less likely to be affected. Age band, gender and ethnicity also explained a significant proportion of variance in 'depression, bad nerves and anxiety', $R^2 = 0.008$, $F(4, 61832) = 120.23$, $p<0.001$.

**Table 6.11 Modelling 'Depression, Bad Nerves and Anxiety' by Baseline Characteristics, Occupation and Working Hours.**

| Variables in the Equation | | Odds Ratio | 95% CI Lower | 95% CI Upper | - 2 Log likelihood | Cox & Snell $R^2$ | Nagelkerke $R^2$ | Percentage correctly predicted |
|---|---|---|---|---|---|---|---|---|
| Model 1 | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .666[a] | .602 | .736 | | | | |
| | 30 - 39 | .840[b] | .760 | .928 | | | | |
| | 50 - 59 | .929 | .846 | 1.021 | | | | |
| | 60 - 69 | .689[a] | .622 | .764 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .601[a] | .564 | .640 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | .529[a] | .466 | .600 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .636[a] | .588 | .689 | | | | |
| | **Constant** | .140[a] | | | 31166.723 | .010 | .024 | 92.9 |
| Model 2 | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .641[a] | .580 | .709 | | | | |
| | 30 - 39 | .841[b] | .761 | .929 | | | | |
| | 50 - 59 | .923 | .840 | 1.014 | | | | |
| | 60 - 69 | .653[a] | .589 | .724 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .570[a] | .534 | .608 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | .532[a] | .469 | .604 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .636[a] | .587 | .688 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [a] | | | | | | |
| | Health professionals | 1.274 | .400 | 4.057 | | | | |
| | Therapy professionals | 2.073[c] | 1.057 | 4.065 | | | | |
| | Caring personal services | 4.145[a] | 2.224 | 7.725 | | | | |
| | Health and social service managers and directors | 2.574 | .932 | 7.110 | | | | |
| | Managers and proprietors in health and care services | 1.885 | .642 | 5.533 | | | | |
| | Teaching and educational professionals | 2.324[c] | 1.235 | 4.374 | | | | |
| | *Other occupations* | 5.230[a] | 2.878 | 9.506 | | | | |
| | **Constant** | .030[a] | | | 30984.150 | .013 | .031 | 92.9 |
| Model 3 | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .848[c] | .753 | .955 | | | | |
| | 30 - 39 | .871[c] | .774 | .979 | | | | |
| | 50 - 59 | .991 | .887 | 1.108 | | | | |
| | 60 - 69 | .680[a] | .596 | .775 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .623[a] | .572 | .680 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | .455[a] | .382 | .542 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .736[a] | .644 | .842 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [a] | | | | | | |
| | Health professionals | 1.204 | .378 | 3.834 | | | | |
| | Therapy professionals | 2.096c | 1.068 | 4.113 | | | | |
| | Caring personal services | 4.128[a] | 2.214 | 7.695 | | | | |
| | Health and social service managers and directors | 2.943c | 1.066 | 8.130 | | | | |
| | Managers and proprietors in health and care services | 2.199 | .749 | 6.455 | | | | |
| | Teaching and educational professionals | 2.321[c] | 1.233 | 4.367 | | | | |
| | *Other occupations* | 3.657[a] | 2.011 | 6.650 | | | | |
| | **Working hours (Baseline = full-time)** | | | | | | | |
| | Part-time | 1.421[a] | 1.305 | 1.548 | | | | |
| | **Constant** | .021[a] | | | 21170.521 | .009 | .026 | 94.7 |

[a] $p < 0.001$, [b] $p < 0.005$, [c] $p < 0.05$.

Baseline characteristics and occupation predictors of 'depression, bad nerves and anxiety'

Significant predictors of 'depression, bad nerves and anxiety' were age band ($b$ = 0.01, $t(5) = 2.46$, $p = 0.014$), gender ($b$ = 0.07, $t(2) = 16.95$, $p<0.001$), ethnic origin ($b$ = -0.04, $t(2) = -9.21$, $p<0.001$), child dependent ($b$ = -0.04, $t(2) = -9.15$, $p<0.001$), and occupation ($b$ = 0.04, $t(8) = 9.02$, $p<0.001$). For example, caring personal services were 4.15 times more likely (95% CI 2.22, 7.73) and *other occupations* 5.23 times more likely (95% CI 2.88, 9.51) to report 'depression, bad nerves and anxiety' compared to nursing and midwifery professionals. However, confidence intervals were large. Age band, gender, ethnicity, child dependent, and occupation also explained a significant proportion of variance in 'depression, bad nerves and anxiety', $R^2 = 0.009$, $F(5, 61831) = 112.59$, $p<0.001$.

Baseline characteristics, occupation and working hours predictors of 'depression, bad nerves and anxiety'

Predictors of 'depression, bad nerves and anxiety' included age ($b$ = -0.02, $t(5)$ = -3.35, $p = 0.001$), gender ($b$ = -0.05, $t(2) = 11.05$, $p<0.001$), ethnic origin ($b$ = -0.04, $t(2) = -8.20$, $p<0.001$), child dependent ($b$ = -0.03, $t(2) = -7.19$, $p<0.001$), occupation ($b$ = 0.02, $t(8) = 4.30$, $p<0.001$), and working hours ($b$ = 0.04, $t(2) = 8.65$, $p<0.001$). Compared to full-time workers, part-time workers were 1.42 times more likely to be affected (95% CI 1.31, 1.55). Age band, gender, ethnicity, child dependent, and occupation also explained a significant proportion of variance in 'depression, bad nerves and anxiety', $R^2 = 0.008$, $F(6, 52366) = 70.23$, $p<0.001$. Despite some of the individual variables being related to the dependent variable as shown in the odds ratios and confidence intervals – the model as whole is not a good fit indicated by Hosmer-Lemeshow being < 0.05.

**Modelling the presence of a progressive illness**

Baseline predictors of a progressive illness

All baseline measures were shown to be a predictor of reporting a progressive illness: age band ($b$ = 0.08, $t$(5) = 19.54, $p$<0.001), gender ($b$ = 0.02, $t$(2) = 4.73, $p$<0.001), ethnic origin ($b$ = -0.02, $t$(2) = -3.75, $p$<0.001), and child dependent ($b$ = -0.03, $t$(2) = -6.15, $p$<0.001). The risk of reporting a progressive illness is shown to be lower in younger age groups and higher in older age groups (see Table 6.12). Males (OR = 0.77, 95% CI 0.69, 0.87), those of other ethnic origin (OR = 0.56, 95% CI 0.44, 0.72), and those with one or more dependent children (OR = 0.63, 95% CI 0.52, 0.75) were less likely to report a progressive illness. Age band, gender, ethnicity, and child dependent also explained a significant proportion of variance in reporting a progressive illness, $R^2$ = 0.010, $F$(4, 61836) = 154.32, $p$<0.001.

Baseline characteristics and occupation predictors of progressive illness

All baseline characteristics and occupation were significant predictors of progressive illness: age band ($b$ = 0.08, $t$(5) = 19.48, $p$<0.001), gender ($b$ = 0.02, $t$(2) = 5.35, $p$<0.001), ethnic origin ($b$ = -0.01, $t$(2) = -3.53, $p$<0.001), child dependent ($b$ = -0.03, $t$(2) = -6.04, $p$<0.001), and occupation ($b$ = 0.02, $t$(8) = 4.84, $p$<0.001). Age band, gender, ethnicity, child dependent, and occupation also explained a significant proportion of variance in progressive illness, $R^2$ = 0.010, $F$(5, 61831) = 128.19, $p$<0.001.

**Table 6.12 Modelling Progressive Illness by Baseline Characteristics, Occupation and Working Hours.**

| Variables in the Equation | | Odds Ratio | 95% CI Lower | 95% CI Upper | - 2 Log likelihood | Cox & Snell $R^2$ | Nagelkerke $R^2$ | Percentage correctly predicted |
|---|---|---|---|---|---|---|---|---|
| Model 1 | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .322[a] | .248 | .419 | | | | |
| | 30 - 39 | .555[a] | .438 | .703 | | | | |
| | 50 - 59 | 1.381[a] | 1.151 | 1.656 | | | | |
| | 60 - 69 | 2.046[a] | 1.710 | 2.447 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .773[a] | .690 | .866 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | .582[a] | .451 | .751 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .625[a] | .524 | .745 | | | | |
| | **Constant** | .026[a] | | | 11760.67 | .010 | .056 | 97.9 |
| Model 2 | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .315[a] | .242 | .409 | | | | |
| | 30 - 39 | .555[a] | .438 | .702 | | | | |
| | 50 - 59 | 1.377[a] | 1.148 | 1.651 | | | | |
| | 60 - 69 | 1.970[a] | 1.647 | 2.358 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .741[a] | .661 | .831 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | .590[a] | .457 | .761 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .624[a] | .523 | .745 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | [c] | | | | | | |
| | Health professionals | <0.001 | <0.001 | <0.001 | | | | |
| | Therapy professionals | .922 | .332 | 2.555 | | | | |
| | Caring personal services | 1.166 | .470 | 2.896 | | | | |
| | Health and social service managers and directors | 2.003 | .492 | 8.153 | | | | |
| | Managers and proprietors in health and care services | .563 | .067 | 4.732 | | | | |
| | Teaching and educational professionals | 1.616 | .676 | 3.860 | | | | |
| | *Other occupations* | 2.109 | .940 | 4.731 | | | | |
| | **Constant** | .013[a] | | | 11729.154 | .011 | .059 | 97.9 |
| Model 3 | **Age bands (years)** | [a] | | | | | | |
| | < 29 | .347[a] | .250 | .480 | | | | |
| | 30 - 39 | .630[a] | .480 | .827 | | | | |
| | 50 - 59 | 1.420[b] | 1.139 | 1.770 | | | | |
| | 60 - 69 | 2.091[a] | 1.667 | 2.622 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .745[a] | .640 | .867 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | .510[a] | .359 | .726 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .638[a] | .516 | .788 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | | | | | | | |
| | Health professionals | <0.001 | <0.001 | <0.001 | | | | |
| | Therapy professionals | .914 | .329 | 2.534 | | | | |
| | Caring personal services | 1.149 | .462 | 2.855 | | | | |
| | Health and social service managers and directors | 2.048 | .503 | 8.346 | | | | |
| | Managers and proprietors in health and care services | .566 | .067 | 4.760 | | | | |
| | Teaching and educational professionals | 1.590 | .665 | 3.800 | | | | |
| | *Other occupations* | 1.597 | .711 | 3.589 | | | | |
| | **Working hours (Baseline = full-time)** | | | | | | | |
| | Part-time | 1.137 | .971 | 1.332 | | | | |
| | **Constant** | .012[a] | | | 8038.194 | .008 | .052 | 98.4 |

[a] $p < 0.001$, [b] $p < 0.005$, [c] $p < 0.05$.

Baseline characteristics, occupation and working hours predictors of progressive illness

All baseline characteristics, occupation and working hours were significant predictors of progressive illness: age band ($b$ = 0.07, $t(5)$ = 15.12, $p$<0.001), gender ($b$ = 0.02, $t(2)$ = 3.74, $p$<0.001), ethnic origin ($b$ = -0.02, $t(2)$ = -3.43, $p$ = 0.001), child dependent ($b$ = -0.02, $t(2)$ = -5.09, $p$<0.001), occupation ($b$ = 0.01, $t(8)$ = 2.91, $p$ = 0.004), and working hours ($b$ = 0.01, $t(2)$ = 2.35, $p$ = 0.019). Age band, gender, ethnicity, child dependent, and occupation also explained a significant proportion of variance in progressive illness, $R^2$ = 0.007, $F(6, 52366)$ = 66.08, $p$<0.001. Despite some of the individual variables being related to the dependent variable as shown in the odds ratios and confidence intervals – the model as whole is not a good fit indicated by Hosmer-Lemeshow being < 0.05.

**Modelling the presence of two or more health conditions**

Baseline predictors of two or more health problems

Age band ($b$ = 0.13, $t(5)$ = 13.61, $p$<0.001), gender ($b$ = 0.03, $t(2)$ = 3.48, $p$ = 0.001), ethnicity ($b$ = 0.02, $t(2)$ = 2.04, $p$ = 0.04), and child dependent ($b$ = -0.05, $t(2)$ = -5.42, $p$<0.001) were significant predictors of two or more health problems in the sample. Younger age groups were shown to have a lower risk of reporting two or more conditions and a higher risk was seen in older age bands, see Table 6.13. Males were 0.88 times less likely to report two or more health problems (95% CI 0.82, 0.95). Age band, gender, ethnicity, and child dependent also explained a significant proportion

## Table 6.13 Modelling Two or More Health Problems by Baseline Characteristics, Occupation and Working Hours.

| Variables in the Equation | | Odds Ratio | 95% CI Lower | 95% CI Upper | - 2 Log likelihood | Cox & Snell $R^2$ | Nagelkerke $R^2$ | Percentage correctly predicted |
|---|---|---|---|---|---|---|---|---|
| Model 1 | **Age bands (years)** | $^{a}$ | | | | | | |
| | < 29 | .459$^{a}$ | .384 | .549 | | | | |
| | 30 - 39 | .658$^{a}$ | .561 | .771 | | | | |
| | 50 - 59 | 1.221$^{b}$ | 1.087 | 1.373 | | | | |
| | 60 - 69 | 1.304$^{a}$ | 1.161 | 1.465 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .878$^{b}$ | .815 | .946 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | 1.137 | .997 | 1.298 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .716$^{a}$ | .638 | .804 | | | | |
| | **Constant** | .487$^{a}$ | | | 16325.478 | .028 | .040 | 68.3 |
| Model 2 | **Age bands (years)** | $^{a}$ | | | | | | |
| | < 29 | .446$^{a}$ | .373 | .534 | | | | |
| | 30 - 39 | .649$^{a}$ | .554 | .761 | | | | |
| | 50 - 59 | 1.216$^{b}$ | 1.081 | 1.367 | | | | |
| | 60 - 69 | 1.256$^{a}$ | 1.117 | 1.411 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .852$^{a}$ | .791 | .919 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | 1.145$^{c}$ | 1.002 | 1.307 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .720$^{a}$ | .641 | .808 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | $^{a}$ | | | | | | |
| | Health professionals | .709 | .140 | 3.583 | | | | |
| | Therapy professionals | 1.714 | .773 | 3.797 | | | | |
| | Caring personal services | 2.383$^{c}$ | 1.139 | 4.987 | | | | |
| | Health and social service managers and directors | 2.946$^{c}$ | .989 | 8.774 | | | | |
| | Managers and proprietors in health and care services | 2.364 | .733 | 7.625 | | | | |
| | Teaching and educational professionals | 1.999 | .942 | 4.238 | | | | |
| | *Other occupations* | 3.424$^{b}$ | 1.700 | 6.897 | | | | |
| | **Constant** | .152$^{a}$ | | | 16267.339 | .033 | .046 | 68.3 |
| Model 3 | **Age bands (years)** | $^{a}$ | | | | | | |
| | < 29 | .506$^{a}$ | .405 | .632 | | | | |
| | 30 - 39 | .667$^{a}$ | .552 | .806 | | | | |
| | 50 - 59 | 1.180$^{c}$ | 1.025 | 1.358 | | | | |
| | 60 - 69 | 1.253$^{b}$ | 1.084 | 1.449 | | | | |
| | **Gender (Baseline = female)** | | | | | | | |
| | Male | .887$^{c}$ | .803 | .981 | | | | |
| | **Ethnicity (Baseline = White)** | | | | | | | |
| | Other ethnic origin | 1.125 | .949 | 1.334 | | | | |
| | **Dependents (Baseline = none)** | | | | | | | |
| | Yes | .755$^{a}$ | .658 | .867 | | | | |
| | **Occupation (Baseline = Nursing and midwifery professionals)** | $^{c}$ | | | | | | |
| | Health professionals | .702 | .139 | 3.545 | | | | |
| | Therapy professionals | 1.752 | .791 | 3.880 | | | | |
| | Caring personal services | 2.378$^{c}$ | 1.137 | 4.975 | | | | |
| | Health and social service managers and directors | 3.081$^{c}$ | 1.035 | 9.173 | | | | |
| | Managers and proprietors in health and care services | 2.454 | .762 | 7.905 | | | | |
| | Teaching and educational professionals | 2.011 | .949 | 4.264 | | | | |
| | *Other occupations* | 2.646$^{c}$ | 1.313 | 5.331 | | | | |
| | **Working hours (Baseline = full-time)** | | | | | | | |
| | Part-time | 1.125$^{c}$ | 1.015 | 1.248 | | | | |
| | **Constant** | .143$^{a}$ | | | 10882.780 | .023 | .034 | 73.7 |

$^{a}$ $p < 0.001$, $^{b}$ $p < 0.005$, $^{c}$ $p < 0.05$.

of variance in the prevalence of two or more health problems, $R^2 = 0.026$, $F(4, 13381) = 88.44$, $p<0.001$.

Baseline characteristics and occupation predictors of two or more health problems

All baseline characteristics and occupation were significant predictors of reporting two or more health problems: age band ($b = 0.13$, $t(5) = 13.38$, $p<0.001$), gender ($b = 0.04$, $t(2) = 4.15$, $p<0.001$), ethnicity ($b = 0.02$, $t(2) = 2.225$, $p = 0.026$), child dependent ($b = -0.05$, $t(2) = -5.30$, $p<0.001$), and occupation ($b = 0.05$, $t(8) = 6.01$, $p<0.001$). For example, caring personal services were 2.38 times (95% CI 1.14, 4.99, $p < 0.05$), health and social service managers and directors 2.95 times (95% CI 0.99, 8.77), and *other occupations* 3.42 times (95% CI 1.70, 6.90) were more likely to report two or more health problems. Age band, gender, ethnicity, child dependent, and occupation also explained a significant proportion of variance in reporting two or more health problems, $R^2 = 0.028$, $F(5, 13380) = 78.16$, $p<0.001$.

Baseline characteristics, occupation and working hours predictors of reporting two or more health conditions

Significant predictors of two or more health problems in the sample were age band ($b = 0.11$, $t(5) = 9.64$, $p<0.001$), gender ($b = 0.03$, $t(2) = 2.56$, $p = 0.011$), child dependent ($b = -0.04$, $t(2) = -3.86$, $p<0.001$), and occupation ($b = 0.03$, $t(8) = 3.28$, p = 0.001). Ethnicity and working hours were not shown to be significant predictors. Age band, gender, ethnicity, child dependent, and occupation also explained a significant proportion of variance in reporting two or more health conditions, $R^2 = 0.020$, $F(6, 9634) = 33.01$, $p<0.001$. Despite some of the individual variables being related to the dependent variable as shown in the odds ratios and confidence intervals – the model as whole is not a good fit indicated by Hosmer-Lemeshow being < 0.05.

## 6.6 Summary

With the number of people experiencing one or more health conditions on the rise, there is a need to better understand the association between health and various predictors, such as demographics, occupation and working hours. To date, few studies have investigated the relationship between health and occupation, specifically health literate and non-literate occupational groups. This study helps to bridge this gap by presenting data on the health of eight occupations in the UK.

Findings from this study indicate that the percentage of people who report many health outcomes are female, older people and working in *other occupations*. There may be a causality link between people with a disability (including health problems), lower paid jobs (Barnes and Mercer, 2005) and lower job security and promotion opportunities (Schur et al., 2009). Typically, people with a health problem face discrimination when seeking employment with managers and employers often perceiving these individuals to require preferential treatment rather than removal of barriers to enable them to actively contribute to society (Fevre et al., 2013), despite the passing of the Equality Act 2010. Non-health literate occupations (e.g. caring personal services and *other occupations*) tended to have a higher proportion of workers with a health condition compared to health literate occupations (e.g. nursing and midwifery professionals, health professionals and therapy professionals), raising the question of why. This point will be discussed further in Chapter 9.

The distribution of specific health conditions reported by workers in each occupation was examined in order to begin to disentangle the extent to which health is associated with factors such as work characteristics. There was an unequal distribution of health conditions across working characteristics – working hours and permanency of job – explaining some of the variance seen. However, it was outwith this study's scope to ascertain the causality between those with pre-existing health conditions and the proportion who develop a health problem while working in these contracts.

### 6.6.1 Strengths and limitations of LFS

This study is one of the few to measure a range of health outcomes across the four countries in the UK by individual occupational groups using a single data source. The main strength of this study is that data about different occupational groups and geographical regions are drawn from the same survey rather than using estimates taken from different surveys at a population level. The main limitation of this study is that health outcomes collected for the LFS are limited and thus the extent to which poor health contributes to workforce exit cannot be satisfactorily examined.

# Chapter 7 Study Four: Scottish Health Survey analysis

This chapter focusses more specifically on a Scottish context. Associated research questions: What percentage of nurses; other health professionals; care workers; teachers and; other occupations in Scotland self-reporting to smoke tobacco, engage in physical activity, and consume alcohol and fruit and vegetables? What is the association between health behaviours, demographics and (i) self-assessed health; (ii) the presence of a long-term illness; (iii) the presence of a mental health condition; and (iv) satisfaction with life among nurses compared to other occupational groups in Scotland?

## 7.1 Introduction

Few studies have examined the health behaviours of different occupations in the health sector internationally. Fewer studies have examined these within the UK, with even less in Scotland. Among nurses internationally, a profile of unhealthy behaviours emerged, with varying proportions of workers engaging in tobacco smoking, physical inactivity, excess alcohol consumption and poor dietary habits (see Chapter 4). The impact of these behaviours on health has been widely documented.

There are three aims attached to this study. First, to enumerate the percentage of nurses compared to other health professionals; care workers; teachers and; *other occupations* in Scotland reporting fair/bad/very bad self-assessed health; the presence of a long-term illness; the presence of a mental health condition; and being satisfied with life. Second, to examine the percentage of nurses; other health professionals; care workers; teachers and; *other occupations* in Scotland self-reporting to smoke tobacco, engage in physical activity, and consume alcohol and fruit and vegetables. Finally, to examine the association between health behaviours, demographics and (i) the risk of being in fair/bad/very bad self-assessed health; (ii) the presence of a long-term illness; (iii) the presence of a mental health condition; and (iii) being satisfied with life among nurses compared to *other health professionals*; care workers; teachers; and *other occupations* in Scotland. In doing so, this study adds a new perspective on occupational health.

## 7.2 SHeS demographic characteristics

As mentioned in Chapter 4, the SHeS is a representative sample of the population resident in Scotland at point of survey. SHeS data were requested from Scottish Government analysts in 2016. These data allowed for cross-sectional analysis of peoples' health over a pre-specified period. Variables which were identified to serve as proxies for health as well as various predictor and demographic variables have been described in Chapter 4.

Between 2012 to 2014, the SHeS collected data on 13,597 people aged 16 to 69 who reported to be in work at the time of the survey, over half of whom were female (51.9%) as shown in Table 7.1. Three hundred and forty-seven participants were nurses, of which most were female (93.7%, 95% CI 93.7, 93.7) with a mean age of 52.0; 241 other health professionals, 66.9% female with a mean age of 47.3; 641 care workers, 84.3% female with a mean age of 48.2; 455 teachers, 68.7% female and mean age of 52.0; and 11913 people in *other occupations*, 48.0% female with a mean age of 48.4.

**Table 7.1 Demographic Characteristics.**

| | Female | | Mean | Standard | Total | |
|---|---|---|---|---|---|---|
| | N | % | age | Error of Mean | N | % |
| Nurse | 325 | 93.7 | 52.0 | 0.87 | 347 | 100 |
| Other health professionals | 161 | 66.9 | 47.3 | 1.13 | 241 | 100 |
| Care workers | 540 | 84.3 | 48.2 | 0.65 | 641 | 100 |
| Teachers | 312 | 68.7 | 52.0 | 0.79 | 455 | 100 |
| Other occupations | 5716 | 48.0 | 48.4 | 0.17 | 11913 | 100 |

## 7.3 Analysis

The analysis of the SHeS sample is reported using both figure and table format and discussed in the body of the text. The section is subdivided into four sections. First descriptive statistics of health will be presented by each occupational group separately. Then descriptive statistics of health-related behaviours will be presented separately for nurses, other health professionals, care workers, teachers and those in other occupational groups. The chapter closes with the presentation of four logistic regression models adjusted for age band, gender and occupation to display the odds of factors that are associated with:

a. The risk of being in fair/bad/very bad self-assessed health.

b. Having long-term illness,

c. Reporting having mental health conditions.

d. Being satisfied with life.

All models used a cut value in the classification table of 0.5, informed by Hosmer-Lemeshow test.

## 7.4 Results

### 7.4.1 Health conditions reported

**Prevalence of self-assessed health reported**

Self-assessed health serves as a global measure of health status in the general population given its reliability at predicting morbidity and mortality at a single point in time (Heistaro et al., 2001; Miilunpalo et al., 1997). There is a suggestion that people tend to judge their health better than would be given by a professional assessment. To compensate for this, self-assessed health was "binarised" into two groups for the analysis – good health (very good and good) and poorer health (fair, poor and very poor health).

The proportion of respondents reporting poor self-assessed health differed by gender and age band. Females and males reported a similar prevalence of poor self-assessed health (23.0% [95% CI 21.9, 24.1] vs. 22.3% [95% CI 21.2, 23.4]). The prevalence of poor self-assessed health increased with age: 12.3% (95% CI 11.0, 13.6) in 17-29, 16.0% (95% CI 14.4, 17.6) in 30-39, 22.2% (95% CI 20.6, 23.8) in 40-49, 29.7% (95% CI 27.9, 31.5) in 50-59 and 34.5% (95% CI 32.4, 36.6) in 60-69 year olds.

ANOVA showed that the effect of age band ($F(4, 11736)=113.84$, $p<0.001$) and gender by age band was significant ($F(4, 11736)=3.01$, $p=0.017$). Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significantly lower in <29 year olds than 40-49, 50-59 and 60-69 year olds ($p<0.001$).

Poor self-assessed health by occupation

The distribution of poor self-assessed health reported by the sample differed by occupational group, see Figure 7.1. For example, 18.8% (95% CI 14.3, 23.3) of nurses, 8.7% (95% CI 4.9, 12.5) of other health professionals, 26.6% (95% CI 23.0, 30.2) of care workers, 8.6% (95% CI 5.8, 11.4) of teachers and 23.4% (95% CI 22.6, 24.2) of *other occupations*.

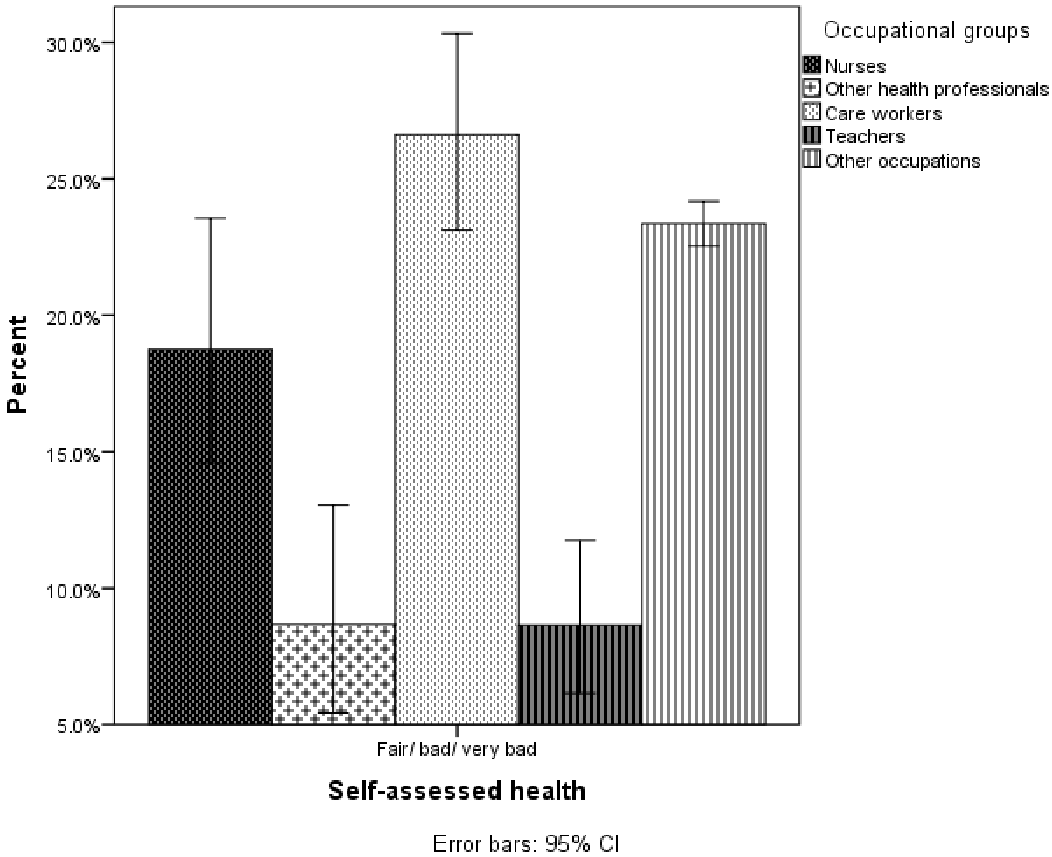



**Figure 7.1 Error Bar Chart for Self-Assessed Health by Occupation.**

Poor self-assessed health by occupation, stratified by gender and age band

The prevalence of poor self-assessed health was low in the sample resulting in statistics not being reported on the characteristics of every occupation in the analysis, see Appendix xi Table 7.2. Poor self-assessed health was reported by 17.4%

of male nurses (95% CI 16.7, 60.5). Among females, the prevalence of poor self-assessed health was lowest in other health professionals (5.8%, 95% CI 2.0, 9.6) and highest in care workers (25.3%, 95% CI 21.4, 29.2). Among males, the prevalence of poor self-assessed health was lowest in other health professionals (14.9%, 95% CI 6.3, 23.5) and highest in care workers (32.8%, 95% CI 23.5, 42.1). The large confidence intervals are reflective of a small sample size. The percentage of poorer health reported by workers across occupations generally increased with age with the exception of care workers aged 60-69 for which it fell. The precise reason for this decline seen is unclear. One hypothesis is that care workers with poor health leave the profession prematurely and either gain employment elsewhere or take early retirement. Alternatively, older care workers may experience increased job control as they become more senior and experienced managing others rather than physically engaging with patients. This notion is supported by the literature with lower job control harmful to health after the age 36 (Ravesteign, van Kippersluis, and van Doorslaer, 2013).

ANOVA showed that the effect of age band was significant in other health professionals ($F(3, 189)=2.70$, $p=0.047$), care workers ($F(3, 488)=4.53$, $p=0.004$) and *other occupations* ($F(3, 8435)=80.42$, $p<0.001$). Gender was also shown to be significant among *other occupations*, $F(1, 8435)=8.18$, $p=0.004$.

**Prevalence of long-term illness reported**

Long-term illness is a self-reported measure of health status that is affected more by subjectivity and imprecision than other measures such as physical and psychological measures. However, chronic long-term illness and perceived health is a good predictor of mortality (Ôstlin, 1990). Therefore, long-term illness provides a useful perspective of peoples' health. Long-term illness was analysed using a binary variable (no condition vs. has condition) for each occupational groups separately.

Data was missing for six people in the sample and these cases were removed from analysis of long-term illness (including limiting long-term illness). The proportion of respondents reporting the presence of a long-term illness differed by gender and age band. 42.5% (95% CI 41.2, 43.8) of females and 39.4% (95% CI 38.1, 40.7) of males reported a long-term illness. The prevalence of poor self-assessed health increased with age: 23.8% (95% CI 22.1, 25.5) in 17-29, 30.1% (95% CI 28.1, 32.1) in 30-39, 37.8% (95% CI 35.9, 39.7) in 40-49, 51.1% (95% CI 49.1, 53.1) in 50-59 and 65.0% (95% CI 62.9, 67.1) in 60-69 year olds. ANOVA showed that the effect of gender ($F$(1, 11731)=15.81, $p$<0.001), age band ($F$(1, 11731)=275.81, $p$<0.001) and gender by age band was significant ($F$(1, 11731)=2.87, p=0.022). Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significantly lower in all age bands compared to <29 year olds, $p$<0.001.

Long-term illness by occupation

The distribution of long-term illness self-reported by the sample differed by occupational group, see Figure 7.2. For example, 40.3% (95% CI 34.6, 46.0) of nurses, 27.5% (95% CI 21.5, 33.5) of other health professionals, 47.5% (95% CI 43.4, 51.6) of care workers, 42.0% (95% CI 37.1, 46.9) of teachers and 40.8% (95% CI 39.8, 41.8) of *other occupations.*

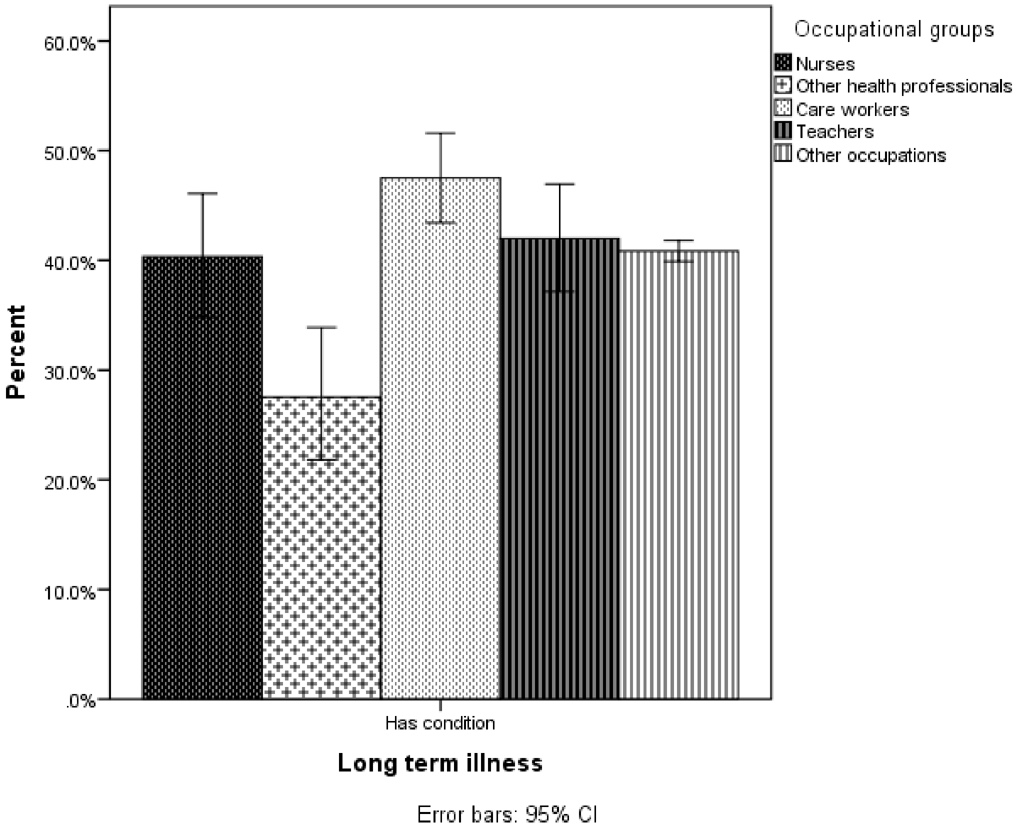



**Figure 7.2 Error Bar Chart for Long-Term Illness by Occupation.**

<u>Long-term illness by occupation, stratified by gender and age band</u>

The prevalence of long-term illness reported by the sample was not evenly distributed across genders and age bands in each occupation, see Appendix xi Table 7.3. For example, the prevalence was 40.5% (95% CI 34.6, 46.4) among female and 37.5% (95% CI 15.7, 59.3) among male nurses. Among females in comparator groups, the lowest prevalence was reported by other health professionals (30.6%, 95% CI 23.1, 38.2) and the highest care workers (48.0%, 95% CI 43.5, 52.5). Among males in comparator groups, the lowest prevalence was reported by other health professionals (20.9%, 95% CI 11.1, 30.7) and the highest care workers (45.1%, 95% CI 35.3, 55.0). The percentage of workers reporting a long-term illness increased with age. For example, in nurses, 27.6% (95% CI 15.7, 39.5) of 30-39, 34.7% (95% CI 25.5, 43.9) 40-49, 52.5% (95% CI 41.1, 63.9) 50-59 and 61.7% (95% 46.2, 77.2) 60-69 year olds reported a long-term illness. ANOVA showed that the effect of age band was significant in other health professionals ($F(3, 189)=4.64$, $p=0.004$), care workers ($F(3, 488)=6.75$, $p<0.001$) and *other occupations* ($F(3, 8430)=142.62$, $p<0.001$). Gender by age group was significant in teachers ($F(3, 304)=3.26$, $p=0.022$) and gender in *other occupations* ($F(1, 8430)=142.62$, $p<0.001$).

*Prevalence of limiting long-term illness reported*

The health measure long-term illness can be further subdivided into limiting and non-limiting. In this section, the percentage of workers who reported a limiting long-term illness is presented. There is a difference between females and males reporting a limiting long-term illness, with females reporting a higher prevalence than males (28.6% [95% CI 27.5, 29.7] vs. 25.2% [95% CI 24.1, 26.3]). One potential explanation is that although females live longer than males, they often report higher rates of long-term illnesses with females more ready to report illness than males, however, there is little in the way of evidence to support this claim (Macintyre et al. 1999). The percentage of people reporting a limiting long-term illness increased with age: 13.8% (95% CI 12.5, 15.1) 17-29, 18.9% (95% CI 17.2, 20.6) 30-39, 24.8% (95% CI 23.1, 26.5) 40-49, 34.5% (95% CI 32.6, 36.4) 50-59 and 44.8% (95% CI 42.6, 47.0) in 60-69 year olds.

ANOVA showed that the effect of age band was significant, $F(4, 4793)=5.71$, $p<0.001$. Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significantly lower in 50-59 ($p=0.017$) and 60-69 year olds ($p=0.001$) compared to 29 year olds.

Limiting long-term illness by occupation

The distribution of limiting long-term illness self-reported by the sample differed by occupational group, see Figure 7.3. For example, 27.8% (95% CI 22.6, 33.0) of nurses, 11.0% (95% CI 6.8, 15.2) of other health professionals, 33.5% (95% CI 29.6, 37.4) of care workers, 21.7% (95% CI 17.6, 25.8) of teachers and 27.0% (95% CI 26.1, 27.9) of *other occupations.*

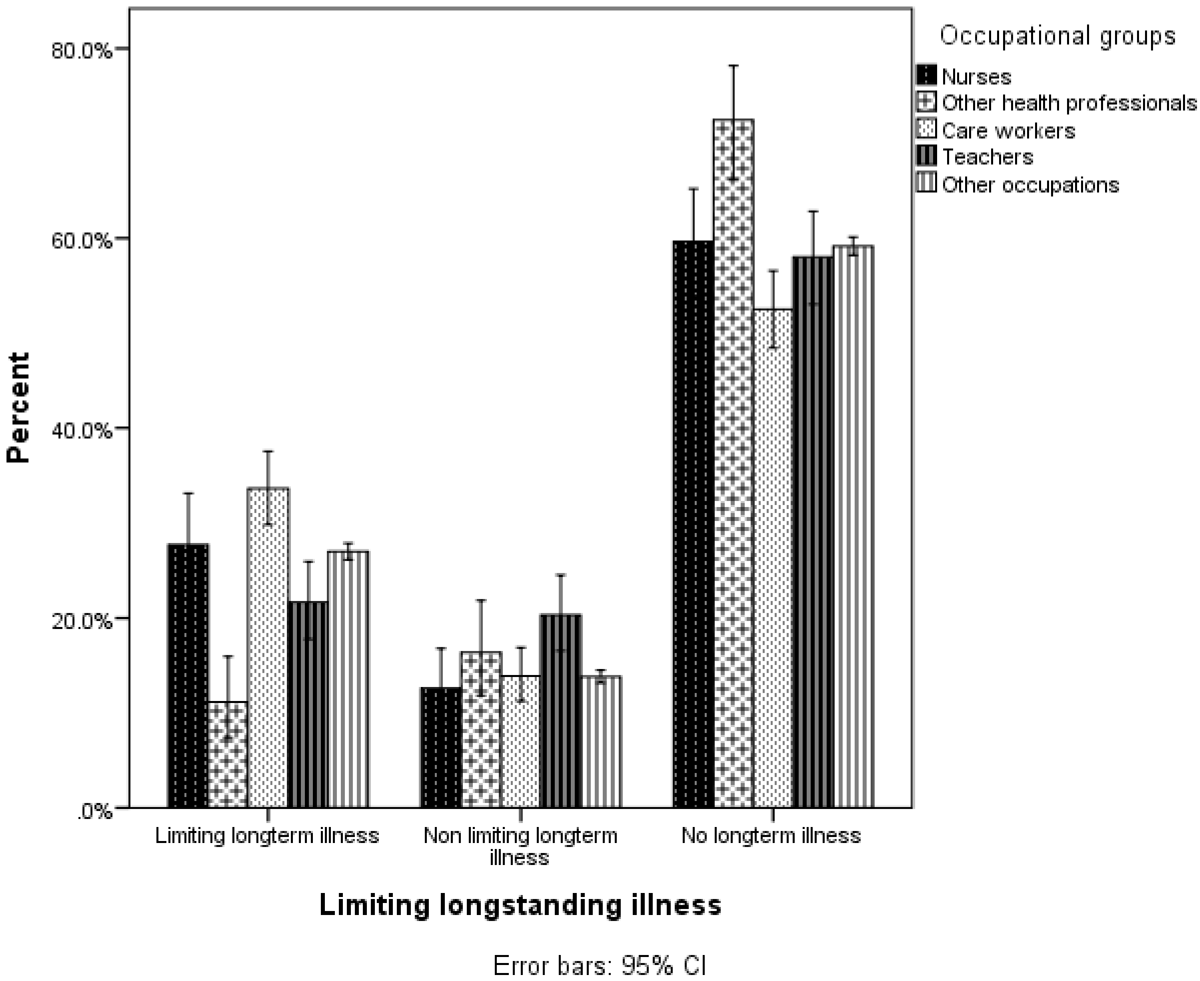



**Figure 7.3 Error Bar Chart for Limiting Long-Term Illness by Occupation.**

Limiting long-term illness by occupation, stratified by gender and age band

The prevalence of a limiting long-term illness was low in the sample resulting in statistics not being reported on the characteristics of every occupation in the analysis, see Appendix xi Table 7.4. Among female nurses the prevalence was 27.3% (95% CI 22.0, 32.6). Among females, the lowest prevalence was reported by other health professionals (11.8%, 95% CI 6.5, 17.1) and the highest care workers (33.5%, 95% CI 29.3, 37.7). Among males, the lowest prevalence was reported by *other occupation* (25.4%, 95% CI 24.2, 26.6) and the highest care workers (33.5%, 95% CI 24.8, 43.6).

The percentage of workers reporting a limiting long-term illness generally increased with age, see Figure 7.4. For example, in nurses, 23.6% (95% CI 15.4, 31.8) of 40-49, 35.3% (95% CI 24.4, 46.2) 50-59 and 48.7% (95% 32.8, 64.6) 60-69 year olds reported a limiting long-term illness. Among teachers, the percentage of participants reporting a limiting long-term illness declined between those aged 30-39 (15.8%, 95% CI 7.9, 23.7) and 40-49 (12.1%, 95% CI 5.0, 19.2) years before increasing again. The reason for this variation between occupations is unclear and warrants more in-depth examination by the research community. ANOVA showed that the effect of gender by age band was significant in other health professionals, $F(3, 44)=3.53$, $p=0.024$. Among *other occupations*, gender ($F(1, 2992)=4.36$, $p=0.037$) and age band ($F(3, 2992)=4.59$, $p=0.003$) were significant.

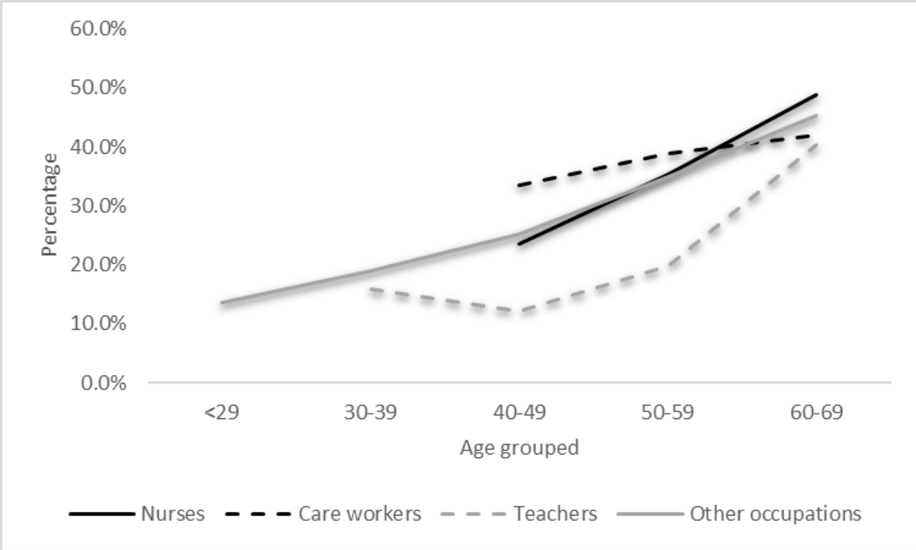



**Figure 7.4 Line Chart for Limiting Long-Term Illness by Age Group Nested Within Occupation.***

* Other health professionals are not presented due to small numbers.

**Prevalence of mental illness reported**

Data on one person was missing and thus was removed from the analysis of mental health conditions. Under eight percent of the sample reported a mental illness (8.8%, 95% CI 7.2, 8.2). This was lower than expected given It has been estimated that approximately fifteen percent of adults experience a mental health condition at any one time (Catto, Tod, and McCartney, 2012) and one-sixth of the working age population of Great Britain experience symptoms associated with mental illness, such as fatigue, sleep problems and irritability (ONS 2001). Differences in prevalence may potentially be due to the analysis only include those who provided an occupation at point of survey and the impact of mental illness stigmatisation held by society on employment. Many employers shy away from employing people with a mental illness, holding stigmatising views (Stuart 2006), such as viewing them as undesirable. Given this, it is perhaps not surprising that many people are reluctant to disclose their mental illness to their employer or strangers they come into contact with.

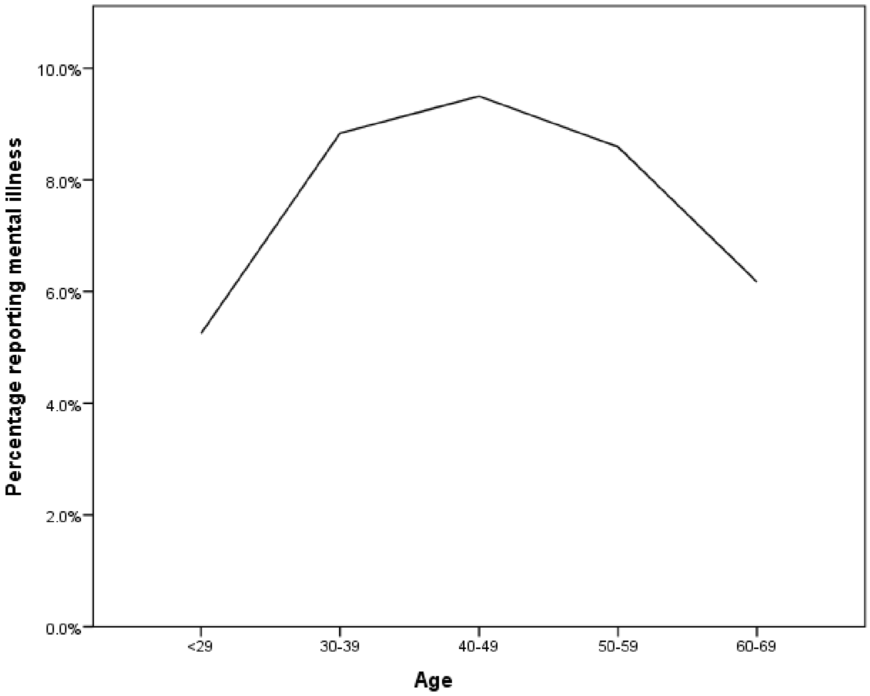



**Figure 7.5 Line Chart for Distribution of Mental Illness by Age Group.**

The percentage of mental illness reported in the sample was higher in females than males (9.1% [95% CI 8.4, 9.8] vs. 6.2% [95% CI 5.6, 6.8]). The percentage of people reporting a mental illness increased between the age of 17-29 (5.2%, 95% CI 4.3, 6.1), 30-39 (8.8%, 95% CI 7.6, 10.0) and 40-49 years (9.5%, 95% CI 8.4, 10.5) before reducing between the age 50-59 (8.6%, 95% CI 7.5, 9.7) and 60-69 (6.2%, 95% CI 5.2, 7.2), shown in Figure 7.5. This finding is confirmed in the literature with women aged between 35 and 54 years most likely to be affected by mental illness (Lelliott et al. 2008). Older adults may be more amenable to the stigma associated with having a mental health condition and may be more likely to seek help and a diagnosis, particularly because they may already have internalised stigma of 'old' - a view supported by the literature (Conner et al., 2010). ANOVA showed that the effect of gender ($F(1, 11731)=34.39$, $p<0.001$) and age band was significant ($F(1, 11731)=10.15$, $p<0.001$). Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significantly lower in 30-39 ($p=0.001$), 40-49 ($p<0.001$) and 50-59 year olds ($p=0.005$) compared to <29 year olds.

<u>Prevalence of mental illness by occupation</u>

While the validity and reliability of this variable in the analysis is questionable, the variable provides a useful insight into mental illness and enables mental illness to be examined in relation to different occupations. Those with a mental illness in employment are more likely to be employed in low status or poorly remunerated jobs or employed in roles inconsistent to their skills or level of education (Lelliott et al. 2008). People with mental illness may be more likely to enter professions that they perceive to have an understanding of mental health conditions and how to promote and support them in the workplace. This hypothesis appears to be supported in the study with care workers (9.9%, 95% CI 7.5, 12.3) exhibiting the highest levels of mental health conditions among occupations under study. The prevalence of mental illness self-reported by nurses was 6.3% (95% CI 3.5, 9.1) teachers 3.4% (95% CI 1.6, 5.2) and *other occupations* 7.9% (95% CI 7.4, 8.4), shown in Figure 7.6.

<u>Prevalence of mental illness by occupation, stratified by gender and age band</u>

The prevalence of mental illness was low in the sample preventing the reporting of many statistics on the characteristics of each occupation in the analysis. Among females, 6.6% (95% CI 3.6, 9.6) of nurses, 11.3% (95% CI 8.5, 14.1) of care workers,

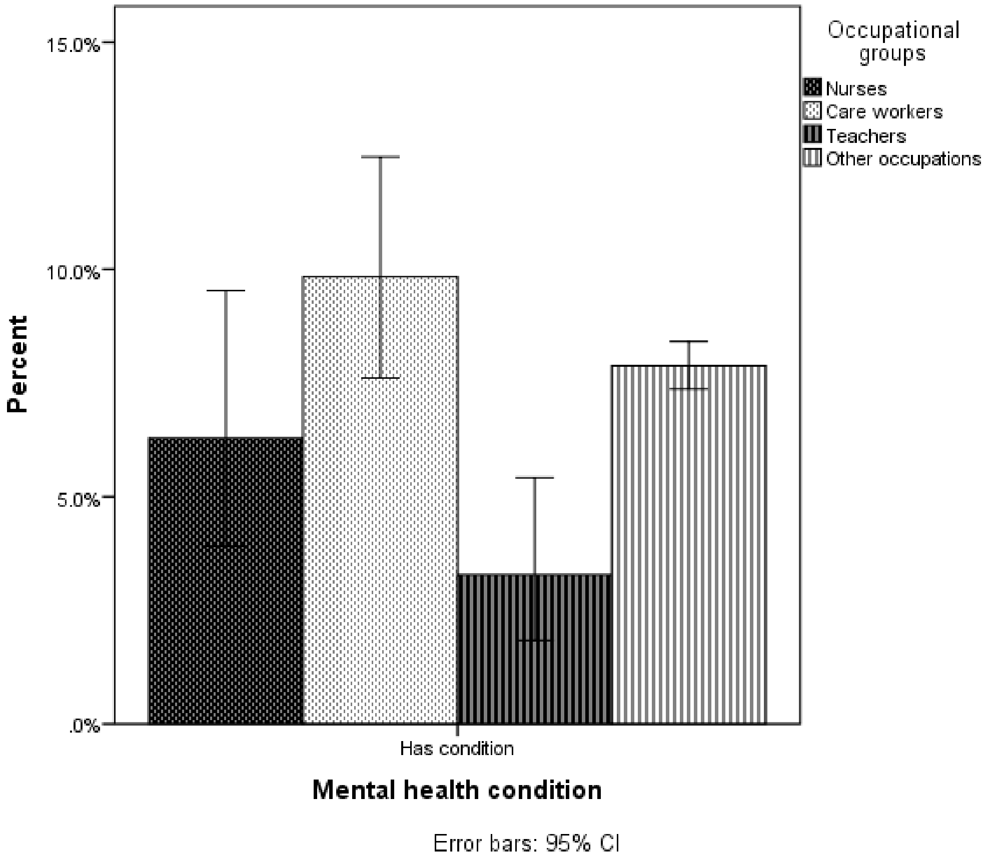



**Figure 7.6 Error Bar Chart for Mental Health Condition by Occupation.** *

* Other health professionals not shown in chart due to small numbers.

3.6% (95% CI 1.4, 5.8) of teachers and 9.5% (95% CI 8.7, 10.3) of *other occupations* reported a mental illness. Among males, there was only one group with sufficient numbers to report – *other occupation* with 6.5% reporting a mental illness (95% CI 5.8, 7.2). The percentage of workers reporting mental illness was generally higher in the age bands 30-39, 40-49 and 50-59, consistent with the literature (Lelliott et al. 2008). A different profile was seen in teachers. Those aged 17-29, 50-59 and 60-69 reported the highest prevalence of mental illness although numbers are too small to report. ANOVA showed that the effect of gender was significant in care workers ($F(1, 488)=7.80$, $p=0.005$) and among *other occupations,* gender ($F(1, 8430)=16.10$, $p<0.001$) and age band were ($F(3, 8430)=9.80$, $p<0.001$).

*Prevalence of stress reported*

Data on stress was missing for 7.8% (n=908) of individuals in the sample and they were removed from analysis of this variable. Under two-fifths of the sample reported to experience some degree of stress in their lives (38.7%, 95% CI 37.8, 39.6). Twenty-three percent (95% CI 22.2, 23.8) of the sample reported moderate stress (score 1-3) and 15.7% (95% CI 15.0, 16.4) high stress (score ≥4). The percentage of respondent reporting stress in the sample was higher in females than males (42.4% [95% CI 41.1, 43.7] and 34.7% [95% CI 33.4, 36.0]). Twenty five percent (95% CI 23.8, 26.0) of females reported moderate and 17.5% (95% CI 16.5, 18.5) high stress. Twenty-one percent (95% CI 19.9, 22.1) of males reported moderate and 13.7% (95% CI 12.8, 14.6) high stress. The prevalence of stress decreased as age increased: 17-29 44.9% (95% CI 42.9, 46.9), 30-39 40.6% (95% CI 38.4, 42.8), 40-49 36.9% (95% CI 34.9, 38.9), 50-59 39.0% (95% CI 37.0, 41.0) and 60-69 31.0% (95% CI 28.9, 33.1). ANOVA showed that the effect of gender ($F(1, 10816)=53.27$ $p<0.001$), age band ($F(4, 10815)=17.26$, $p<0.001$) and gender by age band was significant ($F(4, 10816)=6.50$, $p<0.001$).

<u>Prevalence of stress by occupation</u>

The prevalence of stress reported by nurses was 40.0% (95% CI 34.3, 45.7), other health professionals 35.1%(95% CI 28.5, 41.7), care workers 43.3% (95% CI 39.1, 47.5), teachers 40.3% (95% CI 35.2, 45.4) and *other occupations* 38.4% (95% CI 37.4, 39.4). The lowest prevalence of moderate stress was reported by *other occupations* (22.6%, 95% CI 21.8, 23.4) and the highest teachers (28.3%, 95% CI 23.7, 32.9). The lowest prevalence of high stress was reported by other health professionals (7.8%, 95% CI 4.1, 11.5) and the highest care workers (20.2%, 95% CI 16.8, 23.6). Public service occupations, such as working as a nurse, other health professional, care worker or teacher can be stressful. This is particularly true for professional occupations who experience higher levels of stress than all other occupations (Health and Safety Executive 2015).

<u>Prevalence of stress by occupation, stratified by gender and age band</u>

The prevalence of stress reporting among females in the analysis ranged from 31.9% (95% CI 24.1, 39.7) in other health professionals to 40.8% (95% CI 34.9, 46.7) in nurses and 42.9% (95% CI 41.4, 44.4) in *other occupations.* Among males, *other occupations* reported the lowest prevalence (34.3%, 95% CI 33.0, 35.6) and care workers the highest prevalence of stress (47.4%, 95% CI 37.1, 57.7). The prevalence of stress reported by females and males in *other occupations* is shown in Figure 7.7. The percentage of workers reporting stress generally decreased with age except in the 50-59 year old age band for which it rose across all the occupational groups included in the analysis. For example, among nurses, 67.0% (95% CI 46.4, 87.6) of 17-29 year olds, 42.9% (95% CI 29.6, 56.2) 30-39, 35.7% (95% CI 26.3, 45.1) 40-49, 40.7% (95% CI 29.5, 51.9) 50-59 and 31.8% (95% CI 16.6, 47.0) 60-69 year olds. ANOVA showed that the effect of sex and age band was significant in other health professionals ($F(1, 178)=7.49$, $p=0.007$ and $F(3, 178)=3.09$, $p=0.029$), care workers ($F(1, 445)=4.48$, $p=0.035$ and $F(3, 445)=4.47$, $p=0.004$) and *other occupations* ($F(1, 7753)=41.45$, $p<0.001$ and $F(3, 7753)=3.21$, $p=0.022$). Among *other occupations,* sex by age band was also significant, $F(3, 7753)=6.19$, $p<0.001$).

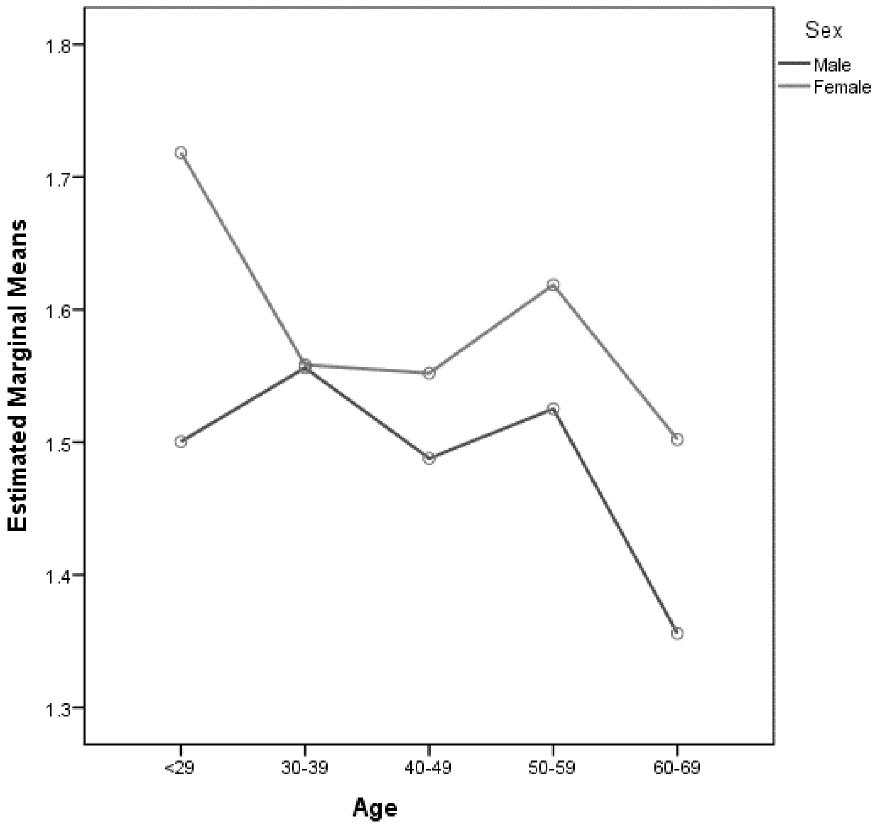



**Figure 7.7 ANOVA for Stress in *Other Occupations* by Gender and Age Group.**

Younger individuals may be less able to cope with the psychological demands of teaching and thus experience stress earlier in their careers whereas other workers may develop stress later in their careers as the accumulation of potentially a low sense of control and high demands are placed on them due to their seniority in the workforce. By middle-age, many workers irrespective of occupation will have begun to experience age related changes in health and physical functioning. These changes can undermine productivity and reduce people's tolerance of organisational change or 'work place politics' contributing to increased stress. Many older workers become overwhelmed or discouraged due to long-term ill health, job demands, or lack of control (Hansson et al., 2001), leading to the development of stress suggesting a complex association between age and stress.

**Prevalence of satisfaction with life reported**

Subjective satisfaction with life reflects people's overall evaluation of their life, it is a judgemental measure in which people assess the quality of their own life against their own unique set of criteria. Components which people use will likely include physical and psychological health to a lesser or greater extent (e.g. depression [Pavot and Diener, 1993]). Findings from the study indicate that females and males rate their satisfaction with life similarly (7.70 [SD 1.70], 7.70 [SD 1.82]). The mean score reported for satisfaction with life decreased with age from 7.89 (SD 1.48) in those aged 29 years or younger to 7.46 (SD 2.03) in those aged 50-59 years. ANOVA showed that the effect of age band was significant, $F(4, 11716)=14.51$, $p<0.001$. Post hoc analysis using the Scheffé post hoc criterion for significance indicated that compared to <29 year olds, those aged 40-49 ($p=0.003$) and 50-59 ($p=0.003$) had a significantly lower prevalence.

<u>Satisfaction with life by occupation</u>

The mean satisfaction with life score reported by nurses was 8.1 (SD 1.4), other health professionals 8.3 (SD 1.2), care workers 7.6 (SD 1.8), teachers 8.1 (SD 1.4) and *other occupations* 7.7 (SD 1.8).

<u>Satisfaction with life by occupation, stratified by gender and age band</u>

The mean satisfaction with life score reported by each occupational group in the analysis differed by gender and age band. The mean satisfaction reported by female nurses was 8.1 (SD 1.4) and males 7.9 (SD 0.8). Among females in other comparator groups the mean was 8.3 (SD 1.2) other health professionals, 7.7 (SD 1.8) care workers, 8.0 (SD 1.5) teachers and 7.6 (SD 1.9) *other occupations.* Among male, the

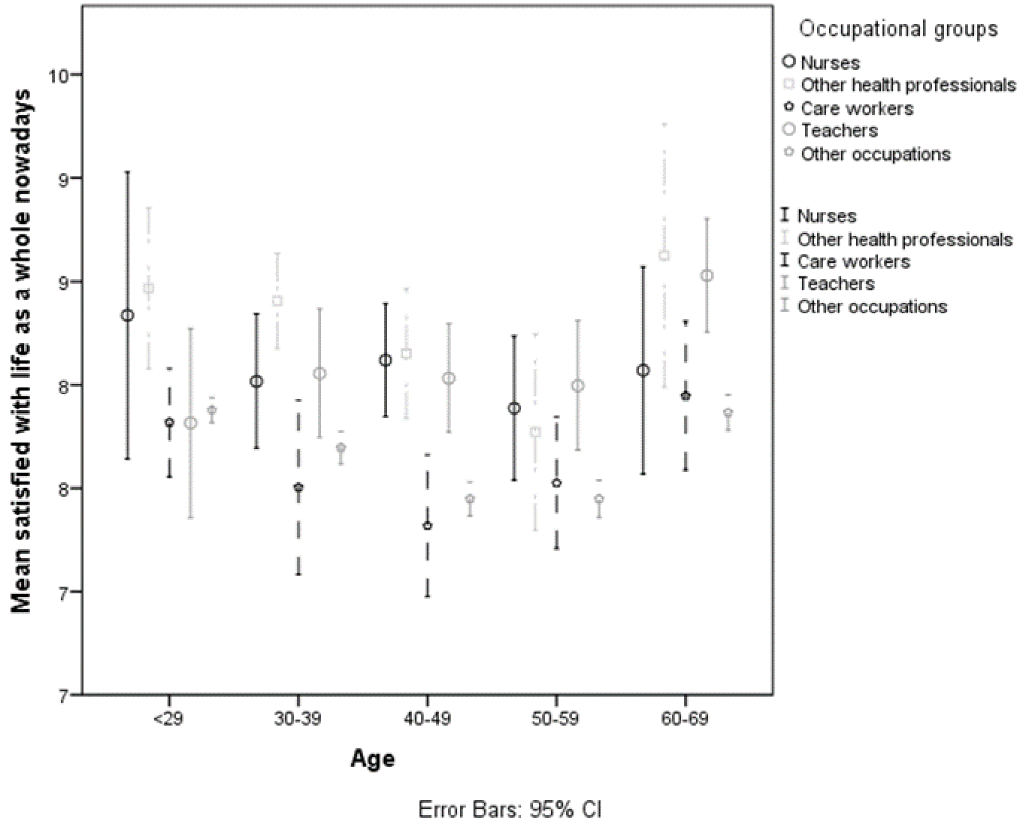



**Figure 7.8 Error Bar Chart for Mean Satisfaction with Life Nowadays by Age Group Nested Within Occupation.**

mean was 8.2 (SD 1.1) other health professionals, 7.3 (SD 1.8) care workers, 8.3 (SD 1.0) teachers and 7.7 (SD 1.8) *other occupations.* The mean satisfaction with life reported by groups in the analysis appeared to show a decline in satisfaction with life over time, see Figure 7.8 and Figure 7.9. In nurses, the mean satisfaction with life was 8.3 (SD 1.5) in 17-29 year olds, 8.0 (SD 1.2) 30-39, 8.1 (SD 1.4) 40-49, 7.9 (SD 1.5) 50-59 and 8.1 (SD 1.5) 60-69 year olds. Among other health professionals, mean satisfaction with life declined as age rose between except from in 60-69 year olds: 8.5 (SD 1.1) 17-29, 8.4 (SD 0.9) 30-39, 8.2 (SD 1.1) 40-49, 7.8 (SD 1.4) 50-59 and 8.6 (SD 1.6) 60-69 year olds. Among teachers, mean satisfaction with life remained fairly consistent between the age bands 30-39, 40-49 and 50-59: 7.9 (SD 1.5) 17-29, 8.1 (SD

1.4) 30-39, 8.0 (SD 1.2) 40-49, 8.0 (SD 1.4) 50-59 and 8.5 (SD 1.3) 60-69 year olds. These findings appear to support other study conclusions in that there may be no simple answer to the question of how life satisfaction changes with age (Baird et al., 2010), being itself confounded by many other factors.

ANOVA showed that the effect of age band was significant in other health professionals ($F(3, 186)=3.90$, $p=0.010$) and *other occupations* ($F(3, 8422)=7.88$, $p<0.001$).

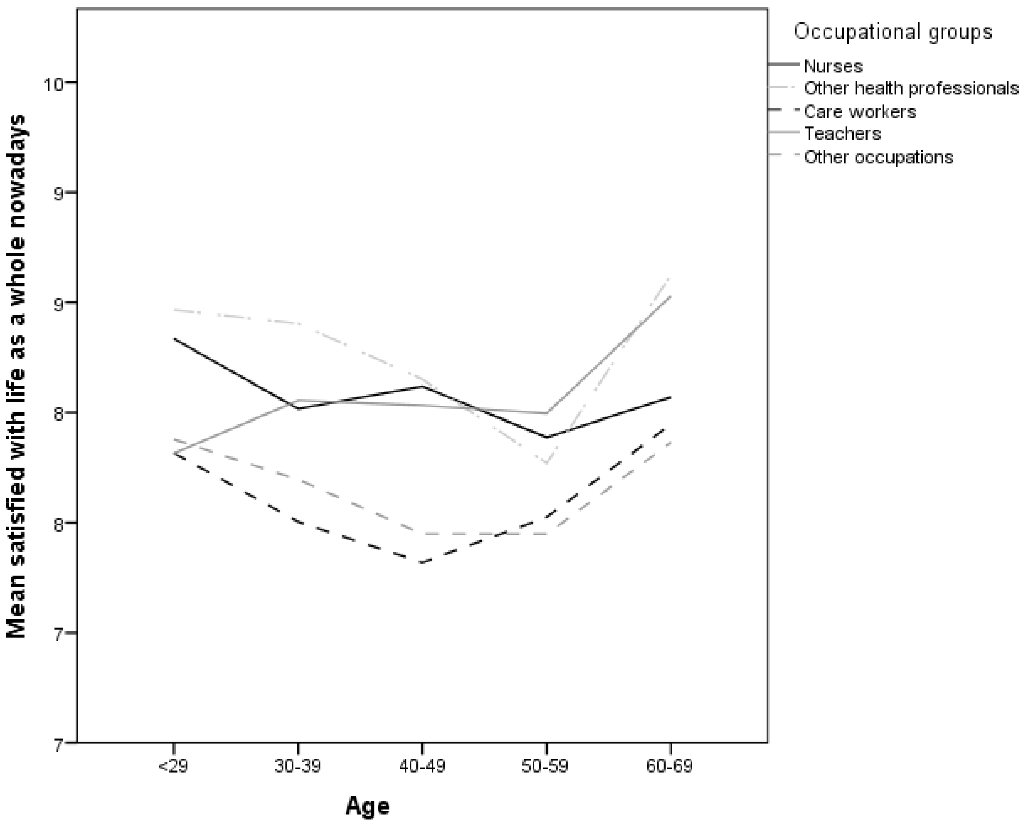



**Figure 7.9 Line Chart for Mean Satisfaction with Life Nowadays by Age Group Nested Within Occupation.**

### 7.4.2 Prevalence of health-related behaviours reported

**Prevalence of tobacco smoking reported**

Forty-two percent of the sample reported to smoke tobacco (95% CI 40.5, 42.9). There was a difference between females (41.2%, 95% CI 39.5, 42.9) and males (42.2%, 95% CI 40.6, 43.8) reporting to smoke and age bands with the prevalence of smoking rising and declining across age bands: 49.9% (95% CI 47.2, 52.6) 17-29, 42.3% (95% CI 39.5, 45.1) 30-39, 44.4% (95% CI 41.9, 46.9) 40-49, 41.0% (95% CI 38.4, 43.6) 50-59 and 30.8%(95% CI 28.3, 33.3) 60-69 year olds. ANOVA showed that the effect of age band was significant, $F(4, 6818)=27.24$, $p<0.001$. Post hoc analysis using the Scheffé post hoc criterion for significance indicated a significantly higher difference in age bands 50-59 and 60-69 than <29 year olds, $p<0.001$.

Prevalence of tobacco smoking by occupation

The distribution of individuals in the sample reporting to smoke tobacco varied by occupational group, see Figure 7.10. Among the sample, 22.5% (95% CI 16.0, 29.0) of nurses, 10.9% (95% CI 4.1, 17.7) of other health professionals, 47.6% (95% CI 42.6, 52.6) of care workers, 15.8% (95% CI 10.0, 21.6) of teachers and 57.1% (95% CI 41.6, 44.2) of *other occupations*.

Prevalence of tobacco smoking by occupation, stratified by gender and age band

The percentage of individuals in the sample who reported to smoke is low preventing the reporting of the characteristics of every occupation in the analysis, see Appendix xi Table 7.5. The percentage of nurses in the sample reporting to smoke tobacco was 22.5% (95% CI 15.8, 29.2) in females. Among females, 47.8% (95% CI 42.3, 53.3) of

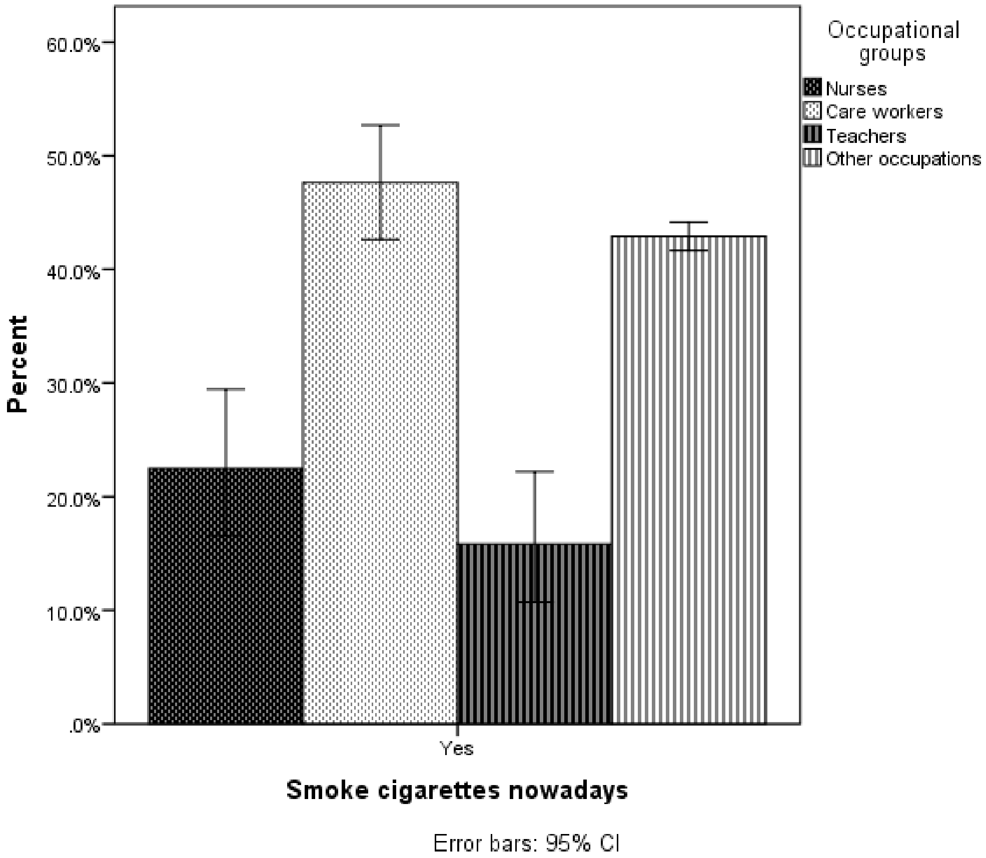



**Figure 7.10 Error Bar Chart for Tobacco Smoking by Occupation.** *

* Other health professionals not presented due to small numbers.

care workers, 18.3% (95% CI 11.0, 25.6) of teachers and 42.8% (95% CI 40.9, 44.7) of *other occupations* reported to smoke. Among males, 47.0% (95% CI 34.5, 59.5) of care workers and 42.9% (95% CI 41.2, 44.6) of *other occupations* reported to smoke. The percentage of individuals reporting to smoke tobacco can only be reported for care workers and *other occupations* due to small numbers. Among care workers, the percentage of participants reporting to smoke increased between the age bands 17-29 and 30-39 where it began to decline: 40.2% (95% CI 30.4, 50.0) 17-29, 61.1% (95% CI 49.2, 73.0) 30-39, 49.8% (95% CI 39.4, 60.2) 40-49, 49.3% (95% CI 38.6, 60.0) 50-59 and 38.1% (95% CI 26.7, 49.5) 60-69 year olds. Among *other occupations*, the percentage of people who reported to smoke decreased between the ages 17-29 and 30-39, increased between 30-39 and 40-49 and then decreased between 40-49, 50-59 and60-69 year olds: 51.4% (95% CI 48.6, 54.2) 17-29, 43.1% (95% CI 40.1, 46.1) 30-39, 46.2% (95% CI 43.5, 48.9) 40-49, 42.3% (95% CI 39.6, 45.0) 50-59 and 31.2% (95% CI 28.6, 33.8) 60-69 year olds. ANOVA showed that the effect of gender was significant in care workers ($F(1, 324)=4.65$, $p=0.032$) and age band in *other occupations* ($F(3, 4832)=7.99$, $p<0.001$).

The prevalence of tobacco smoking has declined over recent years but the disparity among occupational groups continues to exist. Consistent with other studies, demographic factors including gender and age, in addition to occupation influence the prevalence of being a tobacco smoker to a greater or lesser extent. This may have contributed to the higher than expected prevalence of tobacco smoking among care workers and *other occupations* with estimates for a similar period of time around 23.1% (Scottish Government, 2016b). Workplace rules against smoking and workplace smoking cessation programs have been major determinants of current smoking (Ham et al., 2011) with lower availability of such workplace measures partly explaining differences seen between occupational groups. The precise effect these workplace measures have in this study is less clear with a substantial difference between nurses and care workers seen in the study finding who are arguably exposed to similar workplace measures. However, there is one key difference, more care workers are likely to work in the community than nurses potentially increasing the opportunity to smoke between clients.

**Prevalence of physical activity reported**

The percentage of individuals in the sample who reported to engage in physical activity on five or more days a week was lower in females (39.8%, 95% CI 38.6, 41.0) than males (48.8%, 95% CI 47.5, 50.1). The percentage of individuals in the sample reporting to engage in physical activity on five or more days a week declined as age increased: 56.8% (95% 54.9, 58.7) in 17-29, 49.9% (95% CI 47.8, 52.0) in 30-39, 46.0% (95% CI 44.1, 47.9) in 40-49, 39.4% (95% CI 37.5, 41.3) in 50-59 and 26.3% (95% CI 24.4, 28.2) in 60-69 year olds.

Physical activity by occupation

The percentage of people who reported to engage in physical activity differed by occupational group and number of days physical activity engaged in, see Figure 7.11. The percentage of individuals in the sample who reported to engage in physical activity on five or more days a week was 49.5% (95% CI 43.7, 55.3) of nurses, 43.3% (95% CI 36.6, 50.0) of other health professionals, 46.7% (95% CI 42.6, 50.8) of care workers, 39.7% (95% CI 34.8, 44.6) of teachers and 44.1% (95% CI 43.1, 45.1) of *other occupations*. ANOVA showed that the effect of gender ($F(1, 11731)=68.25$, $p<0.001$), age band ($F(4, 11731)=193.75$, $p<0.001$) and gender by age band was significant ($F(4, 11731)=12.19$, $p<0.001$). Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significantly higher in all age bands than <29 year olds ($p<0.001$).

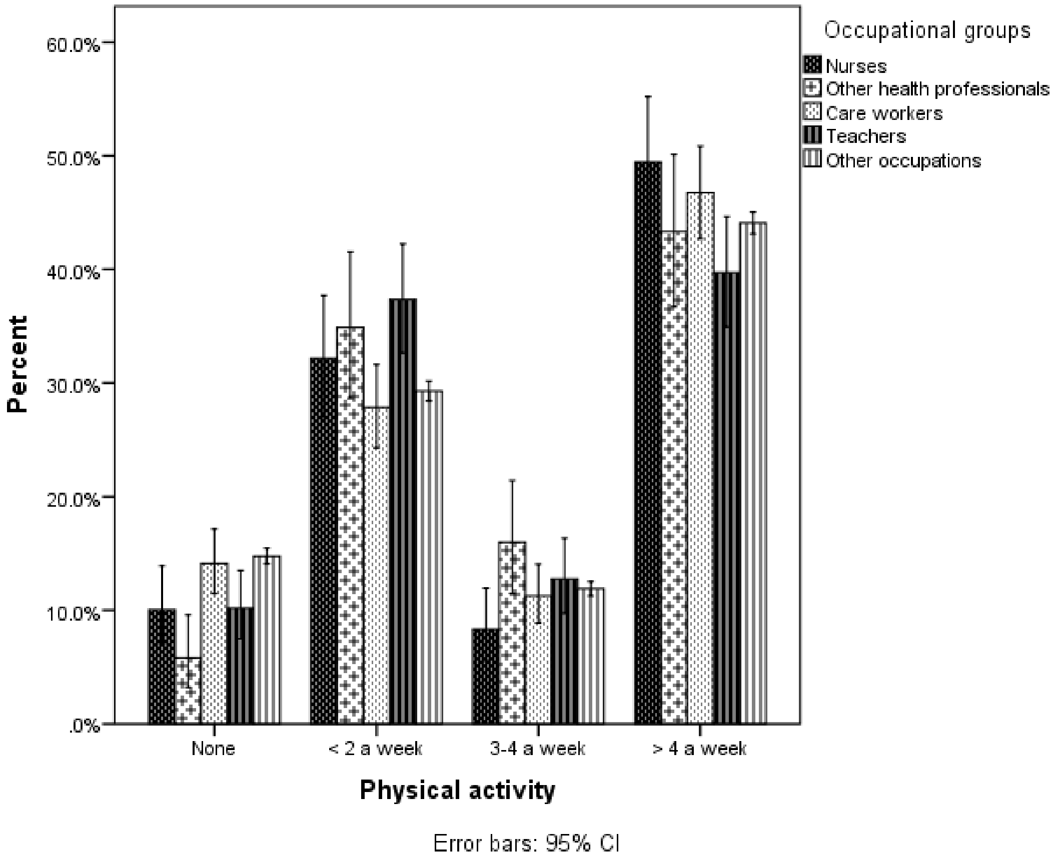



**Figure 7.11 Error Bar Chart for Physical Activity by Occupation.**

These findings suggest that socioeconomic status and educational attainment have little effect on physical activity. Differences may be potentially due to differences in working hours. For example, a systematic review of occupation and adults' engagement in leisure-time physical activity found that those employed in occupations demanding long work hours and low occupational physical activity are at greater risk of inactivity (Kirk and Rhodes, 2011).

Physical activity by occupation, stratified by gender and age band

The distribution of individuals in the sample who engaged in physical activity on five or more days a week differed by occupation, stratified by gender and age band, see Appendix xi Table 7.6. Over fifty percent of female nurses reported to meet this level

(51.3%, 95% CI 45.3, 57.3). Among females in comparator groups, the percentage was lowest in teachers (34.2%, 95% CI 28.5, 39.9) and highest in other health professionals (46.0%, 95% CI 37.8, 54.2). Among males, the percentage was lowest in other health professionals (37.5%, 95% CI 25.7, 49.3) and highest in care workers (54.1%, 95% CI 44.2, 64.0). The large confidence intervals are reflective of a small sample size. The percentage of nurses reporting to engage in physical activity on five or more days a week increased between the age bands 17-29 and 30-39, decreased between the age bands 30-39, 40-49 and 50-59 and increased between 50-59 and 60-69 year olds: 65.2% (95% CI 44.3, 86.1) in 17-29, 67.4% (95% CI 54.9, 79.9) in 30-39, 51.2% (95% CI 41.5, 60.9) in 40-49, 32.0% (95% CI 21.4, 42.6) in 50-59 and 44.7% (95% CI 28.9, 60.5) in 60-69 year olds. Among comparator groups, the percentage was highest in teachers aged 17-29 (42.5%, 95% CI 28.1, 56.9), *other occupations* aged 17-29 (57.2%, 95% CI 55.2, 59.2), *care* workers aged 30-39 (60.8%, 95% CI 50.6, 71.0), and other occupations (53.8%, 95% CI 39.4, 68.2) aged 40-49 years old of other health professionals and 43.7% (95% CI 43.7, 43.7) of teachers aged 40-49 years.

ANOVA showed that the effect of gender was significant in nurses ($F(1, 254)=4.80$, $p=0.029$), teachers ($F(1, 304)=5.06$, $p=0.025$) and *other occupations* ($F(1, 8431)=89.56$, $p<0.001$). Age band was significant in care workers ($F(3, 488)=4.70$, $p=0.003$) and *other occupations* ($F(3, 8431)=79.72$, $p<0.001$). Gender by age group was also significant in *other occupations* ($F(3, 8431)=12.92$, $p<0.001$).

The interaction between genetic and environmental factors that influence human development and pave the way for health and prevent disease includes physical activity. Each person has a unique set of genes and constitutional factors (gender, age, socioeconomic status, occupation, educational attainment and geography). Depending on a person's genetics and constitutional factors, some people are more likely to engage in regular physical activity. For example, a systematic review of correlates in physical activity found that physical activity was consistently higher in males than females and inversely associated with age (Trost, Owen, Bauman, Sallis, and Brown, 2002). Males, more specifically younger males, are more likely to report higher physical activity level than females (Bauman et al., 2009). Behavioural attributes such as dietary habits and smoking status are associated with physical activity level, with a positive association with healthy diet and negative association with being a smoker (Trost et al., 2002).

*Prevalence of sedentary time reported*

To examine physical activity in more detail, a variable was created for sedentary time. 0.2% (n=28) of individuals in the sample did not have data on sedentary time and were removed from the analysis of this variable. Sedentary time for weekdays and weekends were grouped together because occupations included in this analysis, such as nurses and care workers, can work any three to five days out of seven to meet patient needs. The percentage of people reporting the lowest sedentary time (0-270.00) were similar among females (23.5%, 95% CI 22.4, 24.6) and males (23.8%, 95% CI 22.7, 24.9). The percentage of people reporting the lowest sedentary time increased between the age bands 17-29, 30-39 and 40-49 and decreased between 40-49, 50-59 and 60-69 year olds: 23.7% (95% CI 22.0, 25.4) in 17-29, 29.7% (95% CI 27.8, 31.6) in 30-39, 32.2% (95% CI 30.4, 34.0) in 40-49, 21.6% (95% CI 20.0, 23.2) in

50-59 and 9.3% (95% CI 8.0, 10.6) in 60-69 year olds. ANOVA showed that the effect of age band was significant, $F(4, 11708)=175.38$, $p<0.001$.

<u>Sedentary time reported by occupation</u>

The distribution of sedentary time reported by the sample differed by occupational group. For example, the lowest sedentary time was reported by 28.2% (95% CI 23.0, 33.4) of nurses, 38.4% (95% CI 31.8, 45.0) of other health professionals, 26.4% (95% CI 22.8, 30.0) of care workers, 19.4% (95% CI 24.0, 33.0) of teachers and 23.2% (95% CI 22.4, 24.0) of *other occupations*. The mean distribution of sedentary time reported by each occupation is shown in Figure 7.12.

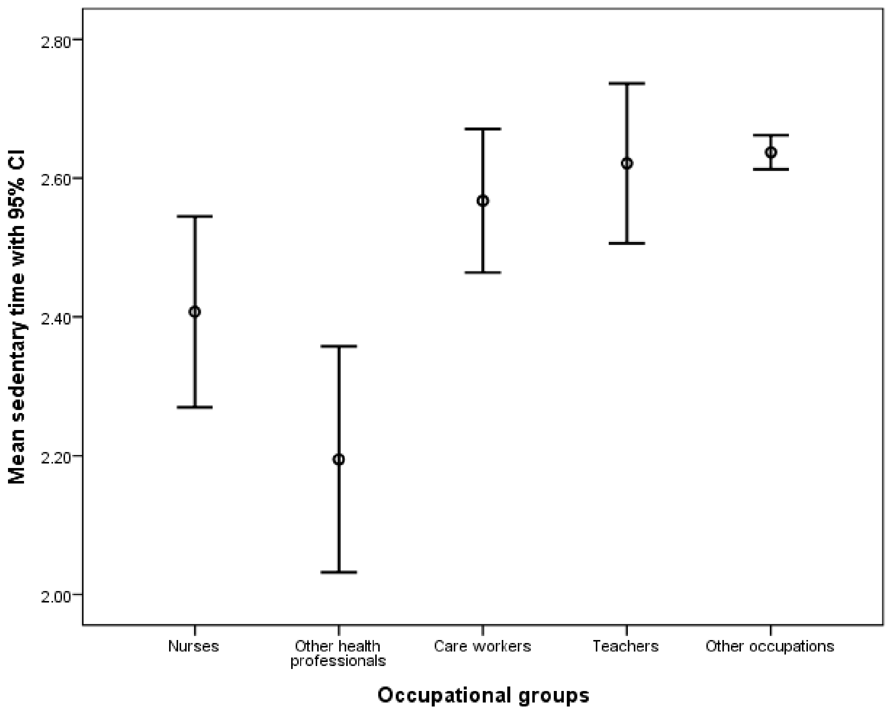



**Figure 7.12 Error Bar Chart for Mean Sedentary Time by Occupation.**

<u>Sedentary time by occupation, stratified by gender and age band</u>

The distribution of sedentary time in the sample is reported on the characteristics of each occupation included in the analysis, see Appendix xi Table 7.7. Under thirty percent of female nurses reported a sedentary time of 0-270 minutes (27.7%, 95% CI 22.4, 33.0). The percentage reported by females in comparator occupations was lowest in teachers (20.8%, 95% CI 16.0, 25.6) and highest in other health professionals (35.7%, 95% CI 27.8, 43.6). Among males, the percentage was lowest in care workers (14.2%, 95% CI 7.3, 21.1) and highest in other health professionals (44.2%, 95% CI 32.2, 56.2). The large confidence intervals are reflective of a small sample size. There is little commonality among age bands reporting the highest percentage of low sedentary time across occupation. The percentage of individuals in the sample reporting 0-270 minutes of sedentary time by occupation is shown in Figure 7.13. Among nurses,

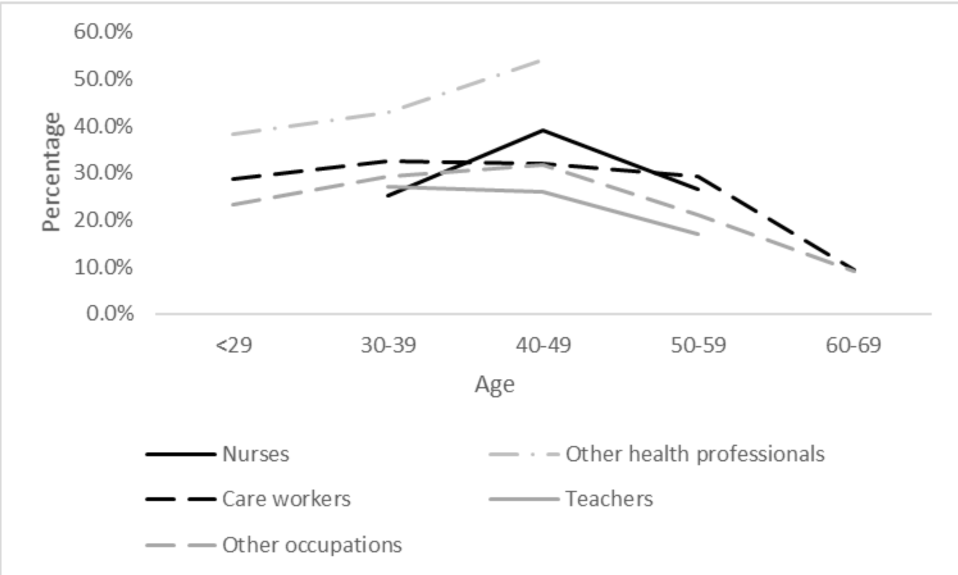



**Figure 7.13 Line Chart for 0-270 Minutes of Sedentary Time by Age Group Nested Within Occupation.**

25.0% (95% CI 13.5, 36.5) of 30-39, 39.0% (95% CI 29.5, 48.5) of 40-49 and 26.5% (95% CI 16.4, 36.6) in 50-59 year olds. Among comparator groups, the highest percentage was seen in care workers aged 30-39 (32.5%, 95% CI 22.7, 42.3), teachers aged 30-39 (27.1%, 95% CI 17.5, 36.7), other health professionals aged 40-49 (54.2%, 95% CI 40.1, 68.3) and *other occupations* aged 40-49 (31.7%, 95% CI 29.7, 33.7). The sedentary time generally increased with age, particularly among males. ANOVA showed that the effect of age band was significant in other health professionals ($F(3, 189)=5.55$, $p=0.001$) and *other occupations* ($F(3, 8411)=48.33$, $p<0.001$). Gender was significant in care workers ($F(3, 487)=12.73$, $p<0.001$) .

**Prevalence of alcohol consumption reported**

Alcohol consumption was examined in relation to Scotland's safe alcohol consumption guidelines that were in place before the 2016 because the years of data used in the analysis related to the earlier recommendations. Categories include non-alcohol consumption, ex consumption, moderate (up to and including 21 units for men and 14 for women), and hazardous consumption (over 21 units for men and 14 for women).

Data was missing for 4.5% (n=610) individuals and they were removed the analysis of this variable. In the sample, 13.9% (95% CI 13.0, 14.8) of females and 10.7% (95% CI 9.9, 11.5) of males were categorised as non-drinkers, 67.3% (95% CI 66.1, 68.5) of females and 64.7% (95% CI 63.4, 66.0) of males were moderate drinkers and 18.8% (95% CI 17.8, 19.8) of females and 24.6% (95% CI 23.5, 25.7) of males were hazardous drinkers. The percentage of non-drinkers increased with age: 10.5% (95% CI 9.3, 11.7) in 17-29, 11.3% (95% CI 9.9, 12.7) in 30-39, 11.6% (95% CI 10.3, 12.9) in 40-49, 12.6% (95% CI 11.3, 13.9) in 50-59 and 16.1% (95% CI 14.5, 17.7) in 60-69 year olds. The percentage of hazardous drinkers by age band was as follows: 21.2% (95% CI 19.6, 22.8) in 17-29, 19.2% (95% CI 17.5, 20.9) in 30-39, 23.2% (95% CI 21.5, 24.9) in

40-49, 22.6% (95% CI 20.9, 24.3) and 21.8% (95% CI 20.0, 23.6) in 60-69 year olds. ANOVA showed that the effect of gender ($F(1, 11584)=73.62$, $p<0.001$), age band ($F(1, 11584)=3.15$, $p=0.013$) and gender by age band was significant ($F(4, 11584)=4.86$, $p=0.001$). Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was not significant.

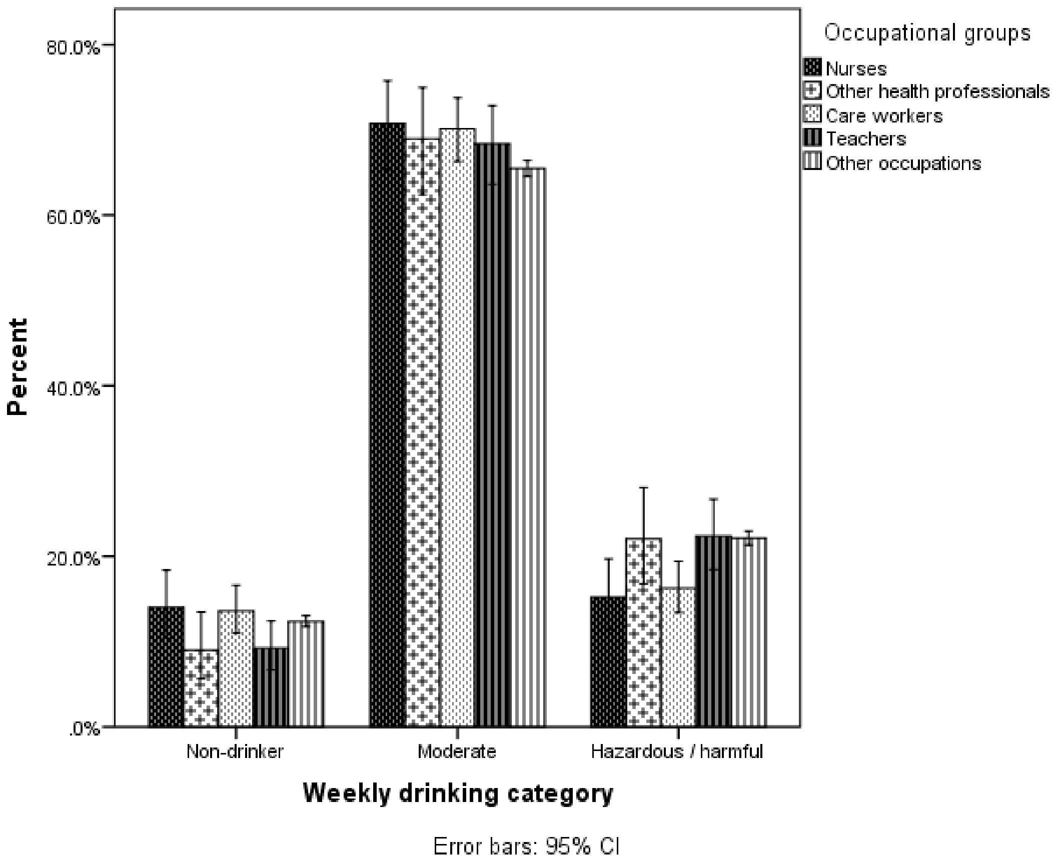



**Figure 7.14 Error Bar Chart for Weekly Drinking Categories by Occupation.**

Alcohol consumption by occupation

The distribution of alcohol consumption self-reported by the sample differed by occupational group, see Figure 7.14. For example, hazardous alcohol consumption reported by each occupation was as follows: 15.2% (95% CI 11.1, 19.3) of nurses, 22.0% (95% CI 16.3, 27.7) of other health professionals, 16.2% (95% CI 13.2, 19.2) of care workers, 22.4% (95% CI 18.2, 26.6) of teachers and 22.1% (95% CI 21.3, 22.9) of *other occupations*.

Alcohol consumption by occupation, stratified by gender and age band

The spread of alcohol consumption differs by occupation, stratified by gender and age band, see Appendix xi Table 7.8. Due to small numbers, some characteristics have not been reported. Fifteen percent of female nurses reported hazardous alcohol consumption (15.0%, 95% CI 10.7, 19.3). Among female comparator groups the prevalence was lowest in care workers (14.5%, 95% CI 11.3, 17.7) and highest in other health professionals (24.4%, 95% CI 17.3, 31.5). Among males, the prevalence was lowest in other health professionals (16.9, 95% CI 7.8, 26.0) and highest in *other occupations* (24.9%, 95% CI 23.7, 26.1). The percentage of the sample reporting hazardous consumption varied by age band. For example, the percentage was highest among nurses aged 50-59 (20.3%, 95% CI 11.1, 29.5), other health professionals aged 40-49 (29.7%, 95% CI 16.3, 43.1), care workers aged 17-29 (23.0%, 95% CI 15.1, 30.9), teachers aged 40-49 (29.5%, 95% CI 19.6, 39.4) and *other occupations* aged 40-49 (23.7%, 95% CI 21.9, 25.5). ANOVA showed that the effect of age band was significant in care workers ($F(3, 483)=3.90$, $p=0.009$) and gender in care workers ($F(1, 483)=4.14$, $p=0.042$) and *other occupations* ($F(1, 8296)=30.03$, $p<0.001$).

*Number of days alcohol consumed*

A more in-depth examination of alcohol consumption in terms of the number of days' alcohol was consumed produced similar findings to that of alcohol drinking category presented above. Under four percent of females (3.6%, 95% CI 3.1, 41) and 6.7% (95% CI 6.0, 7.4) of males reported to consume alcohol almost every day. The percentage of individuals in the sample self-reporting to consume alcohol almost every day rose as age band increased: 1.2% (95% CI 0.8, 1.6) in 17-29, 1.6% (95% CI 1.1, 2.1) in 30-39, 5.5% (95% CI 4.6, 6.4) in 40-49, 6.9% (95% CI 5.9, 7.9) in 50-59 and 10.9% (95% CI 9.6, 12.2) in 60-69 year olds. Similar findings are seen for those consuming alcohols on five or six days a week.

<u>Number of days alcohol consumed by occupation</u>

The number of days individuals consumed alcohol self-reported by the sample differed by occupational group. For example, 4.4% (95% CI 2.0, 6.8) of nurses, 6.2% (95% CI 2.9, 9.5) of other health professionals, 3.7% (95% CI 2.2, 5.2) of care workers, 6.9% (95% CI 4.4, 9.4) of teachers and 5.1% (95% CI 4.7, 5.5) of *other occupations*.

<u>Number of days alcohol consumed by occupation, stratified by gender and age band</u>

The percentage of individuals self-reporting to consume alcohol almost every day differs occupation, stratified by gender and age band. Due to small numbers, the characteristics cannot be presented for each group in the analysis. Under four percent of female nurses reported to consume alcohol almost every day (3.8%, 95% CI 1.5, 6.1). Among females in comparator groups, care workers reported the lowest (3.0%, 95% CI 1.5, 4.5) and other health professionals the highest percentage (6.9%, 95% CI 2.7, 11.1). Among males, 6.6% (95% CI 3.8, 15.6) of those in *other occupations* and 9.7% (95% CI 5.9, 7.3) of teachers reported to consume alcohol almost every day. The distribution of individuals in the sample reporting to consume alcohol almost every day by age band can only be explored in *other occupations* due to small numbers. As age band increased, the percentage reporting to consume alcohol almost every day rose: 1.3% (95% CI 0.8, 1.8) in 17-29, 1.7% (95% CI 1.1, 2.3) in 30-39, 5.7% (95% CI 4.7, 6.7) in 40-49, 7.1% (95% CI 6.0, 8.2) in 50-59 and 10.4% (95% CI 9.0, 11.8) in 60-69 year olds.

Studies have reported that the level of alcohol consumed is unequally distributed between females and males (Rehm et al., 2009). The difference between age bands is more complex. There are many motivates for drinking, such as to enhance social interactions and reduce inner tension (Müller and Schumann, 2011), usually the result of a stressor. The workplace can provide both an opportunity for alcohol intervention as well as a risk factor for harmful alcohol consumption. Working conditions, such as long working hours have been associated with alcohol use (OR 1.11, 95% CI 1.05-1.18) with those exceeding the European Union Directive recommendation of 48 hours a week more likely to increase their alcohol consumption to harmful levels (Virtanen et al., 2015). While this study does not examine working hours, this may partly explain the difference in the level of alcohol consumption seen in the sample.

**Prevalence of dietary habits reported**

*Fruit and vegetable consumption reported*

The percentage of individuals in the sample reporting to consume five portions of fruit and vegetables a day differed by gender and age band. Data was missing on under 0.01% of cases and were removed from the analysis of this variable. Over twenty percent of females (22.3%, 95% CI 21.2, 23.4) and males (20.8%, 95% CI 19.7, 21.9) self-reported to consume five or more portions of fruit and vegetables a day. The percentage remained fairly consistent across age bands: 19.3% (95% CI 17.8, 20.8) in 17-29, 21.3% (95% CI 19.6, 23.0) in 30-39, 22.4% (95% CI 20.8, 24.0) in 40-49, 22.1% (95% CI 20.5, 23.7) in 50-59 and 22.9% (95% CI 21.1, 24.7) in 60-69 year olds. ANOVA showed that the effect of gender ($F(1, 11735)=19.08$, $p<0.001$), age band ($F(4, 11735)=11.19$, $p<0.001$) and gender by age band was significant ($F(4, 11735)=6.38$, $p<0.001$). Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significantly lower in 40-49 ($p=0.002$), 50-59 ($p=0.024$) and 60-69 year olds ($p<0.001$) than <29 year olds.

<u>Fruit and vegetable consumption by occupation</u>

The percentage of five or more portions of fruit and vegetables consumed by the sample differed by occupational group, see Figure 7.1. For example, 28.2% (95% CI 23.0, 33.4) of nurses, 41.2% (95% CI 34.5, 47.9) of other health professionals, 21.8% (95% CI 18.4, 25.2) of care workers, 31.9% (95% CI 27.3, 36.5) of teachers and 20.6% (95% CI 19.8, 21.4) of *other occupations*.

<u>Fruit and vegetable consumption by occupation, stratified by gender and age band</u>

The percentage of individuals self-reporting to consume five or more portions of fruit and vegetables a day differed by gender and age band among each occupation in the analysis. Due to a small sample size we are unable to report on the characteristics of every occupation in the analysis. The consumption of five or more portions of fruit and vegetables a day was reported by 28.7% of female nurses (95% CI 23.3, 34.1).

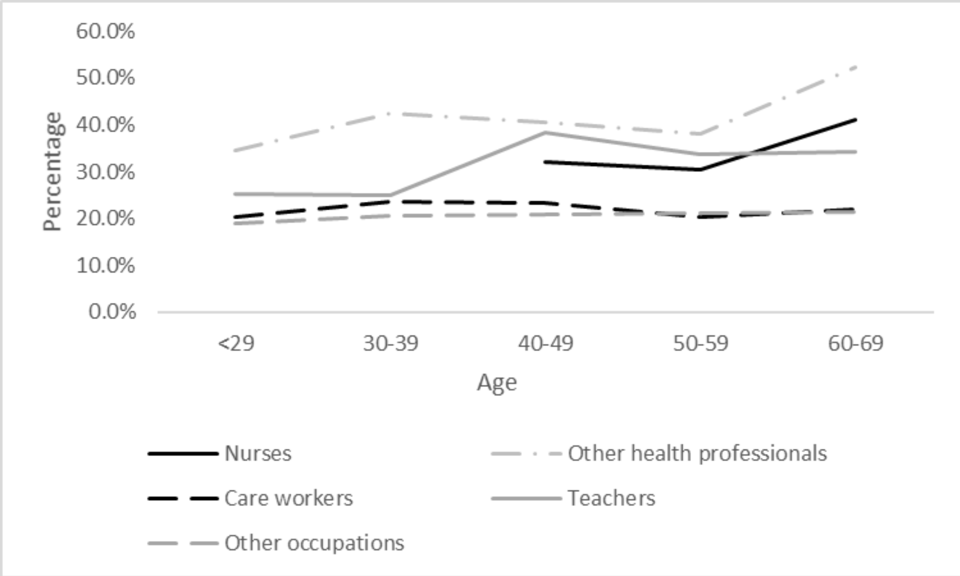



**Figure 7.15 Line Chart for Consumption of Five or More Fruit and Vegetables by Age Group Nested Within Occupation.**

Among female comparator groups, *other occupations* reported the lowest (20.9%, 95% CI 19.7, 22.1) and other health occupations (40.8%, 95% CI 32.7, 48.9) the highest percentage. Among males, those in *other occupations* (20.3%, 95% CI 19.2, 21.4) and other health professionals (20.3%, 95% CI 30.2, 54.0) the highest percentage of individuals consuming five or more portions of fruit and vegetables a day. The percentage of occupations consuming five or more portions of fruit and vegetables varied by age band, see Figure 7.15. For example, among nurses, 32.1% (95% CI 23.0, 41.2) in 40-49, 30.4% (95% CI 19.9, 40.9) in 50-59 and 40.9% (95% CI 25.3, 56.5) in 60-69 year olds reported to consume five or more portions of fruit and vegetables a day. Among *other occupations,* the percentage was as follows: 19.0% (95% CI 17.4, 20.6) in 17-29, 20.5% (95% CI 18.7, 22.3) in 30-39, 21.0% (95% CI 19.3, 22.7) in 40-49, 21.1% (95% CI 19.4, 22.8) in 50-59 and 21.5% (95% CI 19.6, 23.4) in 60-69 year olds. ANOVA showed that the effect of gender ($F$(1, 8433)=10.36,

$p$=0.001), age band ($F$(3, 8433)=4.58, $p$=0.003) and gender by age band ($F$(3, 8433)=7.75, $p$<0.001) was significant in *other occupations.*

Both males and females are not consistently meeting guidelines of five fruit and vegetables a day. Males in particular are eating too little. Studies have suggested that fewer males than females are able to articulate government recommendation for fruit and vegetables (Baker and Wardles, 2003). People with higher socioeconomic status are more likely to consume fresh fruit and vegetables (Darmon and Drewnoswki, 2008). This was not reflected in the study findings, particularly in other health professionals and teachers where numbers were too low to report.

*Percentage of sugar consumed*

Sugar consumption was measured in the study using a combined variable on the frequency that biscuits, cakes and confectionary were consumed. The percentage of sugar consumed was not used as this information was not available in the dataset. Nonetheless, using this single variable on sugar intake, an overview of sugar consumption was generated.

The mean sugar consumption reported by the sample was 0.83 (SD 0.58). The mean score for females was 0.82 (SD 0.58) and 0.85 (SD 0.58) for men. This finding is supported in the literature with a higher percentage of free sugars consumed by males than females, 33% vs. 29% (Sluik, van Lee, Engelen, and Feskens, 2016). Among age bands the score were 0.78 (SD 0.55) in 17-29, 0.80 (SD 0.52) in 30-39, 0.90 (SD 0.62) in 40-49, 0.90 (SD 0.62) in 50-59 and 0.79 (SD 0.56) in 60-69 year olds.

Sugar consumed by occupation

The mean sugar consumption differed by occupation. Among nurses the mean score was 0.91 (SD 0.61), other health professionals 0.74 (SD 0.56), care workers 0.85 (SD 0.59), teachers 0.84 (SD 0.62) and *other occupations* 0.83 (SD 0.58).

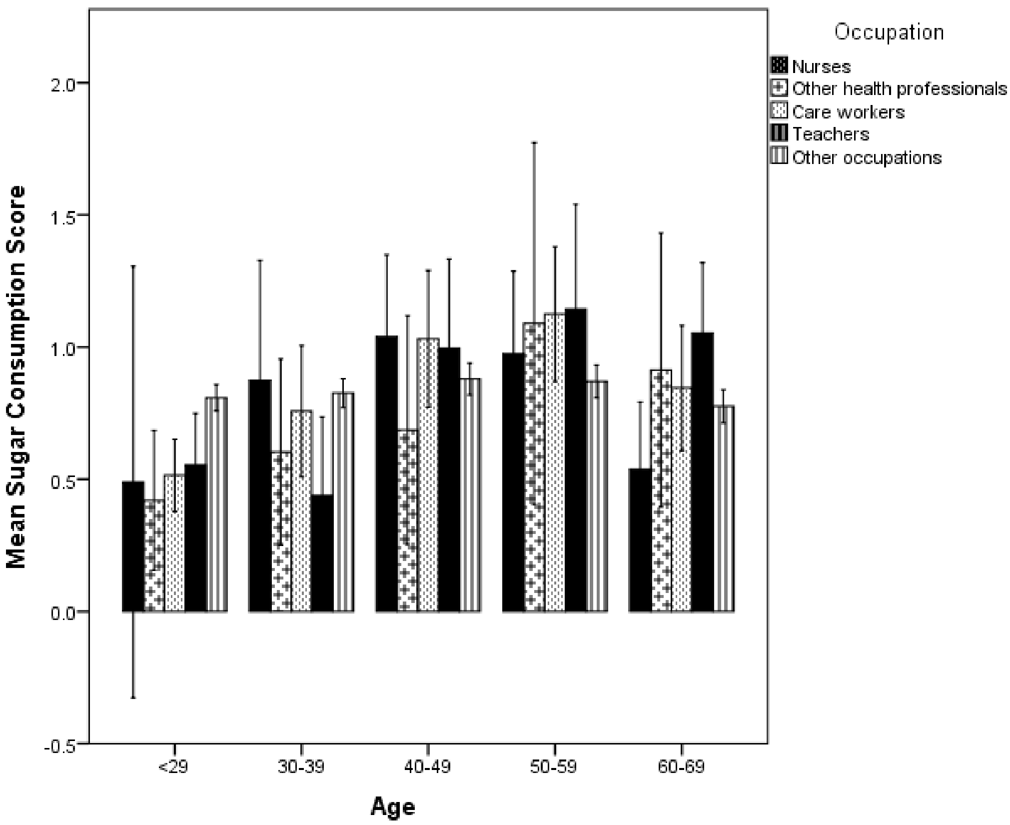



**Figure 7.16 Error Bar Chart for Mean Sugar Consumption by Age Group Nested Within Occupation.**

Sugar consumed by occupation, stratified by gender and age band

The mean sugar consumption score differed by gender and age band in the occupational groups included in the analysis, see Appendix xi Table 7.9. Among nurses, the mean score was 0.92 (SD 0.60) for females and 0.67 (SD 0.84) for males. Among females in comparator groups, the mean score was highest in care workers

(0.85, SD = 0.59) and lowest in other health professionals (0.64, SD 0.49). Among males, the mean score was highest in teachers (1.11, SD 0.72) and lowest in care workers (0.84, SD 0.64). The distribution of mean sugar consumption score in each age group by occupation is shown in Figure 7.16. Among nurses the mean score by age band is as follows: -0.49 (SD 0.37) in 17-29, 0.87 (SD 0.60) in 30-39, 1.04 (SD 0.67) in 40-49, 0.97 (0.62) in 50-59 and 0.54 (SD 0.25) in 60-69 year olds.

**Table 7.10 Prevalence of Health and Health Behaviours by Occupation.**

| | Occupational groups | | | | |
|---|---|---|---|---|---|
| | Nurses | Other health professionals | Care workers | Teachers | *Other occupations* |
| Health | | | | | |
| Poor self-assessed health (%) | 18.8 | 8.7 | 26.6 | 8.6 | 23.4 |
| Long-term illness (%) | 40.3 | 27.5 | 47.5 | 42.0 | 40.8 |
| Mental health condition (%) | 6.3 | | | 3.4 | 7.9 |
| Stress (%) | 40.0 | 35.1 | 43.3 | 40.3 | 38.4 |
| Satisfied with life (mean) | 8.1 | 8.3 | 7.6 | 8.1 | 7.7 |
| Health behaviour | | | | | |
| Smoked tobacco (%) | 22.5 | 10.9 | 47.6 | 18.8 | 57.1 |
| Physical active on ≥ 5 days/week (%) | 49.5 | 43.3 | 46.7 | 39.7 | 44.1 |
| Consumed alcohol (%) | 15.2 | 22.0 | 16.2 | 22.4 | 22.1 |
| Consumed ≥ 5 portions of fruit and vegetables/day (%) | 28.2 | 41.2 | 21.8 | 31.9 | 20.6 |
| Sugar consumption (mean) | 0.9 | 0.7 | 0.9 | 0.8 | 0.8 |

### 7.4.1 Summary of health and health behaviour prevalence by occupation

The prevalence of health and health behaviours reported by each occupational group is summaries in Table 7.10.

## 7.5 Modelling the presence of poor self-assessed health, long-term illness and mental health condition, and low satisfaction with life

The bivariate analysis above appears to show that poorer health, including fair/poor/very poor self-assessed health, long-term illness and the presence of one or more mental health conditions is unevenly distributed across society, specifically in relation to occupation. To explore the risk of poor health across occupations, age bands and gender, conducted multivariate analysis was conducted using four models: poor self-assessed health (see Table 7.11), long-term illness (see Table 7.12), mental health illness (see Table 7.13), and satisfaction with life (recoded into 1 for dissatisfied [score 0-7] and 0 for satisfied [8-10], see Table 7.14). The following baseline categories are used: 40-49 year olds, being female, nursing and midwifery professionals, non-smoker, sedentary time of 0-270 minutes a week, non-drinkers and consumed five or more portions of fruit and vegetables a day.

**Modelling the presence of poor self-assessed health**

<u>Baseline predictors of poor self-assessed health</u>

Age band ($b$ = 0.18, $t(5)$ = 19.14, $p$<0.001) was a significant predictor of poor self-assessed health. Compared to 40-49 year olds, the risk of poor self-assessed health was lower in those aged < 29 (OR = 0.49, 95% CI 0.42, 0.57, $p$ < 0.001) and 30-39 (OR

**Table 7.11 Modelling Poor Self-Assessed Health by Baseline Characteristics, Occupation and Health Behaviours.**

| | Demographics | | | Occupations | | | Tobacco smoking | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 95% CI | | | 95% CI | | | 95% CI | |
| Variable | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower |
| Baseline (40-49 years old) | [a] | | | [a] | | | [a] | | |
| <29 | .490[a] | .420 | .571 | .476[a] | .408 | .555 | .467[a] | .385 | .567 |
| 30-39 | .666[a] | .574 | .774 | .671[a] | .578 | .780 | .622[a] | .515 | .751 |
| 50-59 | 1.481[a] | 1.302 | 1.683 | 1.477[a] | 1.298 | 1.679 | 1.546[a] | 1.313 | 1.820 |
| 60-69 | 1.847[a] | 1.620 | 2.105 | 1.857[a] | 1.628 | 2.119 | 2.131[a] | 1.805 | 2.515 |
| Gender (Baseline = female) | | | | | | | | | |
| Male | .967 | .885 | 1.057 | .926 | .845 | 1.041 | .895 | .797 | 1.004 |
| Constant | .290[a] | | | | | | | | |
| Occupation (Baseline = Nurses) | | | | [a] | | | [a] | | |
| Other health professionals | | | | .474[c] | .268 | .838 | .753 | .349 | 1.625 |
| Care workers | | | | 1.651[b] | 1.159 | 2.352 | 1.470 | .931 | 2.323 |
| Teachers | | | | .398[a] | .250 | .635 | .525[c] | .277 | .995 |
| *Other occupations* | | | | 1.492[b] | 1.099 | 2.026 | 1.416 | .946 | 2.121 |
| Constant | | | | .209[a] | | | | | |
| Smoking status (Baseline = non-smoker) | | | | | | | | | |
| Smoker | | | | | | | 2.512[a] | 2.238 | 2.818 |
| Constant | | | | | | | .177[a] | | |
| Sedentary time (Baseline = 0-270.00) | | | | | | | | | |
| 275.00-360.00 | | | | | | | | | |
| 370.00-480.00 | | | | | | | | | |
| 485.00-720.00 | | | | | | | | | |
| 740.00-2460.00 | | | | | | | | | |
| Constant | | | | | | | | | |
| Drinking status (Baseline = non-drinker) | | | | | | | | | |
| Moderate | | | | | | | | | |
| Hazardous/ harmful | | | | | | | | | |
| Constant | | | | | | | | | |
| Grouped portions of fruit and veg. (Baseline = 5 portions or more) | | | | | | | | | |
| None | | | | | | | | | |
| Less than 5 portions | | | | | | | | | |
| Constant | | | | | | | | | |
| - 2 Log likelihood | | | 11935.290 | | | 11829.845 | | | 7330.098 |
| Cox & Snell R Square | | | 0.038 | | | .046 | | | .083 |
| Nagelkerke R Square | | | 0.057 | | | .071 | | | .120 |
| Hosmer and Lemeshow | | | 0.23 | | | .301 | | | .978 |
| Percentage correctly predicted | | | 77.3 | | | 77.3 | | | 73.2 |
| % correctly predicted no problem | | | 100 | | | 100 | | | 96.0 |
| % correctly predicted problem | | | 0 | | | 0 | | | 12.8 |

[a] significant at p<.001, [b] significant at p<.005, [c] significant at p<.05.

## Table 7.11 Modelling Poor Self-Assessed Health by Baseline Characteristics, Occupation and Health Behaviours Continued.

| | Physical activity | | | Alcohol consumption | | | Dietary consumption | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 95% CI | | | 95% CI | | | 95% CI | |
| Variable | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower |
| Baseline (40-49 years old) | [a] | | | [a] | | | [a] | | |
| <29 | .400[a] | .327 | .489 | .420[a] | .343 | .516 | .419[a] | .342 | .515 |
| 30-39 | .601[a] | .495 | .730 | .581[a] | .476 | .709 | .578[a] | .473 | .705 |
| 50-59 | 1.390[a] | 1.174 | 1.646 | 1.370[a] | 1.153 | 1.628 | 1.376[a] | 1.157 | 1.636 |
| 60-69 | 1.513[a] | 1.270 | 1.803 | 1.475[a] | 1.234 | 1.762 | 1.515[a] | 1.266 | 1.812 |
| Gender (Baseline = female) | | | | | | | | | |
| Male | .881[c] | .783 | .993 | .909 | .805 | 1.027 | .902 | .798 | 1.019 |
| Constant | | | | | | | | | |
| Occupation (Baseline = Nurses) | [a] | | | [a] | | | [b] | | |
| Other health professionals | .708 | .322 | 1.557 | .759 | .500 | 1.152 | .674 | .293 | 1.550 |
| Care workers | 1.474 | .924 | 2.352 | .499 | .241 | 1.036 | 1.419 | .883 | 2.279 |
| Teachers | .470[c] | .245 | .902 | 1.118 | .870 | 1.437 | .510c | .263 | .989 |
| *Other occupations* | 1.316 | .871 | 1.987 | .382[a] | .225 | .647 | 1.262 | .831 | 1.918 |
| Constant | | | | | | | | | |
| Smoking status (Baseline = non-smoker) | | | | | | | | | |
| Smoker | 2.192[a] | 1.946 | 2.470 | 2.139[a] | 1.895 | 2.416 | 2.014[a] | 1.779 | 2.279 |
| Constant | | | | | | | | | |
| Sedentary time (Baseline = 0-270.00) | [a] | | | [a] | | | [a] | | |
| 275.00-360.00 | 1.073 | .885 | 1.301 | 1.118 | .919 | 1.360 | 1.117 | .918 | 1.360 |
| 370.00-480.00 | 1.606[a] | 1.329 | 1.941 | 1.628[a] | 1.343 | 1.974 | 1.619[a] | 1.335 | 1.965 |
| 485.00-720.00 | 3.015[a] | 2.508 | 3.624 | 3.006[a] | 2.493 | 3.625 | 2.965[a] | 2.457 | 3.577 |
| 740.00-2460.00 | 4.856[a] | 3.898 | 6.048 | 4.815[a] | 3.846 | 6.029 | 4.733[a] | 3.778 | 5.931 |
| Constant | .129[a] | | | | | | | | |
| Drinking status (Baseline = non-drinker) | | | | [a] | | | [a] | | |
| Moderate | | | | .413[a] | .347 | .492 | .422[a] | .354 | 0.503 |
| Hazardous/ harmful | | | | .345[a] | .283 | .421 | .350[a] | .287 | 0.428 |
| Constant | | | | .378[a] | | | | | |
| Grouped portions of fruit and veg. (Baseline = 5 portions or more) | | | | | | | [a] | | |
| None | | | | | | | 1.860[a] | 1.496 | 2.314 |
| Less than 5 portions | | | | | | | 1.196[c] | 1.018 | 1.404 |
| Constant | | | | | | | .247[a] | | |
| - 2 Log likelihood | | | 6954.288 | | | 6734.497 | | | 6701.566 |
| Cox & Snell R Square | | | .128 | | | .145 | | | .150 |
| Nagelkerke R Square | | | .186 | | | .211 | | | .217 |
| Hosmer and Lemeshow | | | .004 | | | .048 | | | .289 |
| Percentage correctly predicted | | | 75.5 | | | 76.7 | | | 77.0 |
| % correctly predicted no problem | | | 94.0 | | | 93.3 | | | 93.7 |
| % correctly predicted problem | | | 25.8 | | | 32.0 | | | 32.1 |

[a] significant at p<.001, [b] significant at p<.005, [c] significant at p<.05.

= 0.67, 95% CI 0.57, 0.77, $p < 0.001$). Those aged 50-59 (OR = 1.48, 95% CI 1.30, 1.68, $p < 0.001$) and 60-69 (OR = 1.85, 95% CI 1.62, 2.11, $p < 0.001$) were at greater risk. No significance was seen between females and males ($p > 0.05$). Age band and gender also explained a significant proportion of variance in poor self-assessed health, Cox and Snell $R^2 = 0.038$, $F(2, 11256) = 183.32$, $p<0.001$.

<u>Baseline characteristics and occupation predictors of poor self-assessed health</u>

Age band ($b = 0.18$, $t(5) = 19.25$, $p<0.001$) and occupation ($b = 0.05$, $t(2) = 5.11$, $p < 0.001$) were significant predictors in the model of poor self-assessed health. For example, compared to nurses, other health professionals (OR = 0.47, 95% CI 0.27, 0.84, $p < 0.05$) and teachers (OR = 0.40, 95% CI 0.25, 0.64, $p < 0.01$) were half as likely to report poor self-assessed health. Care workers (OR = 1.65, 95% CI 1.16, 2.35, $p < 0.005$) and those in *other occupations* (OR = 1.49, 95% CI 1.10, 2.03, $p < 0.005$) were one and a half times more likely to report poor self-assessed health compared to nurses. Age band, gender and occupation also explained a significant proportion of variance in poor self-assessed health, Cox and Snell $R^2 = 0.046$, $F(3, 11255) = 131.20$, $p < 0.001$.

<u>Baseline characteristics, occupation and tobacco smoking status predictors of poor self-assessed health</u>

The variables age band ($b = 0.21$, $t(5) = 17.52$, $p<0.001$), gender ($b = -0.03$, $t(2) = -2.36$, $p = 0.18$), occupation ($b = 0.04$, $t(8) = 2.87$, $p = 0.004$) and tobacco smoking ($b = 0.20$, $t(2) = 16.60$, $p<0.001$) were significant predictors of poor self-assessed health. Smokers were 2.51 times more likely to report poor-self assessed health (95% CI 2.24, 2.82, $p < 0.001$). Age band, gender, occupation and smoking status also explained a significant proportion of variance in poor self-assessed health, Cox and Snell $R^2 = 0.083$, $F(4, 6709) = 132.51$, $p<0.001$.

<u>Baseline characteristics, occupation, tobacco smoking status and sedentary time predictors of poor self-assessed health</u>

The variables age band ($b = 0.16$, $t(5) = 13.19$, $p<0.001$), gender ($b = -0.03$, $t(2) = -2.45$, $p = 0.014$), occupation ($b = 0.03$, $t(8) = 2.11$, $p = 0.035$), tobacco smoking ($b = 0.16$, $t(2) = 13.98$, $p<0.001$) and sedentary time ($b = 0.23$, $t(2) = 19.49$, $p<0.001$) were significant predictors of poor self-assessed health. The more sedentary time an individual had the greater the risk of reporting poor-self assessed health (370-480 [OR = 1.61, 95% CI 1.33, 1.94, $p < 0.001$], 485-720 [OR = 3.02, 95% CI 2.51, 3.62, $p < 0.001$], 740-2460 [OR = 4.86, 95% CI 3.90, 6.05, $p < 0.001$]). Age band, gender, occupation, smoking status and sedentary time also explained a significant proportion of variance in poor self-assessed health, Cox and Snell $R^2 = 0.128$ $F(5, 6693) = 186.56$, $p<0.001$.

<u>Baseline characteristics, occupation, tobacco smoking status, sedentary time and alcohol consumption predictors of poor self-assessed health</u>

The variables age band ($b = 0.15$, $t(5) = 12.89$, $p<0.001$), occupation ($b = 0.03$, $t(8) = 2.28$, $p = 0.023$), tobacco smoking ($b = 0.16$, $t(2) = 13.82$, $p<0.001$), sedentary time ($b = 0.23$, $t(2) = 19.17$, $p<0.001$) and alcohol consumption ($b = -0.12$, $t(2) = -10.69$, $p<0.001$) were significant predictors of poor self-assessed health. Compared to non-drinkers, moderate (OR = 0.41, 95% CI 0.35, 0.49, $p < 0.001$) and hazardous/harmful

(OR = 0.35, 95% CI 0.28, 0.42, $p < 0.001$) drinkers were less than half as likely to report poor self-assessed health. Age band, gender, occupation, smoking status, sedentary time and alcohol consumption also explained a significant proportion of variance in poor self-assessed health, Cox and Snell $R^2 = 0.145$, $F(6, 6630) = 176.63$, $p<0.001$.

<u>Baseline characteristics, occupation, tobacco smoking status, sedentary time, alcohol consumption and fruit and vegetable intake predictors of poor self-assessed health</u>

The variables age band ($b = 0.16$, $t(5) = 13.21$, $p<0.001$), gender ($b = -0.02$, $t(2) = -1.97$, $p = 0.049$), occupation ($b = 0.02$, $t(8) = 1.98$, $p = 0.048$), tobacco smoking ($b = 0.15$, $t(2) = 12.43$, $p<0.001$), sedentary time ($b = 0.22$, $t(2) = 18.89$, $p<0.001$), alcohol consumption ($b = -0.12$, $t(2) = -10.63$, $p<0.001$) and fruit and vegetable intake ($b = -0.07$, $t(2) = -6.10$, $p<0.001$) were significant predictors of poor self-assessed health. Compared to individuals consuming five or more portions of fruit and vegetables a day, those no portions (OR = 1.86, 95% CI 1.50, 2.31, $p < 0.001$) and less than five portions (OR = 1.20, 95% CI 1.02, 1.40, $p < 0.05$) significantly more likely to report poor self-assessed health. Age band, gender, occupation, smoking status, sedentary time, alcohol consumption and fruit and vegetable intake also explained a significant proportion of variance in poor self-assessed health, Cox and Snell $R^2 = 0.150$, $F(7, 6629) = 2157.54$, $p<0.001$. While this model was a good fit – Hosmer-Lemeshow ≥ 0.05 – the chi-squared statistic in which it is based is dependent on the sample size which is low in this analysis.

**Modelling the presence of a long-term illness**

Baseline predictors of a long-term illness

Age band ($b$ = 0.29, $t(5)$ = 31.61, $p<0.001$) and gender ($b$ = -0.03, $t(2)$ = -3.29, $p$ = 0.001) were significant predictors of a long-term illness. Compared to 40-49 year olds, the risk of reporting a long-term illness was lower in those aged < 29 (OR = 0.55, 95% CI 0.48, 0.62, $p < 0.001$) and 30-39 (OR = 0.72, 95% CI 0.64, 0.82, $p < 0.001$). Those aged 50-59 (OR = 1.84, 95% CI 1.65 2.06, $p < 0.001$) and 60-69 (OR = 3.00, 95% CI 2.67, 3.36, $p < 0.001$) were at greater risk. Males were 0.87 times less likely than females to report a long-term illness (OR = 0.87, 95% CI 0.81, 0.95, $p < 0.005$. Age band and gender also explained a significant proportion of variance in the prevalence of a long-term illness, Cox and Snell $R^2$ = 0.083, $F(2, 11251)$ = 502.39, $p<0.001$.

Baseline characteristics and occupation predictors of a long-term illness

Significant predictors in the model of a long-term illness were age band ($b$ = 0.29, $t(5)$ = 31.62, $p<0.001$) and gender ($b$ = -0.03, $t(2)$ = -3.46, $p$ = 0.001). For example, compared to nurses, care workers were 1.34 times more likely to report a long-term condition (95% CI 1.01, 1.78, $p < 0.05$). Age band, gender and occupation also explained a significant proportion of variance in the prevalence of a long-term illness, Cox and Snell $R^2$ = 0.084, $F(3, 11250)$ = 335.37, $p<0.001$.

## Table 7.12 Modelling the Presence of a Long-Term Illness by Baseline Characteristics, Occupation and Health Behaviours.

| | Demographics | | | Occupations | | | Tobacco smoking | | | Physical activity | | | Alcohol consumption | | | Dietary consumption | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 95% CI | | | 95% CI | | | 95% CI | | | 95% CI | | | 95% CI | | | 95% CI | |
| Variable | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower |
| Baseline (40-49 years old) | [a] | | | [a] | | | [a] | | | [a] | | | [a] | | | [a] | | |
| <29 | .545[a] | .476 | .624 | .540[a] | .472 | .618 | .506[a] | .424 | .604 | .463[a] | .387 | .555 | .464[a] | .386 | .558 | .465[a] | .386 | .559 |
| 30-39 | .720[a] | .636 | .816 | .723[a] | .638 | .819 | .716[a] | .610 | .840 | .705[a] | .599 | .829 | .697[a] | .591 | .821 | .696[a] | .590 | .821 |
| 50-59 | 1.842[a] | 1.646 | 2.062 | 1.840[a] | 1.644 | 2.059 | 1.812[a] | 1.565 | 2.098 | 1.662[a] | 1.431 | 1.931 | 1.649[a] | 1.417 | 1.918 | 1.654[a] | 1.422 | 1.925 |
| 60-69 | 2.998[a] | 2.672 | 3.363 | 2.992[a] | 2.666 | 3.358 | 2.986[a] | 2.575 | 3.463 | 2.331[a] | 1.998 | 2.720 | 2.275[a] | 1.947 | 2.659 | 2.297[a] | 1.965 | 2.686 |
| Gender (Baseline = female) | | | | | | | | | | | | | | | | | | |
| Male | .873[b] | .807 | .945 | .873[b] | .805 | .946 | .824[a] | .742 | .914 | .818[a] | .735 | .909 | .835[b] | .750 | .931 | .832[b] | .747 | .927 |
| Constant | .642[a] | | | | | | | | | | | | | | | | | |
| Occupation (Baseline = Nurses) | | | | [b] | | | | | | [c] | | | | | | | | |
| Other health professionals | | | | .704 | .479 | 1.034 | .978 | .551 | 1.738 | .979 | .546 | 1.755 | .981 | .712 | 1.351 | 1.073 | .595 | 1.939 |
| Care workers | | | | 1.342[c] | 1.014 | 1.777 | 1.243 | .863 | 1.792 | 1.261 | .871 | 1.827 | 1.055 | .636 | 1.749 | 1.240 | .852 | 1.803 |
| Teachers | | | | .952 | .700 | 1.296 | .690 | .439 | 1.084 | .652 | .412 | 1.031 | 1.223 | .983 | 1.521 | .694 | .437 | 1.102 |
| *Other occupations* | | | | 1.102 | .872 | 1.394 | 1.072 | .785 | 1.466 | 1.028 | .749 | 1.412 | .679[c] | .480 | .961 | 1.015 | .737 | 1.399 |
| Constant | | | | .586[a] | | | | | | | | | | | | | | |
| Smoking status (Baseline = non-smoker) | | | | | | | | | | | | | | | | | | |
| Smoker | | | | | | | 1.492[a] | 1.344 | 1.657 | 1.319[a] | 1.184 | 1.469 | 1.275[a] | 1.143 | 1.423 | 1.257[a] | 1.125 | 1.405 |
| Constant | | | | | | | .602[b] | | | | | | | | | | | |
| Sedentary time (Baseline = 0-270.00) | | | | | | | | | | [a] | | | [a] | | | [a] | | |
| 275.00-360.00 | | | | | | | | | | 1.182[c] | 1.017 | 1.374 | 1.220[c] | 1.048 | 1.421 | 1.222[c] | 1.049 | 1.424 |
| 370.00-480.00 | | | | | | | | | | 1.444[a] | 1.237 | 1.686 | 1.465[a] | 1.252 | 1.713 | 1.467[a] | 1.254 | 1.716 |
| 485.00-720.00 | | | | | | | | | | 2.193[a] | 1.870 | 2.571 | 2.165[a] | 1.842 | 2.543 | 2.158[a] | 1.837 | 2.537 |
| 740.00-2460.00 | | | | | | | | | | 3.779[a] | 3.060 | 4.667 | 3.732[a] | 3.012 | 4.626 | 3.713[a] | 2.995 | 4.602 |
| Constant | | | | | | | | | | .477[a] | | | | | | | | |
| Drinking status (Baseline = non-drinker) | | | | | | | | | | | | | [a] | | | [a] | | |
| Moderate | | | | | | | | | | | | | .469[a] | .395 | .558 | .472[a] | .396 | .561 |
| Hazardous/ harmful | | | | | | | | | | | | | .443[a] | .365 | .536 | .445[a] | .367 | .539 |
| Constant | | | | | | | | | | | | | .970 | | | | | |
| Grouped portions of fruit and veg. (Baseline = 5 portions or more) | | | | | | | | | | | | | | | | | | |
| None | | | | | | | | | | | | | | | | 1.168 | .957 | 1.426 |
| Less than 5 portions | | | | | | | | | | | | | | | | .961 | .843 | 1.096 |
| Constant | | | | | | | | | | | | | | | | .966 | | |
| - 2 Log likelihood | | | 14437.973 | | | 14421.382 | | | 8654.883 | | | 8413.779 | | | 8241.657 | | | 8236.623 |
| Cox & Snell R Square | | | .083 | | | .084 | | | .089 | | | .118 | | | .131 | | | .131 |
| Nagelkerke R Square | | | .111 | | | .113 | | | .119 | | | .158 | | | .175 | | | .175 |
| Percentage correctly predicted | | | 63.9 | | | 64.1 | | | 63.5 | | | 64.9 | | | 65.8 | | | 65.9 |

[a] significant at p<.05, [b] significant at p<.005, [c] significant at p<.001.

Baseline characteristics, occupation and tobacco smoking status predictors of a long-term illness

The variables age band ($b$ = 0.29, $t(5)$ = 24.80, $p$<0.001), gender ($b$ = -0.05, $t(2)$ = -3.72, $p$<0.001) and tobacco smoking ($b$ = 0.09, $t(2)$ = 7.79, $p$<0.001) were significant predictors of a long-term illness. Smokers were 1.49 times more likely to report a long-term illness (95% CI 1.34, 1.66, $p$ < 0.001). Age band, gender, occupation and smoking status also explained a significant proportion of variance in the prevalence of a long-term illness, Cox and Snell $R^2$ = 0.089, $F(4, 6707)$ = 160.51, $p$<0.001.

Baseline characteristics, occupation, tobacco smoking status and sedentary time predictors of a long-term illness

The variables age band ($b$ = 0.25, $t(5)$ = 21.25, $p$<0.001), gender ($b$ = -0.04, $t(2)$ = -3.73, $p$<0.001), tobacco smoking ($b$ = 0.07, $t(2)$ = 5.63, $p$<0.001) and sedentary time ($b$ = 0.18, $t(2)$ = 14.85, $p$<0.001) were significant predictors of a long-term illness. The more sedentary time an individual had the greater the risk of reporting a long-term illness (275-360 [OR = 1.18, 95% CI 1.02, 1.37, $p$ < 0.05], 370-480 [OR = 1.44, 95% CI 1.24, 1.69, $p$ < 0.001], 485-720 [OR = 2.19, 95% CI 1.87, 2.57, $p$ < 0.001], 740-2460 [OR = 3.78, 95% CI 3.06, 4.67, $p$ < 0.001]). Age band, gender, occupation, smoking status and sedentary time also explained a significant proportion of variance the prevalence of a long-term illness, Cox and Snell $R^2$ = 0.118, $F(5, 6691)$ = 176.18, $p$<0.001.

Baseline characteristics, occupation, tobacco smoking status, sedentary time and alcohol consumption predictors a long-term illness

The variables age band ($b$ = 0.25, $t(5)$ = 21.06, $p$<0.001), gender ($b$ = -0.04, $t(2)$ = -3.15, $p$ = 0.002), tobacco smoking ($b$ = 0.06, $t(2)$ = 5.39, $p$<0.001), sedentary time ($b$ = 0.17, $t(2)$ = 14.59, $p$<0.001) and alcohol consumption ($b$ = -0.08, $t(2)$ = -7.31, $p$<0.001) were significant predictors of a long-term illness. Compared to non-drinkers, moderate (OR = 0.47, 95% CI 0.40, 0.56, $p$ < 0.001) and hazardous/harmful (OR = 0.44, 95% CI 0.37, 0.54, $p$ < 0.001) drinkers were less than half as likely to report a long-term illness. Age band, gender, occupation, smoking status, sedentary time and alcohol consumption also explained a significant proportion of variance the prevalence of a long-term illness, Cox and Snell $R^2$ = 0.131, $F(6, 6628)$ = 157.18, $p$<0.001.

Baseline characteristics, occupation, tobacco smoking status, sedentary time, alcohol consumption and fruit and vegetable intake predictors of a long-term illness

The variables age band ($b$ = 0.25, $t(5)$ = 21.11, $p$<0.001), gender ($b$ = -0.04, $t(2)$ = -3.18, $p$ = 0.001), tobacco smoking ($b$ = 0.06, $t(2)$ = 5.00, $p$<0.001), sedentary time ($b$ = 0.17, $t(2)$ = 14.50, $p$<0.001) and alcohol consumption ($b$ = -0.08, $t(2)$ = -7.29, $p$<0.001) were significant predictors of a long-term illness. Compared to individuals consuming five or more portions of fruit and vegetables a day, those no portions (OR = 1.84, 95% CI 1.48, 2.29, $p$ < 0.001) and less than five portions (OR = 1.24, 95% CI 1.24, 1.06, $p$ < 0.05) significantly more likely to report a long-term illness. Age band, gender, occupation, smoking status, sedentary time, alcohol consumption and fruit and vegetable intake also explained a significant proportion of variance in the prevalence of a long-term illness, Cox and Snell $R^2 = 0.131$, $F(7, 6627) = 135.07$, $p<0.001$. This model was not a good fit, Hosmer-Lemeshow < 0.05.

**Modelling the presence of a mental health condition**

Baseline predictors of a mental health condition

Gender ($b = -0.06$, $t(2) = -6.28$, $p<0.001$) was shown to be a significant predictor of the presence of a mental health problem and age band was not ($b = -0.01$, $t(2) = -0.06$, $p = 0.953$). Compared to 40-49 year olds, the risk of a mental health problem 0.54 times lower in those aged < 29 (95% CI 0.43, 0.67, $p < 0.001$) and 0.63 in 60-69 year olds (95% CI 0.50, 0.79, $p < 0.001$). Males were 0.67 times less likely to report a mental health condition compared to females (95% CI 0.59, 0.78, $p < 0.001$). Age band and gender also explained a significant proportion of variance in the prevalence of a mental health condition, Cox and Snell $R^2 = 0.007$, $F(2, 11251) = 19.73$, $p<0.001$.

Baseline characteristics and occupation predictors of a mental health condition

Significant predictors in the model of a mental health condition were gender ($b = -0.06$, $t(2) = -6.66$, $p<0.001$) and occupation ($b = 0.02$, $t(8) = 2.45$, p = 0.14). Age band, gender and occupation also explained a significant proportion of variance in the prevalence of a mental health condition, Cox and Snell $R^2 = 0.010$, $F(3, 11250) = 15.16$, $p<0.001$.

## Table 7.13 Modelling a Mental Health Condition by Baseline Characteristics, Occupation and Health Behaviours.

| | Demographics | | | Occupations | | | Tobacco smoking | | | Physical activity | | | Alcohol consumption | | | Dietary consumption | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 95% CI | | | 95% CI | | | 95% CI | | | 95% CI | | | 95% CI | | | 95% CI | |
| Variable | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower |
| Baseline (40-49 years old) | a | | | a | | | a | | | a | | | a | | | a | | |
| <29 | .538[a] | .431 | .671 | .522[a] | .418 | .652 | .494[a] | .374 | .651 | .449[a] | .339 | .595 | .488[a] | .367 | .649 | .488[a] | .366 | .649 |
| 30-39 | .921 | .753 | 1.125 | .928 | .759 | 1.136 | 1.008 | .792 | 1.284 | 1005 | .785 | 1.286 | .990 | .769 | 1.274 | .992 | .770 | 1.277 |
| 50-59 | .899 | .740 | 1.092 | .892 | .733 | 1.084 | .874 | .688 | 1.110 | .783[c] | .613 | 1.001 | .746[c] | .581 | .958 | .746[c] | .580 | .958 |
| 60-69 | .628[a] | .502 | .786 | .623[a] | .798 | .780 | .623[a] | .475 | .818 | .437[a] | .329 | .580 | .412[a] | .309 | .548 | .423[a] | .317 | .563 |
| Gender (Baseline = female) | | | | | | | | | | | | | | | | | | |
| Male | .674[a] | .586 | .775 | .645[a] | .559 | .744 | .570[a] | .479 | .677 | .543[a] | .455 | .647 | .559[a] | .467 | .668 | .550[a] | .459 | .658 |
| Constant | .125[a] | | | | | | | | | | | | | | | | | |
| Occupation (Baseline = Nurses) | | | | a | | | c | | | c | | | c | | | | | |
| Other health professionals | | | | .421 | .153 | 1.156 | 1.677 | .485 | 5.801 | 1.612 | .461 | 5.640 | .398[c] | .184 | .863 | 1.917 | .547 | 6.715 |
| Care workers | | | | 1.876[c] | 1.081 | 3.254 | 2.395[c] | 1.047 | 5.478 | 2.438[c] | 1.060 | 5.607 | .748 | .275 | 2.030 | 2.330[c] | 1.008 | 5.385 |
| Teachers | | | | .597 | .286 | 1.246 | 1.124 | .368 | 3.428 | 1.025 | .334 | 3.146 | .953 | .668 | 1.360 | 1.110 | .359 | 3.427 |
| *Other occupations* | | | | 1.713[c] | 1.054 | 2.784 | 2.705[c] | 1.257 | 5.820 | 2.555[c] | 1.183 | 5.519 | .431[c] | .187 | .995 | 2.432[c] | 1.121 | 5.277 |
| Constant | | | | .079[a] | | | | | | | | | | | | | | |
| Smoking status (Baseline = non-smoker) | | | | | | | | | | | | | | | | | | |
| Smoker | | | | | | | 2.298[a] | 1.936 | 2.729 | 1.972[a] | 1.654 | 2.351 | 1.882[a] | 1.574 | 2.250 | 1.777[a] | 1.482 | 2.132 |
| Constant | | | | | | | .042[a] | | | | | | | | | | | |
| Sedentary time (Baseline = 0-270.00) | | | | | | | | | | a | | | a | | | a | | |
| 275.00-360.00 | | | | | | | | | | 1.326 | .969 | 1.815 | 1.399[c] | 1.017 | 1.924 | 1.403[c] | 1.019 | 1.931 |
| 370.00-480.00 | | | | | | | | | | 2.291[a] | 1.702 | 3.084 | 2.378[a] | 1.758 | 3.217 | 2.364[a] | 1.746 | 3.200 |
| 485.00-720.00 | | | | | | | | | | 3.129[a] | 2.335 | 4.194 | 3.114[a] | 2.312 | 4.193 | 3.079[a] | 2.285 | 4.149 |
| 740.00-2460.00 | | | | | | | | | | 5.018[a] | 3.640 | 6.919 | 4.829[a] | 3.481 | 6.699 | 4.733[a] | 3.409 | 6.570 |
| Constant | | | | | | | | | | .025[a] | | | | | | | | |
| Drinking status (Baseline = non-drinker) | | | | | | | | | | | | | a | | | a | | |
| Moderate | | | | | | | | | | | | | .410[a] | .327 | .512 | .421[a] | .336 | .528 |
| Hazardous/ harmful | | | | | | | | | | | | | .381[a] | .292 | .497 | .389[a] | .298 | .509 |
| Constant | | | | | | | | | | | | | .139[a] | | | | | |
| Grouped portions of fruit and veg. (Baseline = 5 portions or more) | | | | | | | | | | | | | | | | a | | |
| None | | | | | | | | | | | | | | | | 1.729[a] | 1.276 | 2.344 |
| Less than 5 portions | | | | | | | | | | | | | | | | 1.075 | .840 | 1.376 |
| Constant | | | | | | | | | | | | | | | | .051[a] | | |
| - 2 Log likelihood | | | 6198.152 | | | 6159974 | | | 3975.319 | | | 3814.315 | | | 3692.255 | | | 3674.899 |
| Cox & Snell R Square | | | .007 | | | .010 | | | .028 | | | .048 | | | .056 | | | .059 |
| Nagelkerke R Square | | | .016 | | | .024 | | | .060 | | | .104 | | | .123 | | | .128 |
| Hosmer and Lemeshow | | | .509 | | | .273 | | | .049 | | | .234 | | | .499 | | | .788 |
| Percentage correctly predicted | | | 92.3 | | | 92.3 | | | 90.7 | | | 90.8 | | | 90.8 | | | 90.7 |
| % correctly predicted no condition | | | 100 | | | 100 | | | 100 | | | 100 | | | 99.9 | | | 99.8 |
| % correctly predicted with condition | | | 0 | | | 0 | | | 0 | | | 0 | | | 0.7 | | | 1.2 |

[a] significant at p<.001, [b] significant at p<.005, [c] significant at p<.05.

Baseline characteristics, occupation and tobacco smoking status predictors of a mental health condition

The variables gender ($b$ = -0.09, $t(2)$ = -6.91, $p$<0.001), occupation ($b$ = 0.03, $t(8)$ = 2.06, $p$ = 0.039) and tobacco smoking ($b$ = 0.13, $t(2)$ = 10.58, $p$<0.001) were significant predictors of a mental health condition. Smokers were 2.30 times more likely to report a mental health condition compared to non-smokers (95% CI 1.94, 2.73, $p$ < 0.001). Age band, gender, occupation and smoking status also explained a significant proportion of variance in the prevalence of a mental health condition, Cox and Snell $R^2$ = 0.028, $F(4, 6707)$ = 40.878, $p$<0.001.

Baseline characteristics, occupation, tobacco smoking status and sedentary time predictors of a mental health condition

The variables age band ($b$ = -0.03, $t(5)$ = -2.60, $p$ = 0.009), gender ($b$ = -0.09, $t(2)$ = -7.08, $p$<0.001), tobacco smoking ($b$ = 0.11, $t(2)$ = 8.94, $p$<0.001) and sedentary time ($b$ = 0.14, $t(2)$ = 11.00, $p$<0.001) were significant predictors of a mental health problem. The more sedentary time an individual had the greater the risk of reporting poor-self assessed health (370-480 [OR = 2.29, 95% CI 1.70, 3.08, $p$ < 0.001], 485-720 [OR = 3.13, 95% CI 2.34, 4.19, $p$ < 0.001], 740-2460 [OR = 5.02, 95% CI 3.64, 6.92, $p$ < 0.001]). Age band, gender, occupation, smoking status and sedentary time also explained a significant proportion of variance in the prevalence of a mental health condition, Cox and Snell $R^2$ = 0.048, $F(5, 6691)$ = 57.32, $p$<0.001.

Baseline characteristics, occupation, tobacco smoking status, sedentary time and alcohol consumption predictors of a mental health condition

The variables age band (*b* = -0.04, *t*(5) = -2.87, *p* = 0.004), gender (*b* = -0.08, *t*(2) = -6.70, *p*<0.001), tobacco smoking (*b* = 0.11, *t*(2) = 8.66, *p*<0.001), sedentary time (*b* = 0.13, *t*(2) = 10.83, *p*<0.001) and alcohol consumption (*b* = -0.08, *t*(2) = -6.50, *p*<0.001) were significant predictors of poor self-assessed health. Compared to non-drinkers, moderate (OR = 0.41, 95% CI 0.33, 0.51, *p* < 0.001) and hazardous/harmful (OR = 0.38, 95% CI 0.29, 0.50, *p* < 0.001) drinkers were less than half as likely to report poor self-assessed health. Age band, gender, occupation, smoking status, sedentary time and alcohol consumption also explained a significant proportion of variance in the prevalence of a mental health condition, Cox and Snell $R^2$ = 0.056, *F*(6, 6628) = 54.84, *p*<0.001.

Baseline characteristics, occupation, tobacco smoking status, sedentary time, alcohol consumption and fruit and vegetable intake predictors of a mental health condition

The variables age band (*b* = -0.03, *t*(5) = -2.68, p = 0.007), gender (*b* = -0.08, *t*(2) = -6.78, *p*<0.001), tobacco smoking (*b* = 0.10, *t*(2) = 7.81, *p*<0.001), sedentary time (*b* = 0.13, *t*(2) = 10.64, *p*<0.001), alcohol consumption (*b* = -0.08, *t*(2) = -6.48, *p*<0.001) and fruit and vegetable intake (*b* = -0.05, *t*(2) = -3.66, *p*<0.001) were significant predictors of a mental health condition. Compared to individuals consuming five or more portions of fruit and vegetables a day, those no portions of fruit and vegetables were significantly more likely to report a mental health condition (OR = 1.73, 95% CI 1.28, 2.34, *p* < 0.001). Age band, gender, occupation, smoking status, sedentary time, alcohol consumption and fruit and vegetable intake also explained a significant proportion of variance in the prevalence of a mental health condition, Cox and Snell $R^2$ = 0.059, $F(7, 6627)$ = 49.00, $p$<0.001. While this model was a good fit – Hosmer-Lemeshow ≥ 0.05 – the chi-squared statistic in which it is based is dependent on the sample size which is low in this analysis.

**Modelling the presence of low satisfaction with life**

Baseline predictors of low satisfaction with life

Age band and gender were significant predictors of low satisfaction with life, $p > 0.05$. Compared to 40-49 year olds, the risk of reporting low satisfaction with life was lower In those aged < 29 (OR = 0.80, 95% CI 0.70, 0.89, $p < 0.001$), 30-39 (OR = 0.83, 95% CI 0.73, 0.93, $p < 0.005$) and 60-69 (OR = 0.66, 95% CI 0.58, 0.74, $p < 0.001$). Age band and gender did not explain a significant proportion of variance in the prevalence of low satisfaction with life, Cox and Snell $R^2$ 0.006, $F(2, 11236)$ = 0.89, $p$ = 0.410.

Baseline characteristics and occupation predictors of low satisfaction with life

Occupation was the only significant predictor of low satisfaction with life ($b$ = 0.05, $t(8)$ = 5.28, $p$<0.001). For example, compared to nurses, care workers were 1.93 times (95% CI 1.41, 2.64, $p < 0.001$) and *other occupations* 1.81 times (95% CI 1.38, 2.37, $p < 0.001$) more likely to report low satisfaction with life. Age band, gender and occupation also explained a significant proportion of variance in the prevalence of low satisfaction with life, Cox and Snell $R^2$ = 0.012, $F(3, 11235)$ = 9.89, $p$<0.001.

# Table 7.14 Modelling the Presence of Low Satisfaction with Life by Baseline Characteristics, Occupation and Health Behaviours.

| | Demographics | | | Occupations | | | Tobacco smoking | | | Physical activity | | | Alcohol consumption | | | Dietary consumption | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 95% CI | | | 95% CI | | | 95% CI | | | 95% CI | | | 95% CI | | | 95% CI | |
| Variable | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower | Odds | Upper | Lower |
| Baseline (40-49 years old) | [a] | | | [a] | | | [a] | | | [a] | | | [a] | | | [a] | | |
| <29 | .789[a] | .702 | .886 | .766[a] | .682 | .861 | .785[b] | .671 | .917 | .743[a] | .635 | .870 | .761[b] | .649 | .893 | .759[b] | .646 | .890 |
| 30-39 | .828[b] | .734 | .934 | .832[b] | .737 | .939 | .863 | .737 | 1.010 | .855[c] | .729 | 1.002 | .849[c] | .723 | .997 | .842[c] | .717 | .989 |
| 50-59 | 1.004 | .896 | 1.126 | .997 | .889 | 1.118 | 1.030 | .886 | 1.197 | .965 | .828 | 1.124 | .950 | .815 | 1.108 | .951 | .815 | 1.110 |
| 60-69 | .657[a] | .581 | .744 | .651[a] | .574 | .737 | .683[a] | .584 | .800 | .561[a] | .475 | .661 | .545[a] | .462 | .644 | .555[a] | .470 | .656 |
| Gender (Baseline = female) | | | | | | | | | | | | | | | | | | |
| Male | .996 | .922 | 1.075 | .953 | .881 | 1.031 | .932 | .841 | 1.033 | .932 | .840 | 1.033 | .955 | .860 | 1.060 | .949 | .855 | 1.055 |
| Constant | .643[a] | | | | | | | | | | | | | | | | | |
| Occupation (Baseline = Nurses) | | | | [a] | | | [a] | | | [a] | | | [a] | | | [a] | | |
| Other health professionals | | | | .736 | .475 | 1.140 | 1.311 | .700 | 2.453 | 1.287 | .684 | 2.423 | .519[b] | .356 | .757 | 1.286 | .674 | 2.454 |
| Care workers | | | | 1.928[a] | 1.406 | 2.643 | 1.805[c] | 1.184 | 2.753 | 1.808[c] | 1.182 | 2.765 | .654 | .383 | 1.115 | 1.757[c] | 1.147 | 2.692 |
| Teachers | | | | .929 | .650 | 1.329 | .879 | .513 | 1.505 | .842 | .490 | 1.448 | .940 | .752 | 1.175 | .887 | .515 | 1.528 |
| *Other occupations* | | | | 1.807[a] | 1.376 | 2.372 | 1.968[a] | 1.355 | 2.857 | 1.915[b] | 1.315 | 2.788 | .457[a] | .305 | .685 | 1.872[b] | 1.284 | 2.729 |
| Constant | | | | .383[a] | | | | | | | | | | | | | | |
| Smoking status (Baseline = non-smoker) | | | | | | | | | | | | | | | | | | |
| Smoker | | | | | | | 2.047[a] | 1.849 | 2.266 | 1.897[a] | 1.711 | 2.103 | 1.881[a] | 1.695 | 2.088 | 1.789[a] | 1.617 | 1.999 |
| Constant | | | | | | | .305[a] | | | | | | | | | | | |
| Sedentary time (Baseline = 0-270.00) | | | | | | | | | | [a] | | | [a] | | | [a] | | |
| 275.00-360.00 | | | | | | | | | | .900 | .774 | 1.047 | .928 | .797 | 1.080 | .925 | .794 | 1.078 |
| 370.00-480.00 | | | | | | | | | | 1.316[a] | 1.128 | 1.534 | 1.335[a] | 1.143 | 1.558 | 1.327[a] | 1.136 | 1.550 |
| 485.00-720.00 | | | | | | | | | | 1.603[a] | 1.372 | 1.874 | 1.583[a] | 1.353 | 1.853 | 1.565[a] | 1.337 | 1.833 |
| 740.00-2460.00 | | | | | | | | | | 2.247[a] | 1.845 | 2.737 | 2.249[a] | 1.841 | 2.748 | 2.203[a] | 1.802 | 2.693 |
| Constant | | | | | | | | | | .277[a] | | | | | | | | |
| Drinking status (Baseline = non-drinker) | | | | | | | | | | | | | [a] | | | [a] | | |
| Moderate | | | | | | | | | | | | | .645[a] | .547 | .760 | .658[a] | .558 | .776 |
| Hazardous/ harmful | | | | | | | | | | | | | .541[a] | .450 | .649 | .549[a] | .457 | .660 |
| Constant | | | | | | | | | | | | | .808[c] | | | | | |
| Grouped portions of fruit and veg. (Baseline = 5 portions or more) | | | | | | | | | | | | | | | | [a] | | |
| None | | | | | | | | | | | | | | | | 1.655[a] | 1.369 | 2.003 |
| Less than 5 portions | | | | | | | | | | | | | | | | 1.113 | .973 | 1.273 |
| Constant | | | | | | | | | | | | | | | | .380[a] | | |
| - 2 Log likelihood | | | 14941.362 | | | 14862.979 | | | 8757.948 | | | 8614.658 | | | 8477.745 | | | 8447.889 |
| Cox & Snell R Square | | | .006 | | | .012 | | | .042 | | | .059 | | | .066 | | | .070 |
| Nagelkerke R Square | | | .008 | | | .017 | | | .057 | | | .080 | | | .089 | | | .095 |
| Hosmer and Lemeshow | | | .898 | | | .925 | | | .209 | | | .154 | | | .004 | | | .145 |
| Percentage correctly predicted | | | 64.5 | | | 64.5 | | | 62.3 | | | 64.0 | | | 64.3 | | | 64.0 |
| % correctly predicted 8-10 | | | 100 | | | 100 | | | 84.3 | | | 86.0 | | | 85.8 | | | 84.7 |
| % correctly predicted 0-7 | | | 0 | | | 0 | | | 29.0 | | | 30.5 | | | 31.8 | | | 32.7 |

[a] significant at p<.001, [b] significant at p<.005, [c] significant at p<.05.

Baseline characteristics, occupation and tobacco smoking status predictors of low satisfaction with life

Occupation (*b* = 0.04, *t*(8) = 3.53, *p*<0.001) and tobacco smoking status (*b* = 0.19, *t*(2) = 15.53, *p*<0.001) were the only significant predictors of low satisfaction with life. Smokers were shown to be at over twice the risk of reporting low satisfaction with life compared to non-smokers (OR = 2.05, 95% CI 1.85, 2.27, *p* < 0.001). Age band, gender, occupation and smoking status also explained a significant proportion of variance in the prevalence of low satisfaction with life, Cox and Snell $R^2$ = 0.042, *F*(4, 6695) = 67.27, *p*<0.001.

Baseline characteristics, occupation, tobacco smoking status and sedentary time predictors of low satisfaction with life

The variables age band (*b* = -0.03, *t*(5) = -2.74, *p* = 0.006), occupation (*b* = 0.04, *t*(8) = 3.16, *p* = 0.002), tobacco smoking (*b* = 0.17, *t*(2) = 14.15, *p*<0.001) and sedentary time (*b* = 0.11, *t*(2) = 9.02, *p*<0.001) were significant predictors of low satisfaction with life. The more sedentary time an individual had the greater the risk of reporting low satisfaction with life increased (275-360 [OR = 0.90, 95% CI 0.77, 1.05, *p* > 0.005], 370-480 [OR = 1.32, 95% CI 1.13, 1.53, *p* < 0.001], 485-720 [OR = 1.60, 95% CI 1.37, 1.87, *p* < 0.001], 740-2460 [OR = 2.25, 95% CI 1.85, 2.74, *p* < 0.001]). Age band, gender, occupation, smoking status and sedentary time also explained a significant proportion of variance the prevalence of low satisfaction with life, Cox and Snell $R^2$ = 0.059, *F*(5, 6679) = 70.35, *p*<0.001.

Baseline characteristics, occupation, tobacco smoking status, sedentary time and alcohol consumption predictors low satisfaction with life

The variables age band (*b* = -0.04, *t*(5) = -2.97, *p* = 0.003), occupation (*b* = 0.04, *t*(8) = 3.25, p = 0.001), tobacco smoking (*b* = 0.17, *t*(2) = 14.05, *p*<0.001), sedentary time (*b* = 0.11, *t*(2) = 8.76, *p*<0.001) and alcohol consumption (*b* = -0.07, *t*(2) = -5.59, *p*<0.001) were significant predictors of low satisfaction with life. Compared to non-drinkers, moderate (OR = 0.65, 95% CI 0.55, 0.76, *p* < 0.001) and hazardous/harmful (OR = 0.54, 95% CI 0.45, 0.65, *p* < 0.001) drinkers were significantly less likely to report low satisfaction with life. Age band, gender, occupation, smoking status, sedentary time and alcohol consumption also explained a significant proportion of variance the prevalence of low satisfaction with life, Cox and Snell $R^2$ = 0.060, *F*(6, 6618) = 63.70, *p*<0.001.

Baseline characteristics, occupation, tobacco smoking status, sedentary time, alcohol consumption and fruit and vegetable intake predictors of low satisfaction with life

The variables age band (*b* = -0.03, *t*(5) = -2.76, *p* = 0.006), occupation (*b* = 0.04, *t*(8) = 3.03, p = 0.002), tobacco smoking (*b* = 0.16, *t*(2) = 12.99, *p*<0.001), sedentary time (*b* = 0.11, *t*(2) = 8.54, *p*<0.001), alcohol consumption (*b* = -0.07, *t*(2) = -5.54, *p*<0.001) and fruit and vegetable intake (*b* = -0.05, *t*(2) = -4.21, *p*<0.001) were significant predictors of low satisfaction with life. Compared to individuals consuming five or more portions of fruit and vegetables a day, those no portions of fruit and vegetables were 1.66 times more likely to report low satisfaction with life (95% CI 1.37, 2.00). Age band, gender, occupation, smoking status, sedentary time, alcohol consumption and fruit and vegetable intake also explained a significant proportion of variance in the prevalence of low satisfaction with life, Cox and Snell $R^2 = 0.070$, $F(7, 6617) = 57.27$, $p<0.001$. While this model was a good fit – Hosmer-Lemeshow ≥ 0.05 – the chi-squared statistic in which it is based is dependent on the sample size which is low in this analysis.

## 7.6 Summary

Despite many studies having examined the association between demographics, health behaviours and health measures, to date, few have investigated the relationship in different occupational groups. Even fewer have examined these relationships among people in Scotland. This study helps to bridge this gap by presenting data on the health of five occupations in Scotland.

Across all health measures, the percentage of poor health was generally higher in females, older people and care workers. A proxy suggested that eighty-five percent of care workers are female the mean age of workers in the private section 47 years (Robertson, 2014). It is estimated that around one in every thirteen people in paid employment are employed in the social care section, a majority of whom will be carers. Given the high number of people employed as care workers and the findings from this study which showed that carers came out worse in many measures of health, urgent action is needed. From this study, one cannot determine whether there is something about being a care worker per se that leads to poorer health or other factors. Care workers may be drawn from the poorest groups in society and thus have pre-existing health conditions or are predisposed to risk factors which contribute to poor health.

The distribution of the percentage of females and males who reported to smoke tobacco, meet physical activity guidelines, exceeds alcohol guidelines, and consume sugary foods and drinks offered some evidence to support the higher percentage of poor health seen among care workers. For example, the highest percentage of people who smoked was seen in care workers as well as the highest intake of sugary foods. Care workers also reported one of the highest percentages of people who consumed a harmful amount of alcohol. Based on these findings, there is an emerging question around whether an individual's occupation can be predicted by their smoking status.

The reasons for the higher percentage of poor health seen in care workers are unknown and warrant further investigation, but likely do not result from differences in health behaviours, rather occupational and childhood factors. There appears to be little difference between the distribution of poor health across occupational groups. This confirms the previous hypothesis that health education has little effect on people's health at an individual level particularly at a behavioural level – tobacco smoking, physical activity, alcohol consumption and dietary habits. People up to the age of sixty appear to be generally robust to health behaviours raising controversial questions about the impact health behaviour interventions delivered by both the government and health services have on peoples' health. Even within health sector workers there are huge variations but precisely what proportion of this difference is attributed to pay difference or shift work is unclear.

### 7.6.1 Strengths and limitations

This is the first study in Scotland to use routinely collected data to examine the health of different occupations and the extent to which health behaviours predict health. The main strength of this study is that data on different occupational groups are drawn from the same survey rather than using estimates taken from different surveys at a population level. As with any study, this study has a number of limitations. First, analysis used cross-sectional data preventing peoples' health being monitored over time. Poor health generally develops over time and thus ascertaining health at a point in time is sufficient to address the research questions of this study. Second, a small sample size prevented the presentation of data at each level in the analysis. Some variables in the SHeS used in this analyse had low information quality. Third, data collected by the SHeS does not allow health conditions to be investigated at a closer level, for example the precise condition experienced (e.g. type II diabetes, hypertension).

# Chapter 8 Study Five: British Household Panel Survey and Understanding Society analysis

Findings in relation the final study and associated research questions are now examined. This final study drew on longitudinal data from the British Household panel Survey (BHPS) to address two questions: What percentage of nursing and midwifery professionals who reported poor health left the workforce between 2003 and 2016 compared to other occupational groups? How do demographic and behavioural variables and life satisfaction relate to early workforce exit of nurses and midwives compared to other occupational groups?

## 8.1 Introduction

The problem of early exit of staff is compounded with staffing shortages and occupational health risks, a situation exacerbated by an ageing population. This situation is of particular importance among health literate occupations such as nurses, where in the next decade, one third of nurses globally will retire (Centre for Workforce Intelligence, 2013) and Scotland is no different (ISD, 2014b). This does not include people who leave the workforce early for other reasons, including poor health.

This chapter builds on the previous cross-sectional analysis presented in this thesis (see Chapters 5, 6 and 7) providing a longitudinal perspective on the health of health workers and teachers in the UK, specifically self-assessed health, smoking status and workforce exit. The focus is on poor health and workforce exit over a thirteen-year period, 2003 to 2016. By examining the prevalence of poor health and workforce exit over thirteen-years by occupational group longitudinally, this study adds a new perspective on occupational health and its impact on workforce exit, specifically among nursing and midwifery professional, nursing auxiliaries, care assistants and home carers, primary and nursery education teaching professionals, and secondary education teaching professionals.

## 8.2 BHPS and Understanding Society demographic characteristics

The subjects were participants of the British Household Panel Survey (BHPS) and the survey Understanding Society. As mentioned in Chapter 4, the BHPS and Understanding Society are nationally representative longitudinal studies that aims to further understanding of social and economic change at an individual and household level in order to identify, model and forecast change, their cause and consequences. The datasets links together to provide a longitudinal subsample of people in the UK between 2003 and 2016 enabling analysis of the populations health over a thirteen-year period. It is to be noted that the British Household Panel Survey later became Understanding Society and so it was possible to link these two datasets together to provide a longer period of time for analysis. Opting to start analysis of data in 2003 and not 1992 ensured variables used in this analysis were more consistent, improving reliability and accuracy of findings. In addition, restricting analysis to the last thirteen years improved the current applicability. Between 2003 and 2012, the BPHS collected data on 5,659 people who indicated their occupation as nursing and midwifery professional, nursing auxiliaries, care assistants and home carers, primary and nursery education teaching professionals, or secondary education teaching professionals. After 2012, these respondents were followed in the replacement to BHPS - Understanding Society. There were 4,688 females aged 17 to 60 years and 971 males aged 17 to 65 who reported an occupation at point of survey with a mean age of 41.61 years (SE 0.139). Specifically, there were 1,867 nursing and midwifery professionals, 877 nursing auxiliaries, care assistants and home carers, 1,492 primary and nursery education teaching professionals, and 1,423 secondary education teaching professionals. Those aged below 17 and women over 60 and men over 65 years were excluded as it was assumed that people below 17 were typically in full-time education and women over 60 and men over 65 years were generally likely to be retired. While this assumption has certain limitations, given the complexity to define working age at an individual level, it was considered the best available criteria to enable comparisons to be drawn and meaningful findings to emerge.

## 8.3 Analysis

First, descriptive statistics were computed for gender, age, occupation and workforce exit for the BHPS. Next, descriptive statistics were produced for workforce exit by gender, age, self-assessed health, smoking status and overall life satisfaction for the BHPS. Then, the association between gender, age, self-assessed health, smoking status and overall life satisfaction on workforce exit between 2003 to 2012 by occupation was analysed using two Cox proportional hazards regression models in the BHPS. A hazard ratio greater than one indicates an increased likelihood of workforce exit. Then, an additional Cox proportional hazards model was constructed to estimate the association between occupation/ self-assessed health/ smoking status/ overall life satisfaction and workforce exit between 2003 to 2016. A child indicator was not used in this analysis because of challenges to get a continuous series. Demographic variables were entered in to the model simultaneously followed by self-assessed health, smoking status and overall life satisfaction to assess the extent to which demographics, health, smoking status and overall life satisfaction explained differences between workforce exit (yes versus no) by occupational group. Shown in Figure 8.1 is the hypothesised model of mediating effects of self-assessed health, smoking status and overall life satisfaction on occupation and workforce exit. Finally, respondents examined in the BHPS were followed through into Understanding Society and their records linked between datasets to provide a single combined dataset. The above analysis plan was then repeated using the combined BHPS and Understanding dataset.

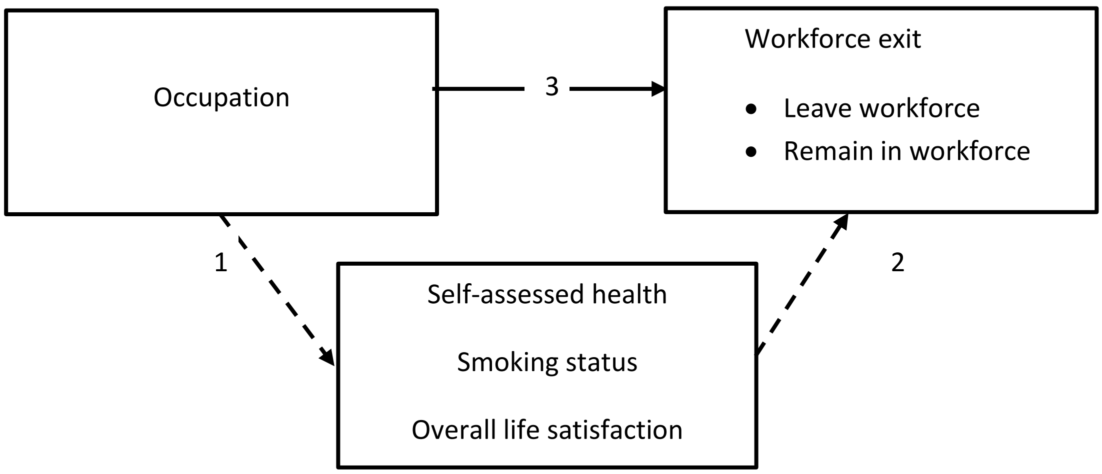



**Figure 8.1 Hypothesised Model of Mediating Effects of Self Assessed Health, Smoking Status and Overall Life Satisfaction on Occupation and Workforce Exit.**

## 8.4 BHPS results

Findings from the BHPS analysis are presented below before findings from the BHPS and Understanding Society analysis are outlined.

### 8.4.1 Demographics

Presented in Table 8.1 is the distribution of respondents according to age and gender within each occupational group. The proportion of females differed strongly among occupations, ranging from 59.3% in secondary education teaching professionals to 86.8% in nursing and midwifery professionals. There was little variation in the mean age of workers across occupations, ranging from 38.7 years (SE 0.435) in nursing auxiliaries, care assistants and home carers to 43.1 years (SE 0.330) in secondary education teaching professionals.

**Table 8.1 Demographic Characteristics.**

| | Male | | Female | | Mean age | Std. Error | Total N | % |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | | | | |
| Nursing and midwifery professionals | 177 | 13.2 | 1160 | 86.8 | 40.94 | 0.254 | 1337 | 100% |
| Nursing auxiliaries, care assistants and home carers | 134 | 18.9 | 574 | 81.1 | 38.68 | 0.435 | 708 | 100% |
| Primary and nursery education teaching professionals | 190 | 17.4 | 905 | 82.6 | 40.33 | 0.337 | 1095 | 100% |
| Secondary education teaching professionals | 470 | 40.7 | 684 | 59.3 | 43.11 | 0.330 | 1154 | 100% |

### 8.4.2 Workforce exit

Life course analysis of study findings indicated that there were five main routes in employment – changing jobs, exited employment, remained in employment, time out and other. For the purpose of this study, these were coded and analysed as a binary variable – remained and left – and are discussed below in relation to gender, age, self-assessed health, smoking status, and overall life satisfaction by occupation.

There was no data missing for age, gender and occupation. Data was missing on self-assessed health status for 16 cases in nursing and midwifery professionals, 9 nursing auxiliaries, care assistants and home carers, 13 primary and nursery education teaching professionals, and 29 secondary education teaching professionals. Smoking status was missing for 57 cases in nursing and midwifery professionals, 35 nursing auxiliaries, care assistants and home carers, 48 primary and nursery education teaching professionals, and 92 secondary education teaching professionals. Satisfaction with life was missing for 61 nursing and midwifery professionals, 41 nursing auxiliaries, care assistants and home carers, 59 primary and nursery education teaching professionals, and 69 secondary education teaching professionals. These missing cases were removed from analysis of the associated variable.

#### 8.4.2.1 Nursing and midwifery professionals

Shown in Table 8.2 is the percentage of females and males, mean age of workers, self-assessed health status, smoking status and overall life satisfaction of nursing and midwifery professionals. From Table 8.2 it is observed that 7.3% (95% CI 5.9, 8.7) of nursing and midwifery professionals left the profession over the study period, 7.3% (95% CI 3.5, 11.1) of males and 7.3% (95% CI 5.8, 8.8) of females. The mean age of workers who left the occupation was 43.4 (SE 1.07) years. Of those who left the occupation, 78.6% (95% CI 76.1, 81.1) reported self-assessed good health and 21.4% (95% CI 16.6, 26.2) self-assessed poor health, and 17.9% (95% CI 13.0, 22.8) reported to smoke and 82.1% (95% CI 79.8, 84.4) did not. Eighty percent (80.2%, 95% CI 77.8, 82.6) of those who left the occupation were satisfied and 19.8% (95% CI 14.9, 24.7) were dissatisfied with their overall life. An ANOVA indicated that gender ($F$(1, 1320)

**Table 8.2 Demographics, Self-Assessed Health, Smoking Status and Overall Life Satisfaction by Whether Left Occupation Stratified by Occupation.**

| | | | Nursing and midwifery professionals | | | Nursing auxiliaries, care assistants and home carers | | | Primary and nursery education teaching professionals | | | Secondary education teaching professionals | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Remain | Leave | Total | Remain | Leave | Total | Remain | Leave | Total | Remain | Leave | Total | Remain | Leave | Total |
| Mean age (Standard Error of Mean) | | | 40.75 (0.26) | 43.39 (1.07) | | 38.72 (0.46) | 38.39 (1.43) | | 39.93 (0.35) | 45.47 (1.36) | | 42.79 (0.34) | 47.30 (1.27) | | 40.77 (0.17) | 43.72 (0.65) | |
| Sex | Male | n | 164 | 13 | 177 | 118 | 16 | 134 | 179 | 11 | 190 | 438 | 32 | 470 | 899 | 72 | 971 |
| | | % | 92.7 | 7.3 | 100 | 88.1 | 11.9 | 100 | 94.2 | 5.8 | 100 | 93.2 | 6.8 | 100 | 92.6 | 7.4 | 100 |
| | Female | n | 1075 | 85 | 1160 | 515 | 59 | 574 | 838 | 67 | 905 | 633 | 51 | 684 | 3061 | 262 | 3323 |
| | | % | 92.7 | 7.3 | 100 | 89.7 | 10.3 | 100 | 92.6 | 7.4 | 100 | 92.5 | 7.5 | 100 | 92.1 | 7.9 | 100 |
| Total | | n | 1239 | 98 | 1337 | 633 | 75 | 708 | 1017 | 78 | 1095 | 1071 | 83 | 1154 | 3960 | 334 | 4294 |
| | | % | 92.7 | 7.3 | 100 | 89.4 | 10.6 | 100 | 92.9 | 7.1 | 100 | 92.8 | 7.2 | 100 | 92.2 | 7.8 | 100 |
| Self-assessed health | Good | n | 962 | 77 | 1039 | 460 | 53 | 513 | 858 | 64 | 922 | 868 | 63 | 931 | 3148 | 257 | 3405 |
| | | % | 78.7 | 78.6 | 78.7 | 73.7 | 70.7 | 73.4 | 85.5 | 82.1 | 85.2 | 83.3 | 75.9 | 82.8 | 80.9 | 76.9 | 80.6 |
| | Poor | n | 261 | 21 | 282 | 164 | 22 | 186 | 146 | 14 | 160 | 174 | 20 | 194 | 745 | 77 | 822 |
| | | % | 21.3 | 21.4 | 21.3 | 26.3 | 29.3 | 26.6 | 14.5 | 17.9 | 14.8 | 16.7 | 24.1 | 17.2 | 19.1 | 23.1 | 19.4 |
| Total | | n | 1223 | 98 | 1321 | 624 | 75 | 699 | 1004 | 78 | 1082 | 1042 | 83 | 1125 | 3893 | 334 | 4227 |
| | | % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Smoking status | Smoker | n | 214 | 17 | 231 | 168 | 20 | 188 | 72 | 9 | 81 | 159 | 10 | 169 | 613 | 56 | 669 |
| | | % | 18.1 | 17.9 | 18.0 | 27.9 | 28.2 | 27.9 | 7.4 | 12.2 | 7.7 | 16.1 | 13.9 | 15.9 | 16.3 | 17.9 | 16.5 |
| | Non-smoker | n | 971 | 78 | 1049 | 434 | 51 | 485 | 901 | 65 | 966 | 831 | 62 | 893 | 3137 | 256 | 3393 |
| | | % | 81.9 | 82.1 | 82.0 | 72.1 | 71.8 | 72.1 | 92.6 | 87.8 | 92.3 | 83.9 | 86.1 | 84.1 | 83.7 | 82.1 | 83.5 |
| Total | | n | 1185 | 95 | 1280 | 602 | 71 | 673 | 973 | 74 | 1047 | 990 | 72 | 1062 | 3750 | 312 | 4062 |
| | | % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Overall life satisfaction | Dissatisfied | n | 238 | 18 | 256 | 136 | 18 | 154 | 161 | 12 | 173 | 196 | 15 | 211 | 731 | 63 | 794 |
| | | % | 20.1 | 19.8 | 20.1 | 22.8 | 25.4 | 23.1 | 16.7 | 16.7 | 16.7 | 19.3 | 21.4 | 19.4 | 19.4 | 20.7 | 19.5 |
| | Satisfied | n | 947 | 73 | 1020 | 460 | 53 | 513 | 803 | 60 | 863 | 819 | 55 | 874 | 3029 | 241 | 3270 |
| | | % | 79.9 | 80.2 | 79.9 | 77.2 | 74.6 | 76.9 | 83.3 | 83.3 | 83.3 | 80.7 | 78.6 | 80.6 | 80.6 | 79.3 | 80.5 |
| Total | | n | 1185 | 91 | 1276 | 596 | 71 | 667 | 964 | 72 | 1036 | 1015 | 70 | 1085 | 3760 | 304 | 4064 |
| | | % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

= 14.24, *p*<0.001), age (*F*(43, 1320) = 1.52, *p*=0.018) and gender by age (*F*(32, 1320) = 1.66, *p*=0.012) was significantly associated with whether left occupation in nursing and midwifery professionals. Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significant between those aged 60-65 years and all other age groups (*p*<0.001).

#### 8.4.2.2 Nursing auxiliaries, care assistants and home carers

Displayed in Table 8.2 is the percentage of females and males, mean age of workers, self-assessed health status, smoking status and overall life satisfaction of nursing auxiliaries by whether left the occupation. From Table 8.2 it can be seen that 10.6% (95% CI 8.3, 12.9) of nursing auxiliaries, care assistants and home carers left the profession over the study period, 11.9% (95% CI 6.4, 17.4) of males and 10.3% (95% CI 2.5, 18.1) of females. The mean age of workers who left the occupation was 38.4 (SE 1.43) years. Of those who left the occupation, 70.7% (95% CI 66.8, 74.6) reported self-assessed good health and 29.3% (95% CI 22.8, 35.8) self-assessed poor health, and 28.2% (95% CI 21.8, 34.6) reported to smoke. Of those who left the occupation, 74.6% (95% CI 70.8, 78.4) were satisfied with their overall life and 25.4% (95% CI 18.5, 32.3) were dissatisfied with their overall life. An ANOVA indicated that age was significantly associated with whether left occupation in nursing auxiliaries, care assistants and home carers, *F*(47, 698) = 1.41, *p*=0.04). There were no other variables significant at the 5% level (*p*=0.6 and *p*=0.11). Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significant between those aged 17-29 years and 50-59 years (*p* = 0.046), 40-49 years and 60-65 years (*p* = 0.048), and 50-59 years and 60-69 years (*p* = 0.019).

#### 8.4.2.3 Primary and nursery education teaching professionals

From Table 8.2 is can be seen that 7.1% (95% CI 5.6, 8.6) of primary and nursery education teaching professionals left the workforce over the period of interest, 5.8% (95% CI 2.5, 9.1) of males and 7.4% (95% CI 5.7, 9.1) of females. The mean age of those who exited was 45.5 (SE 1.36) years. Of those who left the occupation, 82.1% (95% CI 79.6, 84.6) reported self-assessed good health and 17.9% (95% CI 12.0, 23.8) self-assessed poor health. A large proportion of those who left the workforce were non-smokers (87.8%, 95% CI 85.7, 89.9) and were generally satisfied with their overall life (83.3%, 95% CI 80.8, 85.8). An ANOVA indicated that gender, age and gender by age were significantly associated with whether left occupation in primary and nursery education teaching professionals. Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significant between those aged 17-29 years and 50-59 years ($p < 0.001$), 17-29 years and 60-69 years (($p < 0.001$), 30-39 years and 50-59 years ($p < 0.001$), 30-39 years and 60-65 years ($p < 0.001$), 40-49 years and 50-59 years ($p < 0.001$), 40-49 years and 60-65 years ($p < 0.001$), and 50-59 years and 60-65 years ($p = 0.001$).

#### 8.4.2.4 Secondary education teaching professionals

There were 7.2% (95% CI 5.7, 8.7) of secondary education teaching professionals who left the occupation, 6.8% (95% CI 4.5, 9.1) of males and 7.5% (95% CI 5.5, 9.5) of females shown in Table 8.2. The mean age of workers leaving the occupation was 47.3 (SE 1.27) years. Of those who left the occupation, 75.9% (95% CI 73.2, 78.6) reported self-assessed good health and 24.1% (95% CI 18.1, 30.1) self-assessed poor health, and 13.9% (95% CI 8.7, 19.1) reported to smoke and 86.1% (95% CI 83.8, 88.4) reported to be non-smokers. In addition, of those who left the occupation 78.6%

(95% CI 75.9, 81.3) self-reported to be satisfied with life overall and 21.4% (95% CI 15.9, 26.9) dissatisfied. An ANOVA indicated that gender, age and gender by age was not significantly associated with whether left occupation in secondary education teaching professionals. Post hoc analysis using the Scheffé post hoc criterion for significance indicated that age band was significant between those aged 17-29 years and 60-65 years ($p < 0.001$), 30-39 years and 60-65 years ($p < 0.001$), 40-49 years and 60-65 years ($p < 0.001$), and 50-59 years and 60-65 years ($p < 0.001$).

## 8.5 BHPS Cox proportional Hazards Regression

Two Cox regression models were created to explore: (i) the association between workforce exit and self-assessed health, tobacco smoking and overall life satisfaction by occupation; and (ii) the association between workforce exit and occupation, self-assessed health, tobacco smoking and overall life satisfaction. These are presented in turn below. While the hazards of different levels cross over and thus the assumption of proportional hazards cannot be supported, the results have been retained for indicative purposes.

### 8.5.1 Association between workforce exit and smoking status, overall life satisfaction by occupation, stratum by self-assessed health

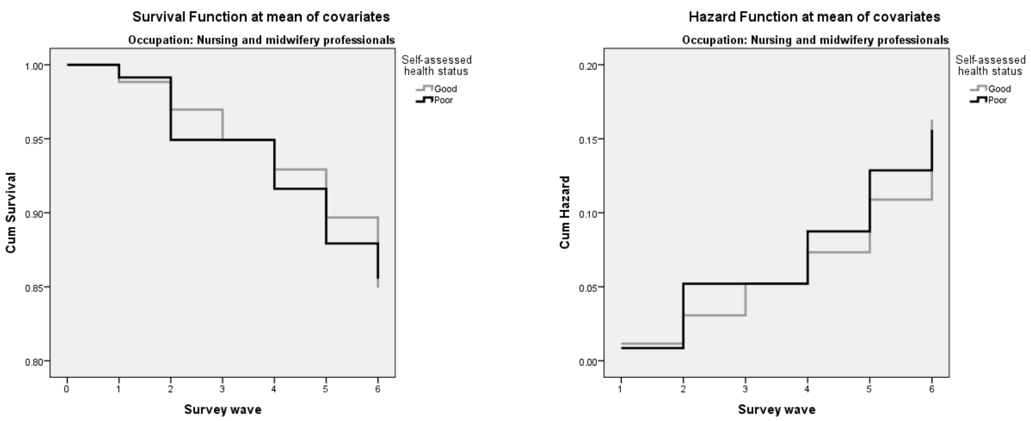
Shown in Table 8.3 is the risk ratio of workforce exit by demographics, smoking status and overall life satisfaction by each occupation, stratum by self-assessed health status. The level of significance of the model fit was significant at the 1% level for primary and nursery education teaching professionals. For nursing and midwifery professionals (p=0.093) and secondary education teaching professionals (p=0.059) the model fit was significant at the 10% level. The model fit was not significant for nursing auxiliaries, care assistants and home carers (p=0.785).

The model shows that age is a significant predictor of workforce exit in nursing and midwifery professionals (p=0.028), primary and nursery education teaching professionals (p<0.001), and secondary education teaching professionals (p=0.004). Smoking status was also a significant predictor of workforce exit in primary and nursery education teaching professionals (p=0.019). There were no other significant predictors of occupational exit at the 5% level.

**Table 8.3 Coefficients of Cox proportional Hazards Model.**

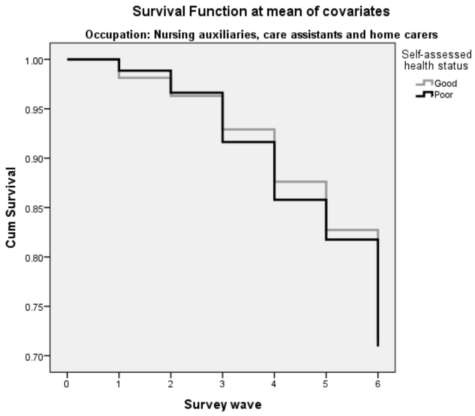
**Nursing and midwifery professionals**

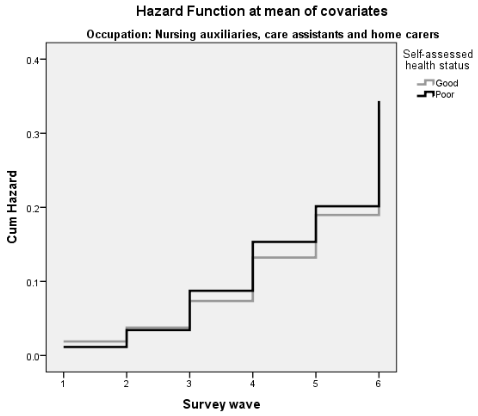
| Variables | Hazard Ratio | 95% CI | |
|---|---|---|---|
| | | Lower | Upper |
| Sex (male) | 1.518 | 0.772 | 2.985 |
| Age | 1.026 | 1.003 | 1.050 |
| Smoke (yes) | 1.089 | 0.621 | 1.910 |
| Life satisfaction | 1.200 | 0.965 | 1.492 |



## Nursing auxiliaries, care assistants and home carers

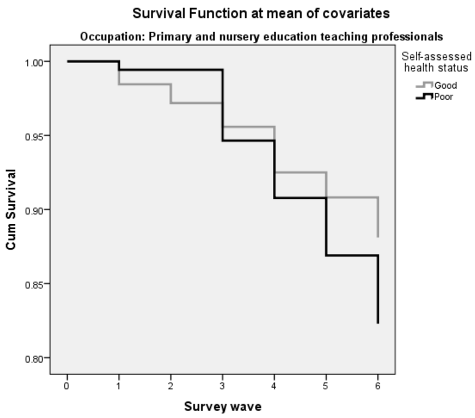
| Variables | Hazard Ratio | 95% CI | |
|---|---|---|---|
| | | Lower | Upper |
| Sex (male) | 1.182 | 0.632 | 2.212 |
| Age | 0.987 | 0.966 | 1.008 |
| Smoke (yes) | 1.003 | 0.588 | 1.711 |
| Life satisfaction | 0.995 | 0.797 | 1.243 |

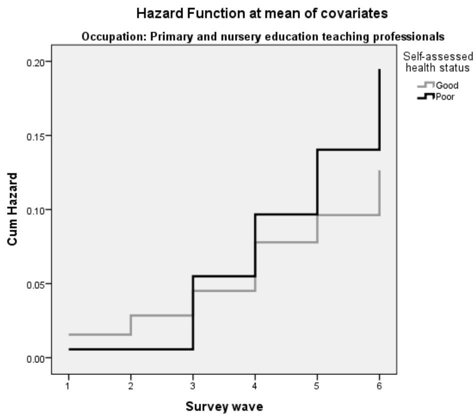



## Primary and nursery education teaching professionals

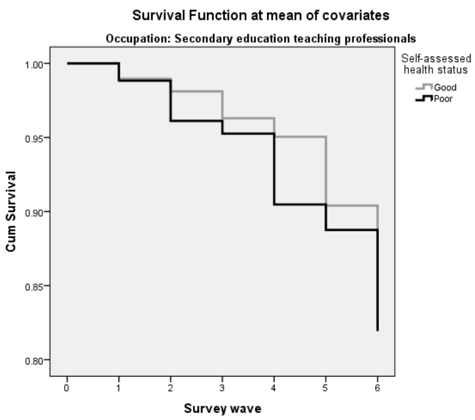
| Variables | Hazard Ratio | 95% CI | |
|---|---|---|---|
| | | Lower | Upper |
| Sex (male) | 0.846 | 0.414 | 1.731 |
| Age | 1.049 | 1.025 | 1.072 |
| Smoke (yes) | 2.473 | 1.160 | 5.274 |
| Life satisfaction | 1.025 | 0.809 | 1.298 |

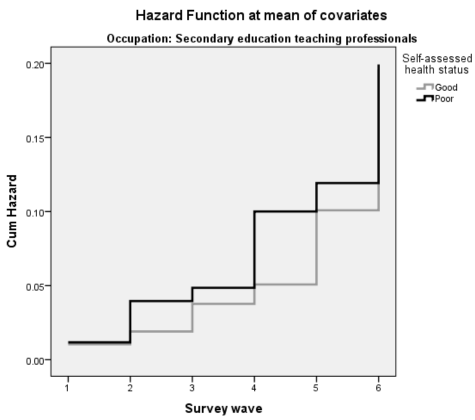



## Secondary education teaching professionals

| Variables | Hazard Ratio | 95% CI | |
|---|---|---|---|
| | | Lower | Upper |
| Sex (male) | 1.048 | 0.629 | 1.746 |
| Age | 1.036 | 1.011 | 1.061 |
| Smoke (yes) | 0.896 | 0.434 | 1.852 |
| Life satisfaction | 1.071 | 0.845 | 1.356 |



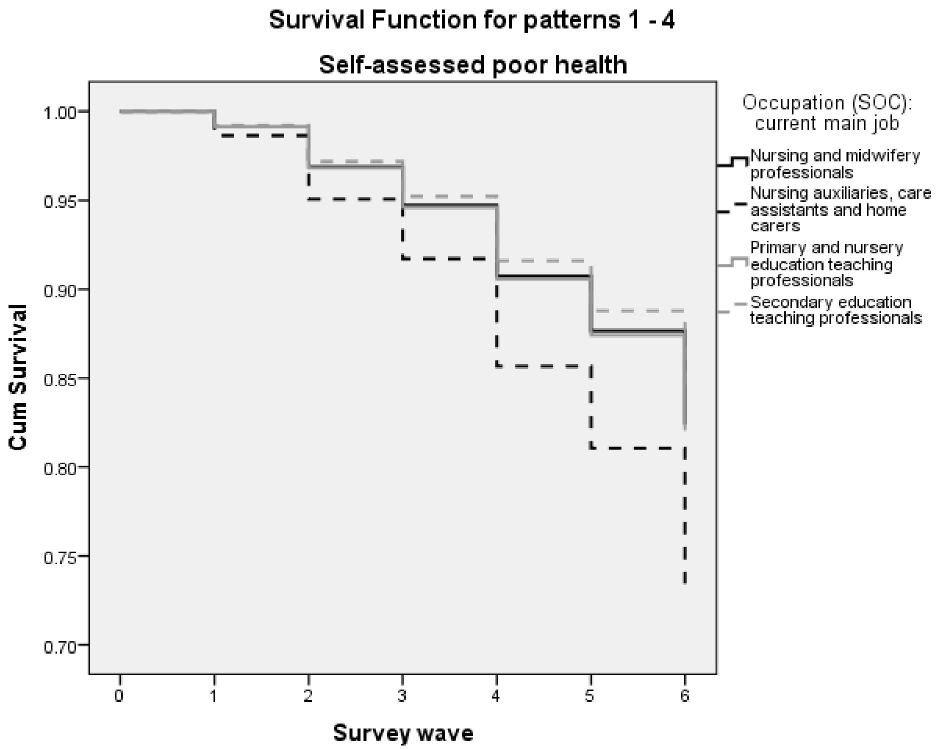



### 8.5.2 Association between workforce exit and self-assessed health, smoking status, overall life satisfaction, stratum by occupation

Exhibited in Table 8.4 is the risk ratio of workforce exit by demographics, occupation, smoking status and overall life satisfaction, stratum by self-assessed health status. The level of significance of the model fit was significant at the 1% level. Baseline characteristics were being female, a non-smoker, and working as a nursing and midwifery professional. The model shows that age ($p<0.001$) and occupation ($p=0.006$) are significantly associated with workforce exit. Specifically, compared to nursing and midwifery professionals, those working as nursing auxiliaries, care assistants and home carers were significantly more likely to exit the workforce. There were no other significant predictors of occupational exit at the 5% level. Although not significant, the model suggests that males exit earlier than females ($p=0.468$) and self-reported smokers earlier than non-smokers ($p=0.341$) are also shown to exit the workforce earlier.

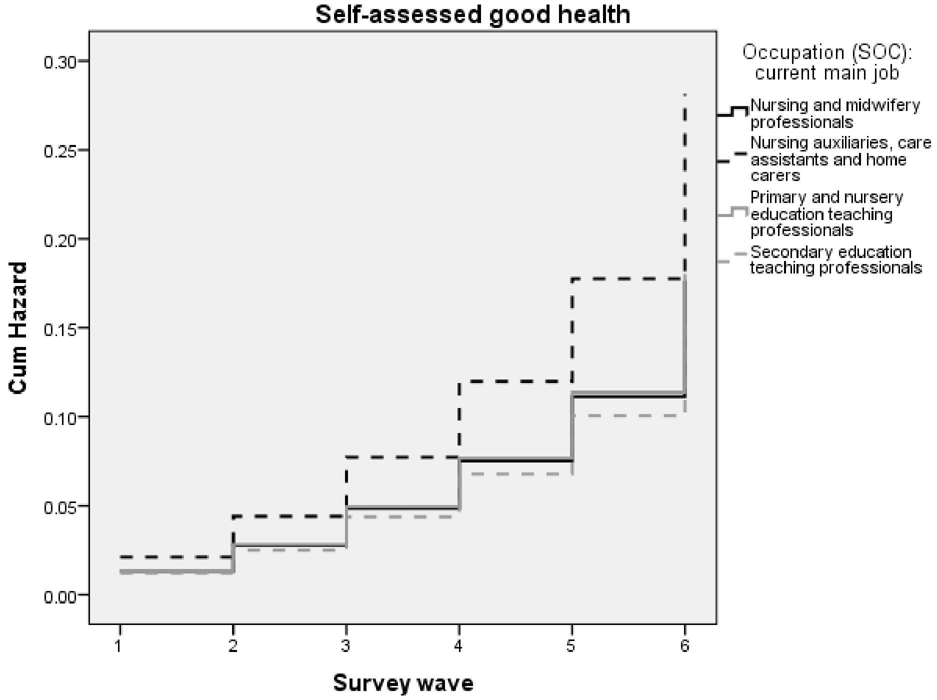
**Table 8.4 Proportional Hazard Model of Workforce Exit.**

| Variables | Hazard Ratio | 95% CI | |
|---|---|---|---|
| | | Lower | Upper |
| Male | 1.119 | 0.826 | 1.518 |
| Age | 1.022 | 1.011 | 1.033 |
| Occupation | | | |
| Nursing and midwifery professionals | 1.594 | 1.158 | 2.195 |
| Primary and nursery education teaching professionals | 1.022 | 0.745 | 1.401 |
| Secondary education teaching professionals | 0.902 | 0.648 | 1.256 |
| Smoke (yes) | 1.162 | 0.853 | 1.584 |
| Life satisfaction | 1.061 | 0.948 | 1.189 |



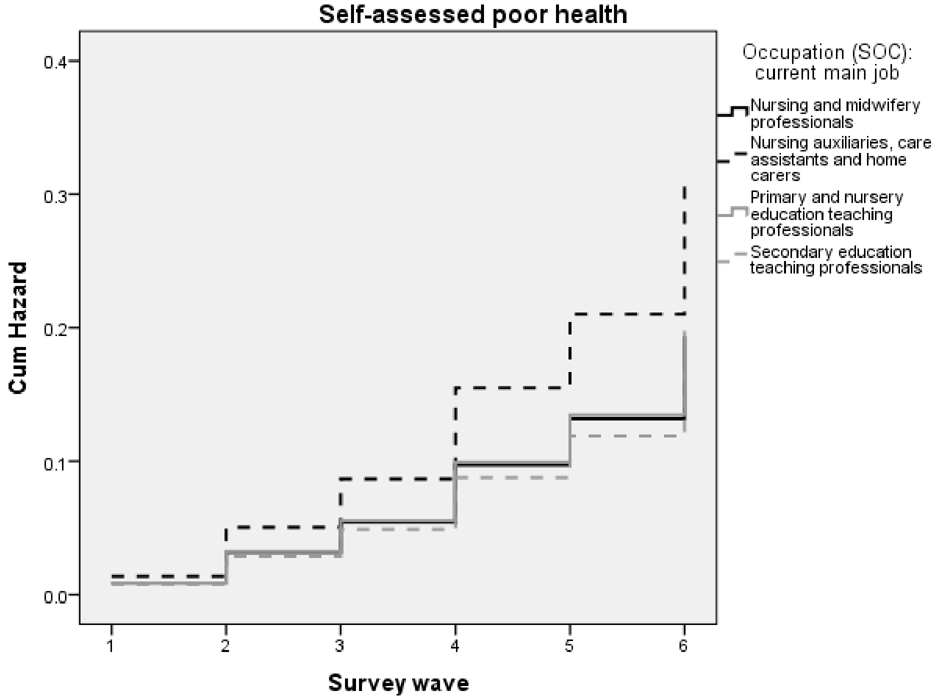
Hazard Function for patterns 1 - 4

Self-assessed good health




Hazard Function for patterns 1 - 4

Self-assessed poor health



## 8.6 BHPS and Understanding Society results

Data available from the UK Data Archive without the requirement of a special licence on occupation was more detailed for the BHPS than Understanding Society. To overcome this, respondents who self-reported to be nursing and midwifery professionals, nursing auxiliaries, care assistants and home carers, primary and nursery education teaching professionals, or secondary education teaching professionals in the BHPS were followed into Understanding Society.

### 8.6.1 Demographics

Shown in Table 8.5 is the distribution of respondents according to age and gender within each occupational group. The proportion of females differed strongly among occupations, ranging from 67.0% in secondary education teaching professionals to 90.5% in nursing and midwifery professionals. There was little variation in the mean age of workers across occupations, ranging from 40.2 years (SE 0.385) in nursing auxiliaries, care assistants and home carers to 43.3 years (SE 0.293) in secondary education teaching professionals. An ANOVA on occupation by demographics indicated that there were significant interactions between occupation and gender ($p<0.001$), age bands ($p<0.001$) and occupation by gender and age group ($p<0.001$).

**Table 8.5 Demographic Characteristics.**

| | Male | | Female | | Mean age | Std. Error | Total N | % |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | | | | |
| Nursing and midwifery professionals | 177 | 9.5 | 1690 | 90.5 | 41.64 | 0.212 | 1867 | 100% |
| Nursing auxiliaries, care assistants and home carers | 134 | 15.3 | 743 | 84.7 | 40.18 | 0.385 | 877 | 100% |
| Primary and nursery education teaching professionals | 190 | 12.7 | 1302 | 87.3 | 40.80 | 0.278 | 1492 | 100% |
| Secondary education teaching professionals | 470 | 33.0 | 953 | 67.0 | 43.29 | 0.293 | 1423 | 100% |

### 8.6.2 Workforce exit

Consistent with the analysis of the BHPS, workforce exit was coded and analysed as a binary variable – remained and left – and are discussed below in relation to gender, age, self-assessed health, smoking status, and overall life satisfaction by occupation. There was no data missing for age, gender and occupation. Data was missing on self-assessed health status for 269 cases of which 91.1% was from survey wave 12. The number of cases missing by occupation was as follows: 96 nursing and midwifery professionals, 33 nursing auxiliaries, care assistants and home carers, 73 primary and nursery education teaching professionals, and 67 secondary education teaching professionals. Smoking status was missing for 285 nursing and midwifery professionals, 111 nursing auxiliaries, care assistants and home carers, 218 primary and nursery education teaching professionals, and 208 secondary education teaching professionals. Smoking status was missing for 373 (45.4%) cases in survey wave 9 and 322 in survey wave 10 (39.2%). Satisfaction with life was missing for 107 nursing and midwifery professionals, 65 nursing auxiliaries, care assistants and home carers, 90 primary and nursery education teaching professionals, and 88 secondary education teaching professionals. Missing satisfaction with life ranged between 10 (2.9%) in wave 12 to 54 (15.4%) in wave 2. The reason for this large numbers of missing responses in specific survey waves for self-assessed health status and smoking status is unclear. These missing cases were removed from analysis of the associated variable.

**Table 8.6 Demographics, Self-Assessed Health, Smoking Status and Overall Life Satisfaction by Whether Left Occupation Stratified by Occupation.**

| | | | Nursing and midwifery professionals | | | Nursing auxiliaries, care assistants and home carers | | | Primary and nursery education teaching professionals | | | Secondary education teaching professionals | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Remain | Leave | Total | Remain | Leave | Total | Remain | Leave | Total | Remain | Leave | Total | Remain | Leave | Total |
| Mean age (Standard Error of Mean) | | | 41.50 (0.22) | 43.88 (1.02) | | 40.35 (0.40) | 38.44 (1.40) | | 40.37 (0.28) | 46.83 (1.18) | | 42.98 (0.30) | 47.58 (1.15) | | 41.40 (0.14) | 44.47 (0.61) | |
| Sex | Male | n | 164 | 12 | 177 | 118 | 16 | 134 | 179 | 11 | 190 | 438 | 32 | 470 | 889 | 72 | 971 |
| | | % | 92.7 | 7.3 | 100 | 88.1 | 11.9 | 100 | 94.2 | 5.8 | 100 | 93.2 | 6.8 | 100 | 92.6 | 7.4 | 100 |
| | Female | n | 1590 | 100 | 1690 | 681 | 62 | 743 | 1214 | 88 | 1302 | 887 | 66 | 953 | 4372 | 316 | 4688 |
| | | % | 94.1 | 5.9 | 100 | 91.7 | 8.3 | 100 | 93.2 | 6.8 | 100 | 93.1 | 6.9 | 100 | 93.3 | 6.7 | 100 |
| Total | | n | 1754 | 113 | 1867 | 799 | 78 | 877 | 1393 | 99 | 1492 | 1325 | 98 | 1423 | 5271 | 388 | 5659 |
| | | % | 93.9 | 6.1 | 100 | 91.1 | 8.9 | 100 | 93.4 | 6.6 | 100 | 93.1 | 6.9 | 100 | 93.1 | 6.9 | 100 |
| Self-assessed health | Good | n | 1263 | 87 | 1350 | 537 | 54 | 591 | 1075 | 77 | 1152 | 1016 | 70 | 1086 | 3891 | 288 | 4179 |
| | | % | 76.2 | 77.0 | 76.2 | 70.1 | 69.2 | 70.0 | 81.4 | 77.8 | 81.2 | 80.8 | 71.4 | 80.1 | 77.8 | 74.2 | 77.5 |
| | Poor | n | 395 | 26 | 421 | 229 | 24 | 253 | 245 | 22 | 267 | 242 | 28 | 270 | 1111 | 100 | 1211 |
| | | % | 23.8 | 23.0 | 23.8 | 29.9 | 30.8 | 30.0 | 18.6 | 22.2 | 18.8 | 19.2 | 28.6 | 19.9 | 22.2 | 25.8 | 22.5 |
| Total | | n | 1658 | 113 | 1771 | 766 | 78 | 844 | 1320 | 99 | 1419 | 1258 | 98 | 1356 | 5002 | 388 | 5390 |
| | | % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Smoking status | Smoker | n | 323 | 23 | 346 | 214 | 21 | 235 | 113 | 14 | 127 | 206 | 13 | 219 | 856 | 71 | 927 |
| | | % | 21.8 | 22.3 | 21.9 | 30.9 | 28.8 | 30.7 | 9.5 | 16.9 | 10.0 | 18.2 | 16.0 | 18.0 | 19.0 | 20.9 | 19.2 |
| | Non-smoker | n | 1156 | 80 | 1236 | 479 | 52 | 531 | 1078 | 69 | 1147 | 928 | 68 | 996 | 3641 | 269 | 3910 |
| | | % | 78.2 | 77.7 | 78.1 | 69.1 | 71.2 | 69.3 | 90.5 | 93.1 | 90.0 | 81.8 | 84.0 | 82.0 | 81.0 | 79.1 | 80.8 |
| Total | | n | 1479 | 103 | 1582 | 639 | 73 | 766 | 1191 | 83 | 1274 | 1134 | 81 | 1215 | 4497 | 340 | 4837 |
| | | % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Overall life satisfaction | Dissatisfied | n | 339 | 19 | 358 | 173 | 21 | 194 | 233 | 16 | 249 | 236 | 20 | 256 | 981 | 76 | 1057 |
| | | % | 20.5 | 18.3 | 20.3 | 23.4 | 28.4 | 23.9 | 17.8 | 17.6 | 17.8 | 18.8 | 24.4 | 19.2 | 19.8 | 21.7 | 80.1 |
| | Satisfied | n | 1317 | 85 | 1402 | 565 | 53 | 618 | 1078 | 75 | 1153 | 1017 | 62 | 1079 | 3977 | 275 | 4252 |
| | | % | 79.5 | 81.7 | 79.7 | 76.6 | 71.6 | 76.1 | 82.2 | 82.4 | 82.2 | 81.2 | 75.6 | 80.8 | 80.2 | 78.3 | 80.1 |
| Total | | n | 1656 | 104 | 1760 | 738 | 74 | 812 | 1311 | 91 | 1402 | 1253 | 82 | 1335 | 4958 | 351 | 5309 |
| | | % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

#### 8.6.2.1 Nursing and midwifery professionals

Displayed in Table 8.6 is the percentage of females and males, mean age of workers, self-assessed health status, smoking status and overall life satisfaction of nursing and midwifery professionals. From Table 8.6 it can be seen that 6.1% of nursing and midwifery professionals left the profession over the study period, 7.3% of males and 5.9% of females. The mean age of workers who left the occupation was 43.88 (SE 1.02) years. Of those who left the occupation, 77.0% reported self-assessed good health and 23.0% self-assessed poor health, and 22.3% reported to smoke and 77.7% did not. Almost eighty-two percent of those who left the occupation were satisfied and 18.3% were dissatisfied with their overall life. An ANOVA indicated that gender ($F(1, 1770) = 10.20$, $p=0.001$) and age ($F(43, 1770) = 1.71$, $p=0.003$) were significantly associated with self-assessed health.

#### 8.6.2.2 Nursing auxiliaries, care assistants and home carers

Presented in Table 8.6 is the percentage of females and males, mean age of workers, self-assessed health status, smoking status and overall life satisfaction of nursing auxiliaries by whether they left the occupation. From Table 8.6 it can be seen that 8.9% of nursing auxiliaries, care assistants and home carers left the profession over the study period, 11.9% of males and 8.3% of females. The mean age of workers who left the occupation was 38.44 (SE 1.40) years. Of those who left the occupation, 69.2% reported self-assessed good health and 30.8% self-assessed poor health, and 28.8% reported to smoke. Of those who left the occupation, 71.6% were satisfied with their overall life and 28.4% were dissatisfied with their overall life. An ANOVA indicated that age was significantly associated with self-assessed health, $F(47, 843) = 1.42$, $p=0.037$). No other variables were statistically significant at the 5% level.

### 8.6.2.3 Primary and nursery education teaching professionals

Under seven percent (6.6%) of primary and nursery education teaching professionals left the workforce over the period of interest, 5.8% of males and 6.8% of females exhibited in Table 8.6. The mean age of those who exited was 46.83 (SE 1.18) years. Of those who left the occupation, 77.8% reported self-assessed good health and 22.2% self-assessed poor health. A large proportion of those who left the workforce were non-smokers (93.1%) and were generally satisfied with their overall life (82.4%). An ANOVA indicated that gender, age and gender by age was not significantly associated with whether left occupation in primary and nursery education teaching professionals.

### 8.6.2.4 Secondary education teaching professionals

From Table 8.6 it can be seen that 6.9% of secondary education teaching professionals left the occupation between 2003 and 2016, 6.8% of males and 6.9% of females. The mean age of workers leaving the occupation was 47.58 (SE 1.15) years. Of those who left the occupation, 71.4% reported self-assessed good health and 28.6% self-assessed poor health, and 16.0% reported to smoke and 84.0% reported to be non-smokers. In addition, of those who left the occupation 75.6% self-reported to be satisfied with life overall and 24.4% dissatisfied. An ANOVA indicated that gender was significantly associated with whether left occupation in secondary education teaching professionals, $F(1, 1355) = 4.38$, $p=0.037$. No other variables were statistically significant at the 5% level.

## 8.7 BHPS and Understanding Society regression

Two Cox regression models were fitted as in section 8.5.

### 8.7.1 Association between workforce exit and smoking status, overall life satisfaction by occupation, stratum by self-assessed health status

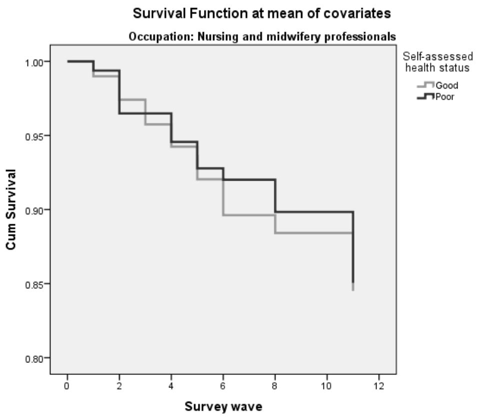
Shown in Table 8.7 is the risk ratio of workforce exit by demographics, smoking status and overall life satisfaction by each occupation, stratum by self-assessed health status. The level of significance of the model fit was significant at the 1% level for primary and nursery education teaching professionals. For nursing and midwifery professionals (p=0.072) and secondary education teaching professionals (p=0.022) the model fit was significant at the 10% level. The model of fit was insignificant for nursing auxiliaries, care assistants and home carers (p=0.101).

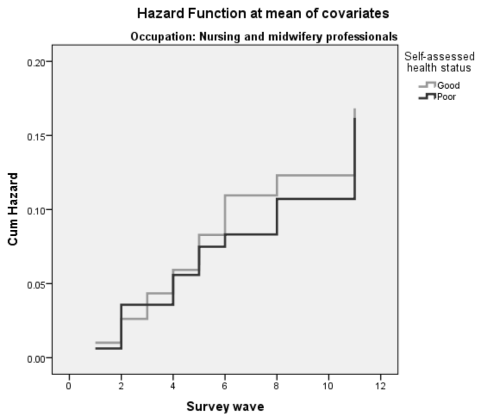
The model shows that age is a significant predictor of workforce exit in nursing and midwifery professionals (p=0.039), nursing auxiliaries, care assistants and home carers (p=0.028), primary and nursery education teaching professionals (p<0.001), and secondary education teaching professionals (p=0.006). There were no other significant predictors of occupational exit at the 5% level.

**Table 8.7 Proportional Hazard Models of Workforce Exit.**

**Nursing and midwifery professionals**

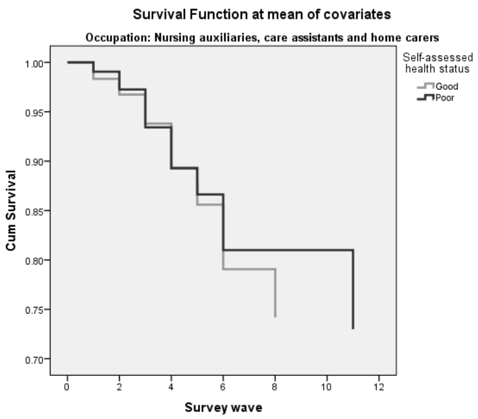
| Variables | Hazard Ratio | 95% CI | |
|---|---|---|---|
| | | Lower | Upper |
| Sex (male) | 1.663 | 0.885 | 3.125 |
| Age | 1.024 | 1.001 | 1.047 |
| Smoke (yes) | 0.700 | 0.425 | 1.152 |
| Life satisfaction | 1.141 | 0.949 | 1.372 |

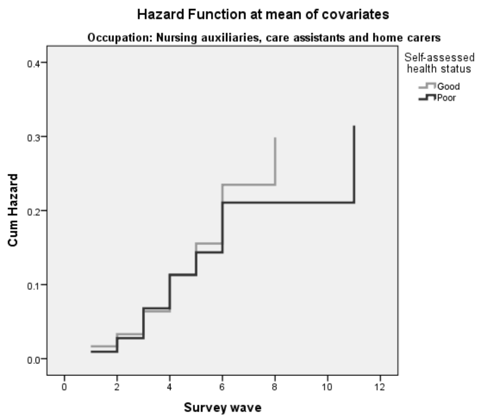



## Nursing auxiliaries, care assistants and home carers

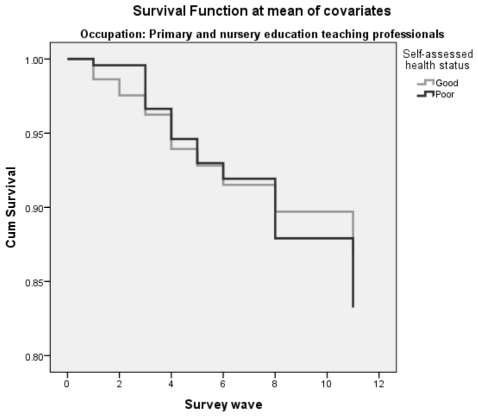
| Variables | Hazard Ratio | 95% CI Lower | 95% CI Upper |
|---|---|---|---|
| Sex (male) | 1.264 | 0.689 | 2.320 |
| Age | 0.976 | 0.956 | 0.997 |
| Smoke (yes) | 0.698 | 0.412 | 1.180 |
| Life satisfaction | 0.971 | 0.799 | 1.181 |

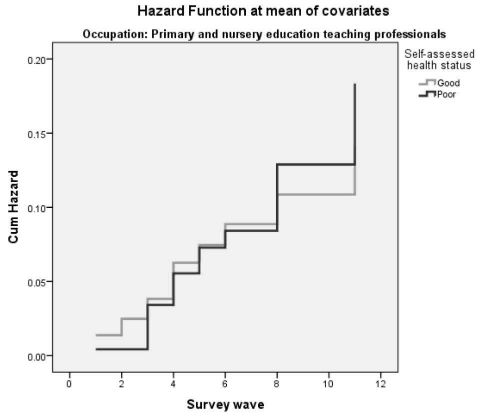



## Primary and nursery education teaching professionals

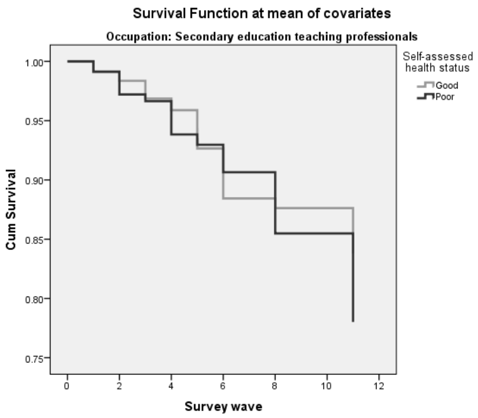
| Variables | Hazard Ratio | 95% CI Lower | 95% CI Upper |
|---|---|---|---|
| Sex (male) | 0.962 | 0.502 | 1.844 |
| Age | 1.050 | 1.027 | 1.072 |
| Smoke (yes) | 1.261 | 0.687 | 2.315 |
| Life satisfaction | 1.038 | 0.837 | 1.286 |

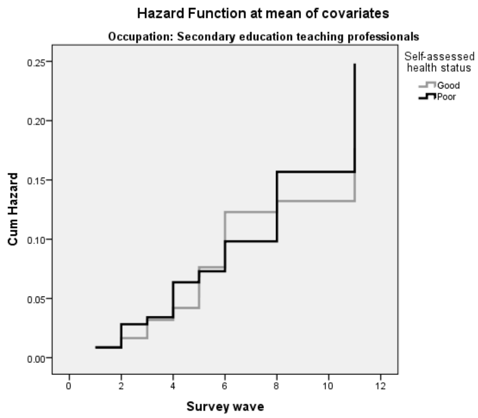



**Secondary education teaching professionals**

| Variables | Hazard Ratio | 95% CI Lower | 95% CI Upper |
|---|---|---|---|
| Sex (male) | 0.930 | 0.572 | 1.513 |
| Age | 1.033 | 1.009 | 1.056 |
| Smoke (yes) | 0.527 | 0.274 | 1.017 |
| Life satisfaction | 0.954 | 0.783 | 1.162 |



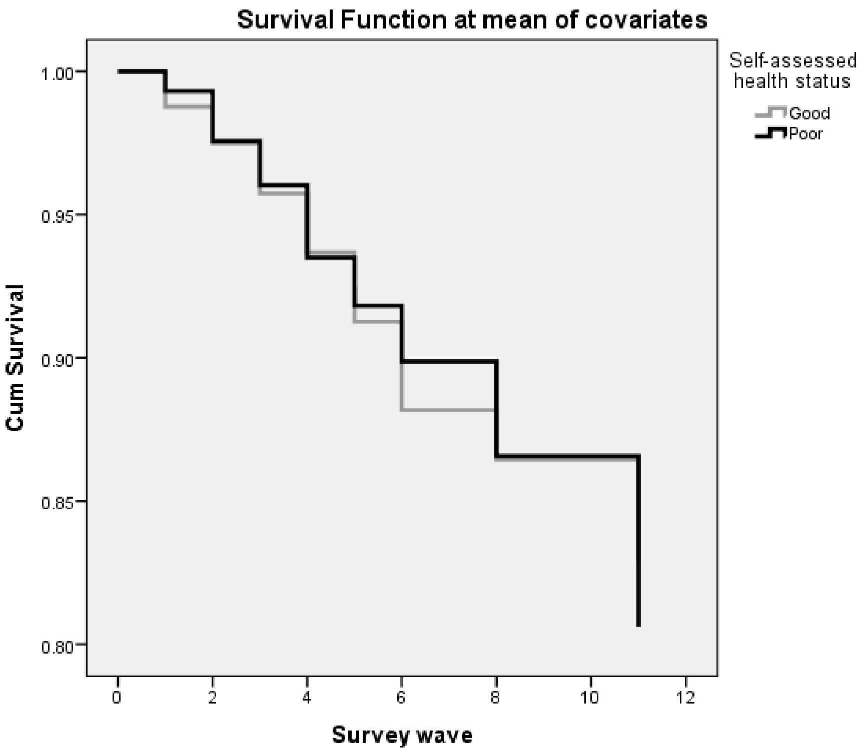



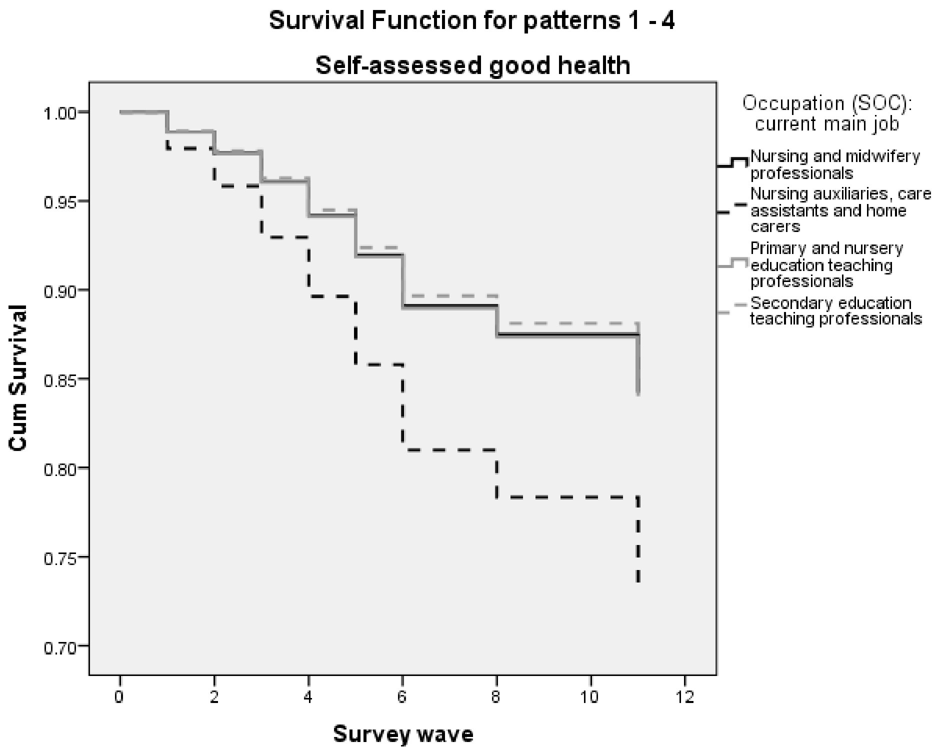

### 8.7.2 Association between workforce exit and occupation, smoking status, overall life satisfaction, stratum by self-assessed health status

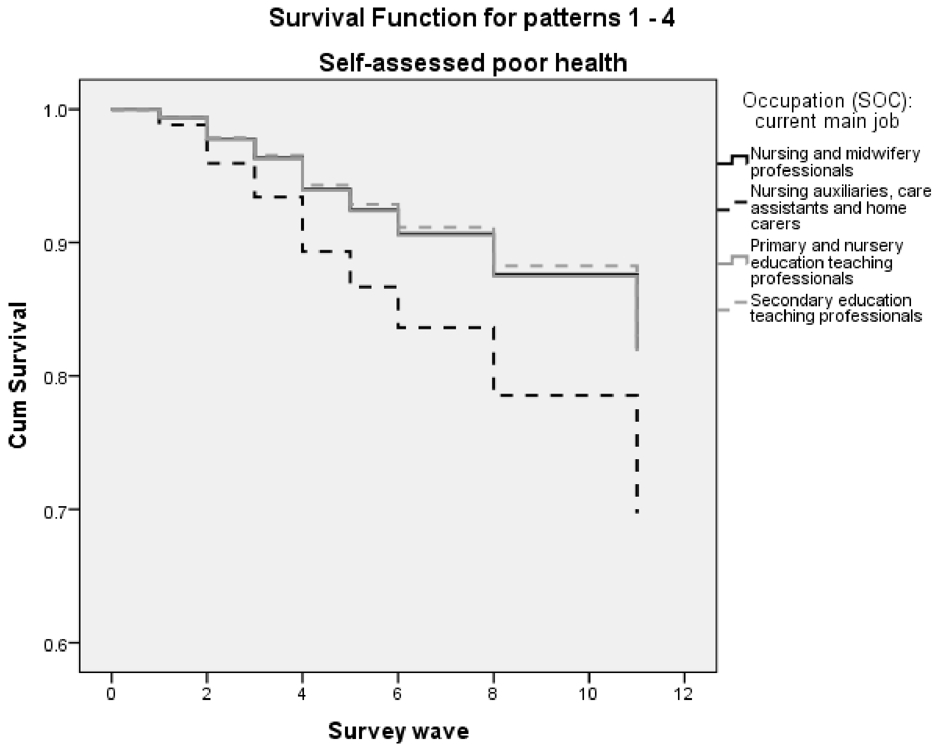
Displayed in Table 8.8 is the risk ratio of workforce exit by demographics, occupation, smoking status and overall life satisfaction, stratum by self-assessed health status. The level of significance of the model fit was significant at the 1% level. The model shows that age (p=0.001), occupation (p<0.001) and smoking status (p=0.044) were significantly associated with workforce exit. For example, nursing auxiliaries, care assistants and home carers were significantly more likely to leave the workforce compared to nursing and midwifery professionals (p<0.001). Smokers were more likely to leave the workforce than non-smokers. There were no other significant predictors of occupational exit at the 5% level.

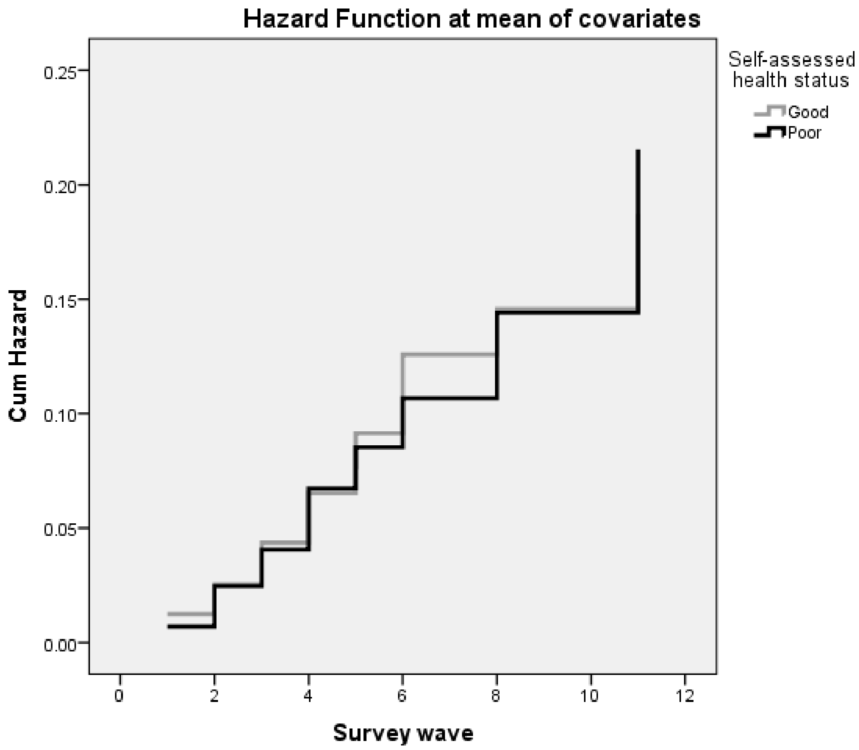
**Table 8.8 Proportional Hazard Model of Workforce Exit.**

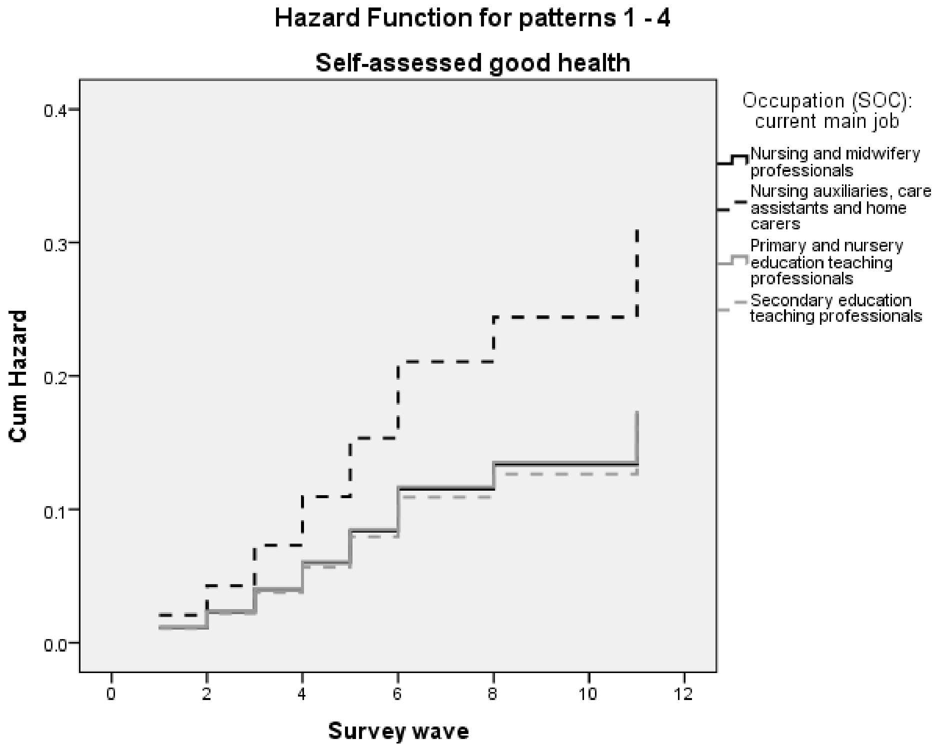
| Variables | Hazard Ratio | 95% CI | |
|---|---|---|---|
| | | Lower | Upper |
| Sex (male) | 1.140 | 0.853 | 1.523 |
| Age | 1.019 | 1.008 | 1.030 |
| Occupation | | | |
| Nursing auxiliaries, care assistants and home carers | 1.826 | 1.342 | 2.485 |
| Primary and nursery education teaching professionals | 1.013 | 0.752 | 1.364 |
| Secondary education teaching professionals | 0.946 | 0.691 | 1.295 |
| Smoke (yes) | 0.750 | 0.567 | 0.992 |
| Life satisfaction | 1.020 | 0.926 | 1.123 |

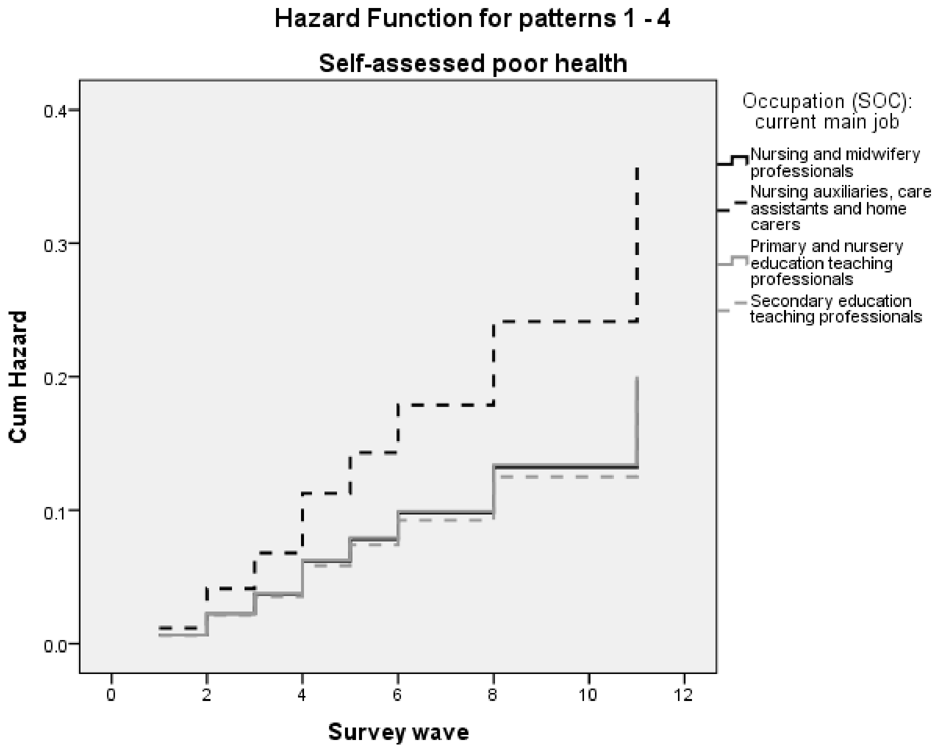

Survival Function at mean of covariates
Self-assessed health status
Good
Poor
Cum Survival
1.00
0.95
0.90
0.85
0.80
0
2
4
6
8
10
12
Survey wave


Survival Function for patterns 1 - 4
Self-assessed good health
Occupation (SOC): current main job
Nursing and midwifery professionals
Nursing auxiliaries, care assistants and home carers
Primary and nursery education teaching professionals
Secondary education teaching professionals
Cum Survival
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0
2
4
6
8
10
12
Survey wave


Survival Function for patterns 1 - 4
Self-assessed poor health
Cum Survival
Survey wave
Occupation (SOC): current main job
Nursing and midwifery professionals
Nursing auxiliaries, care assistants and home carers
Primary and nursery education teaching professionals
Secondary education teaching professionals
1.0
0.9
0.8
0.7
0.6
0
2
4
6
8
10
12


Hazard Function at mean of covariates
Cum Hazard
Survey wave
Self-assessed health status
Good
Poor
0.25
0.20
0.15
0.10
0.05
0.00
0
2
4
6
8
10
12


Hazard Function for patterns 1 - 4
Self-assessed good health
Cum Hazard
Survey wave
Occupation (SOC): current main job
Nursing and midwifery professionals
Nursing auxiliaries, care assistants and home carers
Primary and nursery education teaching professionals
Secondary education teaching professionals
0.0
0.1
0.2
0.3
0.4
0
2
4
6
8
10
12


Hazard Function for patterns 1 - 4
Self-assessed poor health
Cum Hazard
Survey wave
Occupation (SOC): current main job
Nursing and midwifery professionals
Nursing auxiliaries, care assistants and home carers
Primary and nursery education teaching professionals
Secondary education teaching professionals
0.0
0.1
0.2
0.3
0.4
0
2
4
6
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12

## 8.8 Conclusion

Older workers irrespective of occupations were more likely to exit the occupation. Poor self-assessed health in secondary education teaching professionals was associated with a higher risk of workforce exit. Smoking status in primary and nursery education teaching professionals was associated with workforce exit. Compared to nursing and midwifery professionals, people employed as nursing auxiliaries, care assistants and home carers were significantly more likely to leave the workforce. No other predictors were significantly associated with workforce exit in the sample.

The finding that older workers were more likely to leave the workforce is in line with other studies, which mainly focused on retirement. Perera, Sardeshmukh and Kulik's (2015) cross-sectional study of twenty-four workers aged 45 years or over who had recently left full-time employment in Australia reported that there were three distinct decision options – retirement, change jobs or take a break from the labour market.

A meta-analysis of twenty-nine longitudinal studies on associations between poor health and exit from the labour market showed that self-assessed poor health was a risk factor for transition into disability pension (relative risk (RR) 3.61; 95% CI 2.44-5.35), unemployment (RR 1.44; 95% CI 1.26-1.65) and early retirement (RR 1.27; 95% CI 1.90-2.33) (van Rijn, Robroek, Brouwer, and Burdorf, 2014). The results presented here partly corroborate that self-assessed poor health was a risk factor for exit from the labour market among secondary education teaching professionals, but not among nursing and midwifery professionals, nursing auxiliaries, care assistants and home carers, or primary and nursery education teaching professionals. Two possible explanations may be considered. First, nursing and midwifery professionals, nursing auxiliaries, care assistants and home carers, primary and nursery education teaching professionals have a more hands on caring role compared to secondary education teaching professionals due to the client range and/or reason for contact. Second, secondary education teaching professionals may have more of a stressful role-preparing teenagers for vital exams which will have both a direct and indirect effect on their futures.

Previous studies have reported the importance of smoking on exit from the labour market. A cohort study (Hagger-Johnson et al., 2017) of 7704 respondents (5392 males) in the Whitehall II study of found that males reporting to smoke were at higher risk of exiting the labour market (RR 1.49; 95% CI 1.24-1.78, $p<0.05$) and no significant risk among females (RR 0.81; 95% CI 0.63-1.03, $p>0.05$). These findings were not replicated in this study with smoking status in primary and nursery education teaching professionals only associated with exit from the occupation.

### 8.8.1 Strengths and limitations

The longitudinal nature of workforce exit among different health worker groups is one benefit of this study. There is one main limitation associated with this study. Subtle variation in the wording of the self-assessed health question and scale used in the BHPS and Understanding Society could have obscured results. From the analysis of these dataset separately the risk was rated as low.

### 8.8.2 Summary

The study presented in this chapter sought to address one main aim: to identify the consequences of poor health among health professionals, health associate professionals, therapists, healthcare related personal services, and teaching professionals. To achieve this there were two key questions. Firstly, how many nurses, care workers and teachers in the UK that reported self-assessed poor health left the workforce between 2003 and 2016? The proportion of workers reporting self-assessed poor health in each occupation that left the workforce over the study period was presented, 11.8% of nursing auxiliaries, care assistants and home carers, 10.3% of secondary education teaching professionals, 8.8% of primary and nursery education teaching professionals, and 7.4% of nursing and midwifery professionals. Secondly, are occupation and self-reported health, health behaviours and work characteristics associated with workforce exit amongst health workers and teachers? The influences of demographics, self-assessed health, smoking status and overall life satisfaction were largely found to be insignificant in occupational groups under study.

# Chapter 9 Conclusions and discussion

## 9.1 Introduction

This chapter first provides a summary of answers to each of the thesis' research questions and associated studies. It then goes on to discuss the findings in relation to the wider literature and other relevant theories. Limitations are discussed prior to an examination of implication for future research and recommendations covering a range of areas.

Increasing employment and maintaining sustained employment are central to many government policies and agendas on public health and welfare reform in many industrialised countries. With active engagement in paid employment generally assumed to have a protective effect on health (Waddell and Burton, 2006) and discontinued employment adversely effecting health (von Bonsdorff et al., 2016), maintaining sustained employment is important.

The health of nurses and other public service workers is important, not only for health systems and patients, but for the workers themselves (Waddell and Burton, 2006). Poor health is associated with sickness absence (Kivimäki et al., 2003; Singh-Manoux et al., 2006), reduced productivity, and patient safety concerns, as well as reduced satisfaction with life (Marmot et al., 1991). Despite the importance of health for health workers, there is strong evidence in the literature to suggest that their health is problematic.

The aim of this thesis was to identify the effect of work on the health of those described as health workers and if this might lead to early exit from the workforce. To achieve this aim, there were six objectives:

A. To review the current literature on the self-reported prevalence of tobacco smoking, physical activity, alcohol consumption, and dietary habits, specifically sugar, fat and fruit and vegetable intake, among nurses and student nurses internationally.
B. To compare the health status of nursing and midwifery professionals to those in caring personal services, health and social service managers and directors, managers and proprietors in health and care services, teaching and educational professionals and *other occupations* in the UK.
C. To compare the self-reported health and satisfaction with life of nursing and midwifery professionals to: caring personal services; health and social service managers and directors; managers and proprietors in health and care services; teaching and educational professionals; and *other occupations* in the UK.
D. To assess the importance of behavioural influencing factors on the health of nurses in comparison to: other health professionals; care workers; teachers; and *other occupations* in Scotland.
E. To conduct a comparative analysis of health and satisfaction with life of: nurses and other health professionals; care workers; teachers; and *other occupations* in Scotland.

F. To examine the relation of poor health to early workforce exit of nursing and midwifery professionals in comparison to: nursing auxiliaries, care assistants and home carers; primary and nursery education teaching professionals; and secondary education teaching professionals in the UK.

This thesis began with a review of the literature relating to determinants of health as identified in Dahlgren and Whitehead's (1991) model of factors known to influence health (see Chapter 2). The review identified literature available on factors potentially influencing health state and health problems, from individual level determinants of poor health such as tobacco smoking and alcohol consumption, to income and area deprivation. This chapter provided a basis on which the remaining work presented in this thesis was built.

An integrative review of available evidence relating to the health behaviours of pre- and post-registered nurses internationally, based on a systematic search of three electronic databases, was presented in Chapter 3. The review identified 156 relevant studies, of which 113 measured tobacco smoking, 64 physical activity, 52 alcohol consumption, and 18 dietary habits, primarily among high-income countries. The main findings from this review were: 89.2 percent of qualified nurses reported to meet the government recommendations of physical activity compared to 46.0 percent of student nurses, between 0.8 percent and 17.0 percent of nurses reported heavy alcohol consumption compared with 33.0 percent of student nurses, 40.1 percent of nurses reported consuming five fruit and vegetable portions a day compared with 27.4 percent of student nurses. These findings indicate a pattern of unhealthy behaviours among qualified and student nurses, with student nurses often fairing the worst. These findings suggest potential health problems in the future workforce.

In Chapter 4, the data accessed for this research study and the analyses employed were described. The analysis provides descriptive statistics with 95 percent confidence intervals on the health, health behaviours and impact of health on employment. Next, logistic regression models were applied to give the odds ratios of groups in the sample reporting the health outcome of interest or the risk of workforce exit due to poor health.

The study in Chapter 5 described the health status of nursing and midwifery professionals relative to other occupations in the UK. The study used data on 197,867 individuals who participated in the APS between January and March 2016 and reported an occupation. From the analysis it was shown that many predictors of health investigated within the regression models were not statistically significant. Younger workers were significantly less likely to report a current disability than older workers (particularly among nursing and midwifery professionals, health professionals, caring personal services, teaching and educational professionals and those in *other occupations*). The presence of a current disability was correlated with reporting dissatisfaction with life for nursing and midwifery professionals, health professionals, therapy professionals and caring personal services. In most occupational groups, few variables were found to be associated with individuals self-reporting a health problem of more than one year's duration.

Potential associations between health determinants, the health status of workers and the susceptibility of workers in different occupations to health problems was described in Chapter 6. The LFS study population consisted of 61,921 workers in the UK across eight occupational groups – nursing and midwifery professionals, health professionals, therapy professionals, caring personal services, health and social services managers and directors, managers and proprietors in health and care services, teaching and educational professionals, and *other occupations* – who participated in the LFS between January to March 2016. From the analysis in this thesis it was found that females, older people and those in *other occupations* generally reported the highest prevalence of poor health.

Descriptive statistics were generated to explore the distribution of health by individual characteristics and health behaviours among nurses relative to other health professionals, care workers, teachers and *other occupations.* The SHeS collected information on 10,164 individuals between 2012 and 2014 who reported to be in employment at point of survey. It was evident from the analysis that care workers reported the highest levels of poor health, partly explained by higher rates of tobacco smoking, excess alcohol consumption and high sugar intake. As one would expect, younger workers appeared to be more resilient to poor health than older workers.

In Chapter 8, the consequences of poor health among (i) nursing and midwifery professionals, (ii) nursing auxiliaries, care assistants and home carers, (iii) primary and nursery education teaching professionals and (vi) secondary education teaching professionals, in relation to early workforce exit over a thirteen-year period, 2003 and 2016, was investigated. Results showed that, as expected, older workers had a higher risk of workforce exit. Smokers were more likely to leave the workforce than non-smokers. Other demographics, self-assessed health and overall satisfaction with life were generally not significantly associated with workforce exit among all occupations (nursing and midwifery professionals, primary and nursery education teaching professionals, and secondary education teaching professionals) at the 5 percent level.

## 9.2 Answers to research questions

The study addressed nine research questions. The questions, and subsequent findings, are presented below.

1. **What is the international evidence of the prevalence of tobacco smoking, physical activity, alcohol consumption, and dietary habits, specifically sugar, fat and fruit and vegetable intake, among nurses and student nurses?**

The prevalence of health behaviours reported by nurses varied between countries. For example, between 1:100 (Yang, Yang and Pan, 2001) to 7:10 (Kenna and Wood, 2004). The prevalence of nurses categorised as heavy alcohol users consuming five or more drinks per occupation ranged between less than 1:100 (past month) (Kenna and Wood, 2004) to 2:5 (past year) (Trinkoff et al., 2000). Under one in a hundred nurses reported to consume foods high in fat and sugar two to three times a day (Malik et al., 2011). Between less than 1:100 (Happell, Gaskin, Reid-Searl and Dwyer, 2014) and 1:50 (Fair et al., 2009) reported to consume five or more portions of fruit and between 1:10 (Fair et al., 2009) and 2:5 (Happell et al., 2014) consumed vegetables daily.

Student nurses' health behaviours were generally poor, evident by the high prevalence of tobacco smoking, low physical activity, high alcohol consumption and poor dietary habits. Between under one in a hundred (Klainin-Yobas, He and Lau, 2015) and one in two (Andrea, Walter, Elena, Alfea and Piersante, 2001) reported to smoke and only half met government physical activity recommendations (Malik et al., 2011). One in three student nurses were categorised as heavy alcohol users (Hensel, Middleton and Engs, 2014). One in three student nurses reported to consume foods high in sugar and one in five ate foods high in fat everyday (Blake and Harrison, 2013). Between one in five (Blake et al., 2011; Malik et al., 2011) and one in three (Blake and Harrison, 2013) reported to consume five fruit and vegetable portions daily.

Thus, there seems to be a large variation of tobacco smoking, physical activity, alcohol consumption, and dietary habits among nurses and student nurses when compared internationally. There are many cases where dangerous levels of consumption are reported, especially for student nurses.

2. **What is the percentage of nursing and midwifery professionals compared to other professions and occupations in the UK, who report a current disability, health problem that affects the amount or kind of work undertaken, and low satisfaction with life associated with disability or health problems?**

Compared to nursing and midwifery professionals, the percentage of workers reporting a current disability varied by occupation. Disability was reported by 11.1 percent (95% CI 11.0, 11.2) of nursing and midwifery professionals compared to 7.1 percent (95% CI 6.9, 7.1) of other health professionals. A similar percentage of disability was reported by nursing and midwifery professionals, therapy professionals and teaching and educational professionals (11.1%, 95% CI 11.0, 11.2; 11.1%, 95% CI 11.0, 11.3; and 10.8%, 95% CI 10.8, 10.9 respectively). A higher percentage of caring personal service workers (16.8%, 95% CI 16.7, 16.9), health and social services managers and directors (12.1%, 95% CI 11.9, 12.3), managers and proprietors in health and care services (16.2%, 95% CI 15.6, 16.8), and those in *other occupations* (25.1%, 95% CI 20.0, 20.0) reported a disability compared to nursing and midwifery professionals.

The percentage of workers reporting to have a health problem that affected the amount or type of work they were able to do when compared was generally similar among front line workers and higher in workers in *other occupations.* For example, 24.7 percent (95% CI 24.4, 24.9) of nursing and midwifery professionals reported a health problem that affected the amount of work they were able to undertake compared to 46.7 percent (95% CI 46.6, 46.7) of those in *other occupations.* Twenty-seven percent of nursing and midwifery professionals (95% CI 26.8, 27.2), reported a health problem that affects the kind of work they are able to do compared to 27.3 percent of therapy professionals (95% CI 26.8, 27.8), 28.6 percent of teaching and educational professionals (95% CI 28.5, 28.8) and 51.5 percent of *other occupations* (95% CI 51.5, 51.5).

Nursing and midwifery professionals were generally less satisfied with their life than other front-line health service workers, excluding caring personal service workers, and more satisfied than those in non-health occupations. On average, nursing and midwifery professionals reported a satisfaction with life score of 7.88 (*SD* = 1.45) compared to 7.93 (*SD* = 1.36) for health professionals and 8.03 (*SD* = 1.22) for therapy professionals. The average score in caring personal services was 7.53 (*SD* = 1.76). Among non-health workers, satisfaction with life scores were lower: 7.87 (*SD* = 1.35) in teaching and educational professionals and 7.57 (*SD* = 1.78) in *other occupations.*

These findings indicate that nursing and midwifery professionals report fewer health problems that impact on their work compared to caring personal service workers and those in *other occupations.* There may be something about being a nursing or midwifery professional per se that has a protective effect on health or it may be that nursing and midwifery professionals are drawn from more affluent areas of society compared to caring personal service workers. Educational attainment may partly explain the difference seen between nursing and midwifery professionals and *other occupations.*

**3. What role do demographic and work variables play in explaining the percentage of nursing and midwifery professionals, compared to other professions and occupations in the UK, who report a current disability, health problem which affects the amount or kind of work undertaken, and low satisfaction with life associated with disability or health problems?**

This question was reformulated to test predefined hypotheses with the following alternative hypotheses accepted:

$H_a$: There is a significant association between demographics and the occurrence of current disability reported by nursing and midwifery professionals compared to: caring personal services; health and social service managers and directors;

managers and proprietors in health and care services; teaching and educational professionals; and *other occupations* in the UK.

$H_a$: There is a significant association between demographics and the occurrence of a health problem affecting the amount or kind of work reported by nursing and midwifery professionals compared to: caring personal services; health and social service managers and directors; managers and proprietors in health and care services; teaching and educational professionals; and *other occupations* in the UK.

$H_a$: There is a significant association between demographics and self-reporting low satisfaction with life among nursing and midwifery professionals compared to: caring personal services; health and social service managers and directors; managers and proprietors in health and care services; teaching and educational professionals; and *other occupations* in the UK.

The extent to which demographic and work variables explain the percentage of nursing and midwifery professions, compared to other professions and occupations in the UK, who reported a health outcome when examined varied between each health measure. For example, significant predictors of current disability were older age bands, being female, of white ethnic origin and working full-time. Being female, of non-white ethnic origin and working part-time were also significant predictors of a health problem that could affect the amount of work an individual is able to do. Younger age bands were statistically significantly less likely to report a health problem that affects the amount of work they are able to do compared to those aged 40-49. Significant predictors of a health problem that affects the type of work an individual is able to do were being of non-white ethnic origin and working part-time.

Individuals aged 17-29 and 60-69 were slightly less likely compared to those aged 50-59, although the differences were statistically significant. Significant predictors of low satisfaction with life were being male and of non-white ethnic origin. Compared to the age band 40-49, all other age bands were significantly less likely to report low satisfaction with life.

Adjusting for the predictors mentioned above indicated a significant difference between nursing and midwifery professionals and caring personal services and *other occupations*. For instance, compared to nursing and midwifery professionals, caring personal services and *other occupations* were significantly more likely to report a current disability, or a health problem that affects the amount or type of work they are able to do, and lower satisfaction with life.

Thus, there seems to be variations in the extent to which demographics and work variables explain health outcome differences in nursing and midwifery professionals compared to other professions and occupations in the UK. There are only a few occupations where demographics and work variables explain occupational prevalence differences.

**4. What is the percentage of: back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; 'depression or bad nerves'; and progressive illness among nursing and midwifery professionals compared to other professions and occupations in the UK?**

Nursing and midwifery professions generally reported fewer health problems compared to other professions and occupations. Three percent of nursing and midwifery professionals reported a back or neck problem (2.9%, 95% CI 2.9, 2.9) compared to 7.2 percent (95% CI 7.1, 7.4) of health professionals, 5.2 percent (95% CI 5.2, 5.3) of therapy professionals, 6.4 percent (95% CI 6.4, 6.4) of caring personal services, 7.4 percent (95% CI 7.2, 7.6) of health and social service managers and directors, 7.2 percent (95% CI 7.0, 7.4) of managers and proprietors in health and care services, 3.7 percent (95% CI 3.7, 3.8) of teaching and educational professionals and 8.3 percent (95% CI 8.3, 8.4) of *other occupations.* Under five percent of nursing and midwifery professionals reported a heart, blood pressure or circulation problem (4.6%, 95% CI 4.5, 4.7) compared to 6.8 percent (95% CI 6.7, 6.9) of therapy professionals, 7.0 percent (95% CI 7.0, 7.0) of caring personal services, 8.7 percent (95% CI 8.5, 8.9) of health and social service managers and directors, 7.1 percent (95% CI 6.9, 7.3) of proprietors in health and care services, 4.7 percent (95% CI 4.7, 4.7) of teaching professionals and 8.9 percent (95% CI 8.9, 8.9) of *other occupations*. Under two percent of nursing and midwifery professionals reported to have diabetes (1.6%, 95% CI 1.6, 1.6) compared to 3.1 percent (95% CI 3.1, 3.1) of therapy professionals, 3.6 percent (95% CI 3.6, 3.6) of caring personal services, 4.7 percent (95% CI 4.6, 4.8) of health and social service managers and directors, 2.0 percent (95% CI 2.0, 2.0) of teaching and educational professionals and 3.7 percent (95% CI 3.7, 3.7) of *other occupations*. The percentage of individuals self-reporting 'depression, bad nerves or anxiety' was 1.4 percent (95% CI 1.4, 1.4) in nursing and midwifery professional compared to 2.0 percent (95% CI 2.0, 2.0) of health professionals, 3.7 percent (95% CI 3.7, 3.7) of therapy professionals, 7.1 percent (95% CI 7.1, 7.1) of caring personal services, 4.6 percent (95% CI 4.5, 4.7) of health and social service managers and directors, 4.0 percent (95% CI 3.9, 4.1) of managers and proprietors in health and care services, 4.0 percent (95% CI 4.0, 4.1) of teaching and educational professionals and 7.2 percent (95% CI 7.2, 7.2) of *other occupations*. Under one percent of nursing and midwifery professionals reported a progressive illness (0.8%, 95% CI 0.8, 0.8) compared to 1.0 percent (95% CI 1.0, 1.0) of therapy professionals, 1.2 percent (95% CI 1.2, 1.2) of caring personal service workers, 2.5 percent (95% CI 2.4, 2.6) of health and social services managers and directors, 1.4 percent (95% CI 1.4, 1.4) teaching and educational professionals, and 2.0 percent (95% CI 2.0, 2.0) of *other occupations*.

Thus, nursing and midwifery professionals seem to have fewer health problems than other professions and occupations included in the analysis. There is even a case where fewer nursing and midwifery professionals report the presence of a back or neck problem compared to less physical occupations such as office-based workers (health and social service managers and directors, and managers and proprietors in health and care services).

5. **What is the association with demographics and work variables and the occurrence of: back and neck problems; heart, blood pressure or circulation problems; diabetes mellitus; 'depression or bad nerves'; and progressive illness among nursing and midwifery professionals compared to other work groups?**

This question was reformulated to test alternative hypotheses with the following hypotheses accepted:

$H_a$: There is a significant association between demographics and work variables and the occurrence of reporting back and neck problems reported among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between demographics and work variables and the occurrence of reporting heart, blood pressure or circulation problems among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between demographics and work variables and the occurrence of reporting diabetes mellitus among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between demographics and work variables and the occurrence of reporting 'depression or bad nerves' among nursing and midwifery professionals compared to other work groups.

$H_a$: There is a significant association between demographics and work variables and the occurrence of reporting a progressive illness among nursing and midwifery professionals compared to other work groups.

The extent to which demographics and work variables predicted the occurrence of different health conditions among nursing and midwifery professionals compared to other work groups varied. For example, significant predictors of back or neck problems were older age bands, being female, and working part-time. Predictors of progressive illness were older age bands, being female and of white ethnic origin. Conversely, analysis showed that older age bands, being male and of non-white ethnic origin were significant predictors of a heart, blood pressure or circulatory problem and diabetes in the sample. Then again, the only significant predictor of reporting 'depression, bad nerves or anxiety' within the sample was part-time work.

Following adjustment of demographics and work variables, many occupational groups were seen to be significantly more likely to report many of the health conditions compared to nursing and midwifery professionals. For example, caring personal services and *other occupations* were significantly more likely to report all the conditions under study excluding progressive illness. Therapy professionals were significantly more likely to report a heart, blood pressure or circulatory problem and diabetes compared to nursing and midwifery professionals. Compared to nursing and midwifery professionals, health professionals, caring personal services and *other occupations* were significantly more likely to report a back or neck problem. A significant difference was also seen in the prevalence of diabetes and reporting 'depression, bad nerves or anxiety' with health and social service managers and directors significantly more likely to report these than nursing and midwifery professionals. Teaching and educational professionals were significantly more likely to report 'depression, bad nerves or anxiety' compared to nursing and midwifery professionals.

These findings indicate that the composition of the workforce is important with different demographic characteristics predicting the presence of different health conditions. Nonetheless, occupational factors also have an impact on health as shown by certain occupations which are at greater risk of different health conditions.

6. **What percentage of: nurses; other health professionals; care workers; teachers; and *other occupations* in Scotland self-report to smoke tobacco, engage in physical activity, and consume alcohol and fruit and vegetables?**

Nurses generally reported healthier behaviours compared to care workers and *other occupations*. For example, 22.5 percent (95% CI 16.0, 29.0) of nurses reported to smoke compared to 47.6 percent (95% CI 42.6, 52.6) of care workers and 57.1 percent (95% CI 41.6, 44.2) of *other occupations*. Almost half of nurses reported to engage in physical activity on five or more days a week (49.5%, 95% CI 43.7, 55.3) compared to 46.7 percent (95% CI 42.6, 50.8) of care workers and 44.1 percent (95% CI 43.1, 45.1) of *other occupations*. Hazardous alcohol consumption was reported by 15.2 percent (95% CI 11.1, 19.3) of nurses compared to 16.2 percent (95% CI 13.2, 19.2) of care workers and 22.1 percent (95% CI 21.3, 22.9) of *other occupations*. Fewer care workers and those in *other occupations* reported to consume five or more portions of fruit and vegetables compared to nurses (21.8%, 95% CI 18.4, 25.2; 20.6%, 95% CI 19.8, 21.4; and 28.2%, 95% CI 23.0, 33.4 respectively). A lower mean sugar consumption score was seen among nurses ($M$ = 0.91, $SD$ = 0.61) compared to care workers ($M$ = 0.85, $SD$ = 0.59) and *other occupations* ($M$ = 0.83, $SD$ = 0.58).

There were mixed findings about the health behaviours reported by nurses compared to other health professionals and teachers. For example, a higher percentage of nurses reported to smoke compared to other health professionals and teachers (22.5%, 95% CI 16.0, 29.0; 10.9%, 95% CI 4.1, 17.7; and 15.8%, 95% CI 10.0, 21.6 respectively). However, a high number of nurses engaged in physical activity on five or more days a week: 49.5 percent (95% CI 43.7, 55.3) of nurses, 43.3 percent (95% CI 36.6, 50.0) of other health professionals and 39.7 percent (95% CI 34.8, 44.6) of teachers. Hazardous alcohol consumption was also lower among nurses compared to other health professionals and teachers (15.2%, 95% CI 11.1, 19.3; 22.0%, 95% CI 16.3, 27.7; and 22.4%, 95% CI 18.2, 26.6 respectively). The percentage of workers who reported to consume five or more portions of fruit and vegetables was higher among nurses compared to other occupations: 28.2 percent (95% CI 23.0, 33.4) of nurses, 41.2 percent (95% CI 34.5, 47.9) of other health professionals and 31.9 percent (95% CI 27.3, 36.5) of teachers.

Thus, occupational type and educational level are seen to be important factors in the type of health behaviours workers engage in.  There are cases where the levels of unhealthy behaviours are higher and lower in occupational groups under study when compared to nurses.

7. **What is the association between health behaviours, demographics and: (i) self-assessed health; (ii) the presence of a long-term illness; (iii) the presence of a mental health condition; and (iv) satisfaction with life among nurses compared to other occupational groups in Scotland?**

This was reformulated to test alternative hypotheses with the following hypotheses accepted:

$H_a$: There is a significant association between health behaviours, demographics and the risk of being in fair/bad/very bad self-assessed health among nurses compared to other occupational groups in Scotland.

$H_a$: There is a significant association between health behaviours, demographics and the presence of a long-term illness among nurses compared to other occupational groups in Scotland.

$H_a$: There is a significant association between health behaviours, demographics and the presence of a mental health condition among nurses compared to other occupational groups in Scotland.

$H_a$: There is a significant association between health behaviours, demographics and being satisfied with life among nurses compared to other occupational groups in Scotland.

The association between health behaviours, demographics and: (i) self-assessed health; (ii) the presence of a long-term illness; (iii) the presence of a mental health condition; and (iv) satisfaction with life among nurses compared to other occupational groups in Scotland varied. First, fair/bad/very bad self-assessed health was associated with older age bands. Compared to nurses, care workers and *other occupations* were more likely to report fair/bad/very bad self-assessed health. Smokers, those not in the lowest sedentary category and those consuming none or less than five portions of fruit and vegetables a day were at increased risk of fair/bad/very bad self-assessed health. Second, older age groups and being female were significant predictors of a long-term illness. Compared to nurses, care workers were significantly more likely to report a long-term condition. Health behaviour predictors of a long-term condition were being a smoker and all sedentary categories. Third, predictors of reporting a mental health condition were being a smoker, being in one of the three most sedentary categories and consuming no fruit and vegetable portions. Fourth, among the sample, predictors of low satisfaction with life were being in the groups of care workers or *other occupations*, being a smoker, having a high amount of sedentary time and consuming no portions of fruit and vegetables.

Thus, while there are variations in the association between health behaviours, demographics and health among nurses compared to other occupational groups, health behaviours are seen to play an important role. Each health outcome being examined was associated with at least one unhealthy health behaviour.

8. **What percentage of nursing and midwifery professionals who reported poor health left the workforce between 2003 and 2016 compared to other occupational groups?**

Nurses who reported poor health were generally less likely to leave the workforce over a thirteen-year period compared to other health occupations. For example, between 2003 and 2016, 23.0 percent (95% CI 19.0, 27.0) of nurses left the workforce compared to 30.8 percent (95% CI 24.8, 36.8) of nursing auxiliaries, care assistants and home carers and 28.6 percent (95% 22.9, 34.3) of secondary education teaching professionals reporting poor self-assessed health.

9. **How do demographics and behavioural variables and life satisfaction relate to early workforce exit of nurses and midwives compared to other occupational groups?**

This was reformulated to test alternative hypothesis with one hypothesis being accepted:

$H_a$: There is a significant association between demographics and early workforce exit among nurses and midwives compared to other occupational groups.

There were few associations between demographics and behavioural variables and life satisfaction to early workforce exit in nurses and midwives compared to other occupational groups. Age was the only predictor of workforce exit in: nursing and midwifery professionals; nursing auxiliaries, care assistants and home carers; primary and nursery education teaching professionals; and secondary education teaching professionals in the UK. Compared to nursing and midwifery professionals, those working as nursing auxiliaries, care assistants and home carers were significantly more likely to leave the workforce ($p<0.001$).

These findings indicate that predicting early workforce exit among nurses and midwives and other occupational groups is complex.

## 9.3 Discussion of main findings

The main findings from this study are discussed in relation to five key areas – other literature, relevant theories, existing policy, future policy and ideas, and possible directions for future research.

### 9.3.1 Other literature

The survey data analysed in this thesis demonstrates an increase in the number of workers reporting poor self-assessed health as age increased (discussed in Chapter 7). This is consistent with findings from van Kippersluis et al. (2009) who reported a moderate steady decline in general health until the age of 70 (discussed in Chapter 2). The Asakawa and Senthilselvan (2012) study reported a very small decline in general health as age increased until the age of 60 when it rapidly decreases.

Overall, females in the study presented in this thesis reported poorer self-assessed health than their male counterparts, which is consistent with previous studies (Oksuzyan et al., 2008; Pappas et al., 2005). Proposed explanations for this difference have largely been rooted in biological, social and psychological interpretations. Biologically, women have unique health needs over and above those of men due to factors including genetics, hormones, pregnancy and childbirth and disease patterns

(Vlassoff, 2007). Socially, women have been treated as socially inferior in some countries with gendered behavioural and cultural norms and values impinging on health (e.g. income, education, health care and diet) (WHO, 2009). Psychologically, middle-aged women have poor general wellbeing and are more susceptible to depression (Sampselle, Harris, Harlow and Sowers, 2002), which may lead them to report poorer self-assessed health.

There was some evidence to indicate that having child dependents were an important predictor of many health conditions in the analysis reported in this thesis. Conditions include: back or neck problems; heart, blood pressure or circulatory problems; diabetes; 'depression, bad nerves and anxiety'; and a progressive illness. A review of the literature on parents in the UK labour market, looking at workers with and without children produced little evidence to support or dispute these findings. Many studies have focused solely on working mothers whereas the study presented in this thesis did not differentiate between mothers and fathers. For example, Adhikari (2012) found that compared to non-working mothers, working mothers experienced significantly higher levels of depression and anxiety. Conversely, other literature has focused on the work-family conflict and its association with health.

All respondents in the study presented in this thesis categorised as a nurse, other health professional or teacher were significantly less likely to report poor self-assessed health compared to those in *other occupations*. One potential explanation for this finding is that these occupations require a degree level qualification or above. Nagel et al. (2008) suggested that low educational attainment is associated with poor self-assessed health (as discussed in Chapter 2). Ross and Wu (1995) took this further proposing that well-educated people are more likely to have subjectively rewarding jobs, higher incomes and, thus, lower economic hardship. Moreover, nurses, other health professionals and teachers are likely to have a higher level of health literacy than those in *other occupations* by virtue of their professional role. This is important. In the Protheroe et al. (2016) cross-sectional study (discussed in Chapter 2) those with low health literacy were significantly more likely to report poor health than those with marginal health literacy (OR 5.28; 95% CI 3.00, 9.29; p<0.001). Marginal health literacy was defined as a score of 2-3 on the Newest Vital Sign tool. The tool quickly assesses an individual's health literacy skills in three minutes using an ice cream nutrition label and a series of questions about it. The more questions an individual gets correct, the better their health literacy.

The type of occupation in which an individual was employed appeared to be an important factor in the prevalence of back and neck problems reported by each occupation in the study. Nursing and midwifery professionals reported the lowest prevalence of back or neck problems in the sample – lower than health and social service managers and directors, and managers and proprietors in health and care services. This finding contradicts evidence from the literature such as the work of Abenhaim et al. (1988) and Fronteira and Ferrinho (2011) who found that musculoskeletal disorders, such as back or neck problems, were more common among nurses than comparison groups used by studies, such as white-collar workers, working women and the general population.

The work of Fronteira and Ferrinho (2011) cited above related to a systematic review of 187 experimental and observational studies on the physical health profile of nurses, of which 23 cross-sectional studies examined musculoskeletal disorders in nurses – such as back and neck problems (two of which involved UK samples). The reviewers assessed the validity of included studies and concluded that of the 23 studies, 20 had low internal validity and five had low external validity. This is consistent with the review of the literature given in this thesis, with many studies affected by selection, performance and/or exclusion bias.

The explanation of the contrast between the above conclusions and the findings of the current study, in which nurses were found to have a lower prevalence of back and neck problems, is unclear. The difference may be partly attributable to a subtle variation in the make-up of the sample. Existing research has predominantly examined back and neck problems among hospital-based nurses. The study presented in this thesis did not differentiate between settings and this difference may partly account for the evident disparities. Nevertheless, the physical demands of the nurse's role are associated with an increased risk of musculoskeletal injury and disease (Trinkoff et al., 2003). Conversely, there is strong evidence showing a clear link between psychological health (e.g. stress, distress and anxiety) and back or neck problems (Linton, 2000). The findings in this thesis may be more reflective of a wider situation, whereby health workers, such as nurses, with injuries may move role and skew the figures.

Caring personal services and managers (including health and social service managers and directors, and managers and proprietors in health and care services) in the study were significantly more likely to report a back or neck problem compared to those in *other occupations*. In the case of caring personal service staff, occupational factors including movements such as heavy lifting, bending and twisting (Da Costa et al., 2012; Ramond et al., 2011), monotonous repetitive tasks, perceived high workload and time pressures (Luttmann et al., 2003) have been reported to contribute to back and neck injuries. These factors may underpin the role of caring personal service workers and managers, and thus explain some of the differences seen. Moreover, lack of decision-making authority (Luttmann et al., 2003) and stress (Nia et al., 2013) have also been linked to increased rates of back and neck injury. This may potentially explain why caring personal service workers experience higher levels of back and neck problems.

The holistic role occupation can have on workers' health is important, particularly in relation to cardiovascular outcomes such as heart, blood pressure and circulation problems. The idea that occupational elements (e.g. physical, mental, biological, chemical, social, and economic) should be viewed as a whole and not a collection of parts is important when examining workers' health as they are all interconnected and impact on health. In the study presented in this thesis, the proportion of health workers reporting heart, blood pressure or circulation problems was lower among hands-on workers (e.g. therapy professionals, health professionals, nursing and midwifery professionals and caring personal services) than white-collar workers (e.g. health and social service managers and directors, and managers and proprietors in health and care services). This is consistent with the wider literature, with workplace stress correlated with an increase in the risk of cardiovascular outcomes (Brown et al., 2003; Cavalheiro et al., 2008; Kivimäki et al., 2012). There are two potential explanations for this. First, managers have greater stress and therefore a higher risk of cardiovascular complications. Alternatively, hands-on workers have greater mobility during the working day and more physical exercise contributing to a better cardiovascular risk profile despite comparable stress levels. Desk-bound workers are predisposed to higher cardiovascular complications by virtue of their work and not their stress levels.

In the UK, over 4.5 million people are living with either type I or type II diabetes (Diabetes UK, 2016) in a population size of 65.6 million (ONS, 2017a), equivalent to 6.9 percent of the UK population. Similar findings were not found in this analysis with less than 5 percent reporting to have diabetes. Differences in prevalence may potentially be due to differences in populations. For example, Diabetes UK measured diabetes among working and non-working people whereas we measured diabetes among the working population only. The prevalence of diabetes of any type was significantly lower among health professionals and teaching and educational professionals than those in the *other occupations* group after adjusting for demographics. Examining the prevalence of diagnosed diabetes of any type by UK country using figures from Diabetes UK (2016) and population estimates from ONS (2017) gives the following information: England 5.3 percent, Northern Ireland 4.6 percent, and Scotland 5.0 percent. This was consistent with the findings in this analysis with workers in Northern Ireland ($r= -0.869$, $p<0.05$) and Scotland ($r= -0.279$, $p<0.05$) being less likely to self-report diabetes of any type compared to those in England.

Each year it is estimated that approximately one in four people in the UK experiences a mental health problem (McManus et al., 2009). Similar findings were not found in this analysis with under one in ten respondents in the LFS reporting a mental health problem (7.0%). However, this difference may be partly explained in that this study only measures the prevalence of three types of mental ill health – 'depression, bad nerves and anxiety'.

The analysis of health workers in the SHeS showed that care workers reported the highest proportion of mental health illness. This is consistent with existing research with one component of mental health, depression, higher among care workers (16.4%) than health practitioners and therapists (3.1%) (Fan et al., 2012). The prevalence is higher in those from a lower educational background or on lower incomes (Santin et al., 2009), such as care workers. Determining which type of mental health illness was most prevalent among care workers in the SHeS was outwith the scope of this study.

The proportion of workers reporting the presence of a mental health condition typically increased with age until the age of 40-49, thereafter a decrease was noted (see Chapter 7). Analysis of the LFS found that the proportion of workers reporting 'depression, bad nerves or anxiety' increased with age until the age of 50-59 but then decreased (see Chapter 6). The precise reason for this decline is unclear. Arguably, some older workers may have taken up more senior roles in the workplace and thus have more control over their work but, conversely, responsibility may bring increased stress. Alternatively, older workers may be more resilient to mental health conditions, such as depression and stress, due to an accumulation of life years and experiences. Crucially, these explanations are not evidence based. While speculative, potential reasons for the ten-year difference in age bands whereby the proportion reporting a mental health condition decreased could be:

(i) a difference in geographical location with one study conducted on a Scottish population and the other on a UK population. For example, Scotland has been reported to experience higher levels of excess morbidity and mortality over and above that explained by socioeconomic deprivation. This evidence has been derived from studies comparing Scotland's health profile with that of England and Wales, and Glasgow to Belfast and Manchester (Cruise and O'Reilly, 2015; Livingston and Lee, 2014; Seaman, Mitchell, Dundas, Leyland and Popham, 2015). A similar pattern has appeared in inner London (Orford et al., 2002).

(ii) differences in the years of data with January to March 2016 in the LFS and 2012 to 2014 in SHeS used in the analysis which might account for some of these differences.

The present study has found that risky health behaviours are prevalent among all occupational groups. Regression analyses conducted to examine the extent to which health behaviours explain differences in poor self-assessed health reported by each occupation indicated that tobacco smoking status was important. In fact, tobacco smoking was more important than occupation in predicting poor self-assessed health, presence of a long-term illness and mental health condition with the difference between smokers and non-smokers statistically significant at the 0.1 percent level.

Smokers were disproportionately drawn from lower socioeconomic groups (Hiscock et al., 2012; Meijer, Gebhardt, van Laar, Kawpis and Beijk, 2016) and those with a lower educational level and income (Margerison-Zilko and Cubbin, 2012). This was observed in the analysis presented in this thesis with the lowest proportion of smokers in the nursing profession and the highest in those employed as care workers. One potential explanation is that a higher proportion of care workers smoke by virtue of the socioeconomic group from which they are drawn. Alternatively, care workers may experience higher rates of workers who smoke to alleviate stress due to higher levels of workplace stress due to high demands and low control. More specifically, care workers are often directly managed by nurses and thus have high demands placed on them with little control over when and how they do many tasks. Published evidence has linked job stress and tobacco smoking with job stress being positively related to continuing to smoke as well as the number of cigarettes smoked by current smokers (Ayyagari and Sindelar, 2009). Ayyagari and Sindelar (2009) conducted a longitudinal study of the effect of job-related stress on the smoking behaviour of 10,775 workers aged 50 to 64 in 1992 in America using data from the 1992 to 2004 Health and Retirement Survey. Ayyagari and Sindelar (2009, p. 10) states "*job stress prevents smokers from quitting*." One potential explanation is in relation to relaxation. Kassel et al.'s (2003) review of the literature found that self-reported smokers perceived smoking to be calming, relaxing and to reduce stress. Given this, many workers who currently smoke may struggle to quit because of the stressful nature of their occupational role and thus it might be that occupations themselves that maintain the cycle of smoking cigarettes to relieve stress.

A variety of factors have been identified at an individual and societal level, which affects the pattern or amount of alcohol consumed by individuals. The WHO's (2014) Global Status Report on Alcohol and Health stated that harmful alcohol use is the leading cause of death in males aged 15-59. The ONS (2017b) report on alcohol-related deaths registered in the UK in 2015 highlighted that Scotland remains the UK constituent country with the highest rate of alcohol-related deaths. Males reported exceeding guidelines in greater numbers than females in the SHeS analysis presented in Chapter 7. Those aged 40-49 were reported to exceed safe alcohol guidelines in the largest numbers, with older people more susceptible to alcohol-related harm. Older people generally consume more alcohol than younger people (WHO, 2014), partly accounting for the differences in associated health problems. This may be due to an accumulated alcohol effect which manifests in later life. In this analysis, all health workers were more likely to remain within the safe alcohol consumption guideline limits than those in *other occupations*.

High sugar consumption can lead to obesity (Swinburn et al., 2004), which is a major contributor in the development of many health conditions (Mokdad et al., 2003). Descriptive analysis of the SHeS indicated a difference in the mean factor score of sugar intake between females and males, with females reporting higher intake of sugars than males. This finding was not supported in the literature with a higher percentage of free sugars consumed by males than females in Scotland (Allender et al., 2006). It is of interest that health literate professions consumed lower levels of sugar than non-health literate occupations.

The study showed that older workers have a higher risk of workforce exit, consistent with other studies. Murray et al.'s (2016) cohort study of 98,756 respondents aged 40-49 and working in 2001 presented evidence that as age increased, the proportion of workers in work declined from 90.0 percent for those aged 40-44 to 82.3 percent for 45-49 year olds, 57.8 percent for those aged 50-54, 29.6 percent for those aged 55-59 and 9.4 percent for 60-69 year olds. Although workforce exit was only examined in relation to remain or leave, other studies have examined workforce exit among older workers in relation to different exit routes. As discussed earlier, Perera et al.'s (2015) cross-sectional study of 24 workers aged 45 years or over who had recently left full-time employment in Australia reported that there were three distinct decision options – retirement, changing jobs or taking a break from the labour market. Unlike most other studies on older workers, Perera et al. (2015) used a qualitative exploratory approach to deepen understanding of employment decisions rather than exclusively focusing on exit from the labour market. This study was concerned with the association between self-assessed health, smoking status, overall life satisfaction and workforce exit among nursing and midwifery professionals, nursing auxiliaries, care assistants and home care workers, primary and nursery education teaching professionals, and secondary teaching and educational professionals. No strong associations were found, nevertheless, the findings from this study have important implications and advance current knowledge and understanding because prior to this study little research had examined the relationship between self-assessed health, smoking status, overall life satisfaction and workforce exit.

As previously mentioned, a meta-analysis of 29 longitudinal studies on associations between poor health and exit from the labour market showed that self-assessed poor health was a risk factor for transition into disability pension (relative risk (RR) 3.61; 95% CI 2.44-5.35), unemployment (RR 1.44; 95% CI 1.26-1.65) and early retirement (RR 1.27; 95% CI 1.90-2.33) (van Rijn et al., 2014). Similar findings were reported by Reeuwijk et al.'s (2017) longitudinal study of 5,273 workers in 11 European countries who participated in one of four national studies over a six-year period – the UK was not one of those countries. Reeuwijk et al. (2007) found that workers with poor health were more likely to leave the labour force than workers in good health. More specifically, poor health was a risk factor for disability benefit (HR 3.36; 95% CI 2.41-4.69) and unemployment (HR 1.43; 95% CI 1.04-1.97). Similar findings on the association between self-assessed poor health and occupational exit were not identified in the present study. One potential explanation for this is that larger organisations, such as publicly funded bodies (e.g. NHS), may be more equipped to support workers in poorer health to remain in work for longer through adapting their work demands to suit the employee. For example, nurses in poor physical health might be transferred into more managerial or administrative roles. However, proving or disproving this hypothesis was outwith the scope of the study.

Previous studies have reported the important influence of smoking on exit from the labour market. As mentioned earlier, a cohort study (Hagger-Johnson et al., 2017) of 7,704 respondents (5,392 males) in the Whitehall II study found that males who reported smoking were at higher risk of exiting the labour market (RR 1.49; 95% CI 1.24-1.78, $p<0.05$) while among females no significant risk was found (RR 0.81; 95% CI 0.63-1.03, $p>0.05$). Similar findings were not found in the present analysis with smoking status not a significant predictor of occupational exit in the regression models. The reason for this difference is unclear. The role of health workers can be stressful and it may be that workers manage this stress by smoking and therefore remain in the workforce.

### 9.3.2 Relevant theories

A life course approach may be important when interpreting findings from the analyses presented in this thesis. This is especially true in relation to interpreting findings from caring personal services. Workers in caring personal services were shown to have poorer self-assessed health and higher levels of health conditions than any other health occupation, which was also true when they were compared with *other occupations*. One potential explanation for this is that caring personal service workers are selected from lower socioeconomic groups and have pre-existing health conditions. Kuh and Sholomo (2005) suggested that there were potentially two reasons for poorer health in adults from a life course perspective. Firstly, chronic disease and many of its risk factors in adulthood are "*biologically 'programmed' during critical periods of growth and development in utero or early infancy*" (Kuh and Shlomo 2005, p. 3). It is not yet fully understood the extent to which later life overrides these early utero referred to effects. Secondly, Kuh & Shlomo (2005, p. 3) suggested, "*adult chronic disease reflects cumulative differential lifetime exposure to damaging physical and social environments [with] risk factors… often cluster together because many are related to socioeconomic position*". It is likely that these two reasons are not independent of each other but rather intertwined and operate simultaneously. This means that even if entering caring personal service work had a protective effect on health it may not have a notable effect on health for those drawn from lower socioeconomic groups. However, it was outwith the scope of this study to support or dispel this association among caring personal service workers.

The behavioural model provides a useful framework in which the health behaviours of workers can be interpreted. In the study presented in this thesis, it is unclear if health behaviours exhibited among workers are due to extent intra-individual phenomenon whereby people make a free choice to engage in or refrain from certain behaviours. Health workers are an interesting sample to use in relation to this model. Health workers such as nursing and midwifery professionals and other health professionals generally have advanced health knowledge and education as part of their core training. Yet the findings from the integrative review (see Chapter 3) and analysis presented (see Chapter 7) indicate a pattern of poor heath behaviours among both health literate and non-health literate groups. It is expected that health literate groups exhibit healthy behaviours due to their level of knowledge and education about the implications of poor health behaviours on health. For example, smoking has been linked to an increased risk of stroke (1-14 cigarettes per day RR=2.2, 95% CI: 1.5, 3.3) (Colditz et al., 1988), coronary heart disease (1-14 cigarettes per day women HR=4.12, 95% CI: 3.57, 4.76 and being male 1.95, 95% CI: 1.66, 2.28) (Tolstrup et al., 2014), and chronic obstructive pulmonary disease (8.31% smokers and 3.04% non-smokers; $p<0.001$) (Parasuramalu et al., 2014). This suggests that workers' decisions to engage or abstain from harmful health behaviours are influenced by factors over and above that of education and knowledge, supporting and enhancing this model.

## 9.4 Limitations

This research has a number of limitations associated with each of the four studies undertaken above. Limitations include observational study designs, participant selection and recruitment, the use of secondary data, consistency of data collection phase, consistency of health question measurements, occupation categorisation, and available background information on individuals.  A summary of the limitations of each dataset used is shown in Table 9.1.

**Table 9.1 Study Limitations by Dataset.**

| Dataset | Limitations |
|---|---|
| APS | • Small bias in participants recruited with only partial coverage of population north of the Caledonian Canal.<br>• Subjective measurements used.<br>• Part of sampling frame used telephone directories with potential non-coverage bias.<br>• Small proportion of sample lost to follow-up. Individuals may have had different outcomes than those who remained.<br>• Large confidence intervals due to small sample size.<br>• Incomplete data. |
| LFS | • Small bias in participants recruited with only partial coverage of population north of the Caledonian Canal.<br>• Subjective measurements used.<br>• Part of sampling frame used telephone directories with potential non-coverage bias.<br>• Small proportion of sample lost to follow-up. Individuals may have had different outcomes than those who remained.<br>• Missing data. |
| SHeS | • Clustered stratified multi-stage sample design which has larger standard errors than a simple random sample design.<br>• Over sampling of some health boards could lead to bias, however, employing sample weights can overcome this limitation.<br>• Outcome used subjective measurements.<br>• Used mixture of telephone and face-to-face interviews.<br>• Variable coded wrong way round. |
| BHPS and Understanding Society | • Small proportion of sample lost to follow-up. Individuals may have had different outcomes than those who remained.<br>• Outcome used subjective measurements.<br>• Change in question wording and Likert Scale responses restricts some longitudinal analysis. |

The study designs used were observational in nature rather than experimental. This was appropriate for questions concerning the prevalence of health status and behaviours. However, the ideal design for addressing causation (e.g. does work cause health problems that result in early exit from the labour force) would be experimental. The timely need for evidence on the health of those who can be described as health workers, along with a range of practical and ethical issues means it is not possible to conduct an experimental study. The main issues with observational designs are confounding and that association does not necessarily mean causation (Carlson and Morrison, 2009). That is, although the study found evidence that there is an association between the exposure and an outcome, there is no evidence to indicate that the exposure caused the outcome. Ascertaining whether alternative explanations for the findings presented in this thesis is important.

There is evidence to indicate that selection and recruitment bias can be a limitation of some observational studies (Hammer, du Prel and Blettner, 2009). First, although the data sources used in the analysis presented in this thesis were governmental surveys which used a robust sampling framework, there is a small risk that the sample was not representative of the target population. The nature of many surveys means that not all selected people take part in the study because the voluntary character of the study generally has to be guaranteed. Second, the voluntary character of the study meant that individuals had the option to not engage in the study. The risk of bias in the analysis presented in this thesis from non-engagement is low, indicated by good response rates.

Consistent across all quantitative studies undertaken as part of this research project are two main limitations widely documented in the literature about the use of routinely collected secondary data in research. Firstly, secondary data has been collected for a different purpose than that of the study and particular information, which one might want, may not have been collected. Rana et al.'s (2014) study noted that the complex nature of data could hinder data being used to its full potential. The use of this secondary data has ethical implications relating to beneficence. Beneficence is concerned with the moral obligation to act for the benefit of others, which in the case of the present study is the current and future health of the workforce, while minimising harm. Understanding and becoming familiar with the data source and seeking clarity from the original study helped to overcome this limitation and maximised the use of available data in addressing each of the research questions. This mitigated this limitation as far as reasonably possible for the five studies undertaken. Furthermore, secondary data may not be appropriate for addressing all research questions because data may not be up-to-date with a sufficient sample size to protect participants' identities. Drawing on four large routinely collected datasets ensured sufficient sample sizes were achieved to address the research questions. Therefore, this was not perceived as an important limitation in this study.

Secondly, the consistency of the data collection phase and the extent to which the database used in the study was affected by problems and respondents' misinterpretation of questions was an important limitation to consider. Included within this limitation is a potential bias in who completes the survey. The surveys used in the present study (APS, LFS, SHeS, BPHS and Understanding Society) were carefully constructed and used only validated questions (Lynn, 2006; ScotPHO, 2014; UK Data Archive, 2016). The data was scanned by data analyst experts who reported that it was reasonable to assume that the data is generally of good quality (Lynn, 2006; ScotPHO, 2014; UK Data Archive, 2016). Nevertheless, data were found to be missing under one variable in the APS dataset and this was removed from the analysis. This was considered to be a low-level limitation in this study.

**Table 9.2 Self-Assessed Health Measure by Dataset.**

| **BHPS** | **Understanding Society** |
|---|---|
| Excellent | Excellent |
| Good | Very good |
| Fair | Good |
| Poor | Fair |
| Very poor | Poor |

A third limitation associated with the analysis conducted on the BHPS and Understanding Society databases presented in Chapter 8 is in relation to general health measurements. As discussed in Chapter 1, the wording of self-assessed health options available to rate one's health may affect the distribution of responses in each group. In the BHPS and Understanding Society surveys, the Likert scale response options differed, as shown in Table 9.2. From Table 9.2 the scale can be seen to have changed in Understanding Society, with the option 'very good' inserted into the options list under 'excellent' health displacing the remaining options and removing 'very poor' altogether. This may have contributed to respondents providing different responses to those which might have resulted from the original categories. Furthermore, the wording of the question changed in Understanding Society with respondents given more freedom to rate their health using their own unique set of criteria. In the BHPS survey, respondents were asked to rate their health over the last 12 months compared to people their own age. In the Understanding Society survey, respondents were merely asked what they would say their health was. This difference in question wording may have led to discrepancies in respondents' responses between datasets.

The measures used to capture dietary intake and physical activity may be a matter for debate. The unusual method of examining sugar consumption (added sugars) rather than the total caloric intake itself was essential since the SHeS did not provide any information on calorific consumption. Caloric consumption refers to the number of calories consumed by individuals on a daily basis. The present study used factor analysis to create a sugar score for confectionary and non-diet soft drinks based on frequency consumed. Any approach to measure diet is deductive as it was based on previous evidence or knowledge of healthy and unhealthy diets. This is not considered to be a major limitation of this thesis.

Fourthly, the level at which occupational data was available for use in the studies differed between datasets. For example, the APS and LFS used the occupational groups: nursing and midwifery professionals; health professionals; therapy professionals; caring personal services; health and social service managers and directors; managers and proprietors in health and care services; and teaching and educational professionals. The SHeS used the categories of nurses, other health professionals, care workers and teachers. While BHPS and Understanding Society used: nursing and midwifery professionals; nursing auxiliaries, care assistants and home carers; primary and nursery education teaching professionals; and secondary education teaching professionals. Drawing on different occupational classifications in this analysis hindered comparisons between studies, however, doing so provided valuable information on the health of these occupations. Respondents were not homogeneous in the employment types with a lot of variation in each job category. This is discussed in more detail below.

The final limitation associated with this study is the limited background information provided on respondents which could consequently provide alternative explanations for the findings. To address this, basic background information on occupations will be presented on highest educational qualification (Table 9.3) and logarithm mean net earnings from main job (Table 9.4). Alternative explanations were investigated but it is only for carers that low qualifications and less paid jobs might be relevant. Presented in Table 9.3 is the highest educational qualification level by gender and age group within each occupation of those included in the SHeS. Among care workers there is little difference between females and males but these workers are less qualified. As age increased, the number of care workers reporting a degree or higher educational qualification level decreased, 22.3 percent in under 30s to 11.9 percent in those aged 50 to 69. There is little difference between sex and age bands in the other occupational groups shown in Table 9.3. Displayed in Table 9.4 is the logarithm monthly mean net earnings of respondents included in the present Understanding Society analysis from their main job by occupational group. Care workers appear to be poorer than workers in the other occupational groups included in the analysis.

**Table 9.3 Highest Educational Qualification of Respondents Included in the Present SHeS Analysis.**

| | | | | Highest educational qualification | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Degree or higher | | School level qualification | | No qualifications | | Total |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % | Count |
| Occupation | Nurses | Sex | Male | 16 | 85.7% | | | | | 19 |
| | | | Female | 232 | 85.8% | | | | | 270 |
| | | Age | <30 | 16 | 78.3% | | | | | 20 |
| | | | 30-49 | 131 | 84.1% | | | | | 156 |
| | | | 50-69 | 100 | 89.6% | | | | | 112 |
| | Other health professionals | Sex | Male | 63 | 95.7% | | | | | 66 |
| | | | Female | 134 | 94.1% | | | | | 143 |
| | | Age | <30 | 35 | 100.0% | | | | | 35 |
| | | | 30-49 | 107 | 94.8% | | | | | 113 |
| | | | 50-69 | 56 | 91.2% | | | | | 62 |
| | Care workers | Sex | Male | 18 | 18.1% | | | | | 98 |
| | | | Female | 68 | 14.4% | 340 | 71.4% | 68 | 14.3% | 476 |
| | | Age | <30 | 25 | 22.3% | | | | | 114 |
| | | | 30-49 | 31 | 14.7% | 162 | 75.8% | 20 | 9.5% | 213 |
| | | | 50-69 | 29 | 11.9% | 162 | 65.6% | 56 | 22.5% | 247 |
| | Teachers | Sex | Male | 112 | 95.5% | | | | | 117 |
| | | | Female | 263 | 97.4% | | | | | 270 |
| | | Age | <30 | 38 | 82.7% | | | | | 45 |
| | | | 30-49 | 162 | 99.3% | | | | | 164 |
| | | | 50-69 | 175 | 98.2% | | | | | 178 |
| | Other occupations | Sex | Male | 1610 | 30.0% | 3035 | 56.5% | 729 | 13.6% | 5374 |
| | | | Female | 1288 | 27.0% | 2780 | 58.2% | 706 | 14.8% | 4774 |
| | | Age | <30 | 596 | 26.0% | 1602 | 70.0% | 92 | 4.0% | 2290 |
| | | | 30-49 | 1361 | 34.2% | 2267 | 57.0% | 352 | 8.8% | 3980 |
| | | | 50-69 | 942 | 24.3% | 1945 | 50.2% | 990 | 25.5% | 3877 |

**Table 9.4 Logarithm for Monthly Mean Net Earnings from Main Job of Respondents Included in the Present Understanding Society Analysis.**

| | N | Mean | Std. Deviation |
|---|---|---|---|
| Nursing and midwifery professionals | 92 | 7.42 | 0.28 |
| Nursing auxiliaries, care assistants and home carers | 26 | 7.11 | 0.31 |
| Primary and nursery education teaching teaching professionals | 69 | 7.51 | 0.39 |
| Secondary education teaching professionals | 56 | 7.67 | 0.22 |

## 9.5 Implications

Faced with an ageing population in many industrialised countries, a major challenge is not only functional health or quality of life but also maintaining a sustainable healthy workforce across every occupation into older years. This is of particular importance with the UK state pension age due to increase to 66 years by October 2020 for both men and women (Pensions Act, 2014). Nevertheless, throughout this thesis the researcher has identified a number of risk factors that negatively impact on subjective health (as measured by self-assessed health) and self-reported health. Notably, unhealthy behaviours, specifically tobacco smoking, were found to have a significant influence on poor health irrespective of occupational group. These findings provide evidence to further support the hypothesis that even small changes in lifestyle can have a notable positive or negative effect on workers' health. Thus, employers should actively encourage workers to modify their behaviours both for their own benefit and for that of their employers and wider society. Overall, health workers do not seem to be any more at risk than other workers.

**Policy implications**

The policy implications of this research were chiefly derived from analysis of the APS, LFS, SHeS and BHPS and Understanding Society (see Chapters 5, 6, 7, 8). The policy implications relate mainly to these chapters as they contain the majority of the analysis and have important consequences for health policy at both an occupational (such as those described as health literate) and governmental level. Firstly, the education of health workers (e.g. obtaining a nursing degree) does not appear to off-set unhealthy behaviours. This raises an important question for the value of health education advice delivered by nurses and other health professionals to patients to promote health. Has the approach of seizing 'teachable moments' during routine patient interaction to tackle health inequalities ceased to become impactful in the 21st century? Secondly, the health of older health workers is poor. The UK, similar to many other countries, is facing an ageing population (Karlsson et al., 2006) with the population required to work on longer into old age. The implications of this on health and health workers' ability to work on longer into old age is not fully understood. For example, among those reporting poor self-assessed health, nursing auxiliaries, care assistants and home carers were significantly more likely to leave the workforce compared to nursing and midwifery professionals ($p<0.001$), primary and nursery education teaching professionals ($p<0.001$) and secondary education teaching professionals ($p<0.001$). Those who do continue to work on later in life will likely be less fit and have higher sickness absence, thus patient safety might be affected. Thirdly, working characteristics such as working hours (Ball and Pike, 2009) and contract type (Ellingsen et al., 2007; Harrington, 2001; Matheson et al., 2014) are important determinants of health. Rising levels of workers employed on part-time or temporary contracts over the last two decades has been an important determinant behind the increasing levels of inequalities in many industrialised countries worldwide (Organisation for Economic Co-operation and Development [OECD], 2012). Are the working hours and contract types of the 21$^{st}$ century hindering workers from remaining in employment longer into older age? Fourthly, self-assessed poor health was generally not associated with workforce exit. Is the value of health education in preventing avoidable workforce exit no longer a useful intervention among today's workforce? In summary, future policy needs to adopt a life course approach to tackle the wider determinants of health across occupations, acting early to prevent and intervene rather than reacting in later years. This is particularly important in times of austerity with cuts to public health budgets within the UK threatening to widen health inequalities (House of Commons Health Committee, 2013).

**Methodological implications**

The study reported in this thesis did not aim to develop new methods; but, rather, apply existing methods to examine the health of health workers and the extent to which poor health can be attributed to known determinants of health. However, this thesis contributes to methodology by demonstrating how secondary data can be used in research.

## 9.6 Contribution of the research

This thesis has made methodological and theoretical contributions to research. Health research has predominantly used primary data to examine health inequalities rather than secondary data. The increasing use of secondary data, particularly routinely collected governmental data, can meaningfully add to the quality of the evidence base by providing larger and more representative samples.

The main methodological contribution made by the work presented in this thesis is in relation to self-assessed health and its link to health-related behaviours. Tobacco smoking was the strongest predictor of poor self-assessed health among workers, more so than occupation.

There are a number of theoretical contributions which emerge from this thesis, particularly in relation to knowledge. Firstly, prior to this study, there was little available research on the prevalence of specific health conditions among workers by separate health occupations in Scotland. Secondly, by highlighting the health and health behaviours of people in health literate occupations, this study has made enhanced evidence available on the health challenges facing the health workforce and the impact of their health on workforce exit. Prior to this study, this evidence often focused on health occupations as an entirety in Scotland whereas in the present analysis specific occupational groups were used (e.g. health professionals, therapy professionals, nursing and midwifery professionals, caring personal services, health and social services managers and directors, and managers and proprietors in health and care services). Thirdly, the findings from the analysis presented in Chapters 3, 5, 6, 7 and 8 may inform the development of policy to sustain a healthy workforce able to work beyond the current retirement age. This is crucial given that workers are a key component of any healthcare service. They are arguably the most important asset of the healthcare system given their role in delivering care, health promotion and education, and the dependence of patients on many of these workers for day-to-day needs. Finally, an integrative review of the health behaviours of pre- and post-qualified nurses presented collated international evidence for the first time, making a valuable contribute to others working or interested in the field.

## 9.7 Recommendations

Recommendations for practice are now discussed in relation to (i) future policy and ideas, (ii) practice, and (iii) possible direction for future research.

### 9.7.1 Future policy and ideas

The findings from the study presented in this thesis suggests that tobacco smoking is an important predictor of poor health, more so than occupation among health workers. The devolved governments in the UK currently has numerous policies aimed at reducing tobacco smoking from the introduction of a nationwide ban on smoking in public areas to removing tobacco products from display in shops (Health Act, 2006). However, many of these policies have not provided a holistic approach to tackling tobacco smoking, omitting to acknowledge the important link between job stress and tobacco smoking. Job stress has been positively related to continuing to smoke as well as the number of cigarettes smoked by current smokers, with Ayyagari and Sindelar (2009, p. 10) stating that "*job stress prevents smokers from quitting*". Therefore, to maximise future policy on reducing the levels of tobacco smoking, policies will need to incorporate strategies to tackle job stress among workers.

### 9.7.2 Recommendations for practice

If workers are to be retained longer into older age in health occupations, consideration is required about how this will be achieved. This is of particular importance among nursing auxiliaries, care assistants and home carers who reported a high prevalence of poor self-assessed health. Among this group, workers reporting poor self-assessed health were more likely to exit the workforce.

If the current health care system is to be secured for years to come then targeted occupation specific interventions are needed to promote and protect the health of workers.

### 9.7.3 Possible direction for future research

The research presented in this thesis was conducted around a series of research questions aimed at increasing understanding of the health of health workers in the UK. Over the course of analysis and thesis construction a number of directions for future research became apparent. Three of these recommendations for future research are:

1. The extent to which occupational factors impair health with a focus on health workers requires more in-depth study, particularly from a worker's perspective. By shadowing workers in each occupation, researchers can begin to develop a deeper understanding of the roles undertaken by workers and the implications these have on their health.
2. There is a need to understand the health status of health workers prior to point of entry into the workforce to determine whether their occupation impairs health or if those with poor health are more likely to enter certain occupations.
3. A more in-depth understanding from a worker's perspective is needed on the role health has in continuing or withdrawing from the workforce among different health occupations, particularly in relation to different health conditions.

# References

Abarca, A. M. D., & Pillon, S. C. (2008). Nursing students' perception regarding predicting factors of drugs use. *Revista Latino-Americana De Enfermagem*, 16, 607-613.

Abdel-Khalek, A. M., & Lester, D. (2017). The association between religiosity, generalized self-efficacy, mental health, and happiness in Arab college students. *Personality and Individual Differences*, *109*, 12-16.

Abenhaim, L., Suissa, S., & Rossignol, M. (1988). Risk of recurrence of occupational back pain over three year follow up. *British Journal of Industrial Medicine*, *45*(12), 829-833.

Abramson, J. L., Williams, S. A., Krumholz, H. M., & Vaccarino, V. (2001). Moderate alcohol consumption and risk of heart failure among older persons. *.Journal of the American Medical Association*, *285*(15), 1971-1977.

Acheson, D. (1998). *Independent inquiry into inequalities in health: report*. London: Stationery Office. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265503/ih.pdf.

Adderley-Kelly, B., & Green, P. M. (2000). Health behaviors of undergraduate African American nursing students. *ABNF Journal*, *11*(1), 7-12.

Adler, N. E., & Stewart, J. (2010). Health disparities across the lifespan: meaning, methods, and mechanisms. *Annals of the New York Academy of Sciences*, *1186*(1), 5-23.

Agrawal, V., Berlin, B., Grote, K., & Scheidler, G. (2012). Creating and sustaining change in nursing care delivery. *Health International, 12*, 52-63.

Ahmadi, J., Maharlooy, N., & Alishahi, M. (2004). Substance abuse: prevalence in a sample of nursing students. *Journal of Clinical Nursing*, *13*(1), 60-64.

Aiken, L.H., Clarke, S.P., Sloane, D.M., Sochalski, J., & Silber, J.H. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *The Journal of the American Medical Association, 228*(16), 1987-1993.

Aitken, L.H., Sloane, D.M., Bruyneel, L., Van den Heede, K., Griffiths, P., Busse, R., Diomidous, M., Kinnunen, J., Kozka, M., Lesaffre, E., McHugh, M.D., Moreno-Casbas, R., Rafferty, A.M., Schwendimann, R., Scott, P.A., Tishelman, C., van Achterberg, T., & Sermeus, W. (2014). Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. *The Lancet, 383*(9931), 1824-1830.

Ajimotokin, S., Haskins, A., & Wade, Z. (2015). *The Effects of Unemployment on Crime Rates in the US*. Retrieved from: https://smartech.gatech.edu/bitstream/handle/1853/53294/theeffectsofunemploymentoncimerates.pdf?ref=patrick.net.

Alamgir, H., Yu, S., Chavoshi, N., & Ngan, K. (2008). Occupational injury among full-time, part-time and casual health care workers. *Occupational Medicine, 58*, 348-354.

Alcock, I., White, M. P., Wheeler, B. W., Fleming, L. E., & Depledge, M. H. (2014). Longitudinal effects on mental health of moving to greener and less green urban areas. *Environmental Science & Technology*, *48*(2), 1247-1255.

Al-Kandari, F., & Vidal, V. L. (2007). Correlation of the health-promoting lifestyle, enrollment level, and academic performance of College of Nursing students in Kuwait. *Nursing & Health Sciences*, *9*(2), 112-119.

Allender, S., Peto, V., Scarborough, P., Boxer, A., & Rayner, M. (2006). *Diet, physical activity and obesity statistics*. Oxford: British Heart Foundation.

Alpar, S. E., Senturan, L., Karabacak, U., & Sabuncu, N. (2008). Change in the health promoting lifestyle behaviour of Turkish University nursing students from beginning to end of nurse training. *Nurse Education in Practice*, *8*(6), 382-388. doi: 10.1016/j.nepr.2008.03.010.

Alvarez, J., Canduela, J., & Raeside, R. (2012). Knowledge creation and the use of secondary data. *Journal of Clinical Nursing*, *21*(19pt20), 2699-2710.

Amani, R., & Gill, T. (2013). Shiftworking, nutrition and obesity: implications for workforce health-a systematic review. *Asia Pacific Journal of Clinical Nutrition*, *22*(4), 698-708.

An, F. R., Xiang, Y. T., Yu, L., Ding, Y. M., Ungvari, G. S., Chan, S. W. C., Yu,D. S. F., Lai, K. Y. C., Qi, Y. K., Zeng, J. Y., Wu, P. P., Hou, Z. J., Correll, C. U., Newhouse, R., & Chiu, H. F. K. (2014). Prevalence of nurses' smoking habits in psychiatric and general hospitals in China. *Archives of Psychiatric Nursing*, *28*(2), 119-122.

Andrea, M. S., Walter, V., Elena, B., Alfea, F., & Piersante, S. (2001). A comparison of smoking habits, beliefs and attitudes among Tuscan student nurses in 1992 and 1999. *European Journal of Epidemiology*, *17*(5), 417-421.

Angel, S., & Bittschi, B. (2014). Housing and health. *ZEW-Centre for European Economic Research Discussion Paper*, (14-079). Retrieved from: https://www.econstor.eu/bitstream/10419/102754/1/798889810.pdf.

Arber, S., Fenn, K., & Meadows, R. (2013). Subjective financial well-being, income and health inequalities in mid and later life in Britain. *Social Science & Medicine*, *100*, 12-20.

Asakawa, K., & Senthilselvan, A. (2012). Trajectories of health-related quality of life differ by age among adults: results from an eight-year longitudinal study. *Journal of Health Economics, 31*(1), 207-218.

Asfar, T., Al-Ali, R., Ward, K. D., Vander Weg, M. W., & Maziak, W. (2011). Are primary health care providers prepared to implement an anti-smoking program in Syria? *Patient Education and Counseling*, *85*(2), 201-205. doi: 10.1016/j.pec.2010.11.011.

Ayyagari, P., & Sindelar, J.L. (2009). The impact of job stress on smoking and quitting: evidence from the HRS. *The B.E. Journal of Economic Analysis & Policy*, *10*(1), art27.

Baird, B. M., Lucas, R. E., & Donnellan, M. B. (2010). Life satisfaction across the lifespan: findings from two nationally representative panel studies. *Social Indicators Research*, *99*(2), 183-203.

Bajekal, M. (2005). Healthy life expectancy by area deprivation: magnitude and trends in England, 1994-1999. *Health Statistics Quarterly*, *25*, 18.

Baker, A. H., & Wardle, J. (2003). Sex differences in fruit and vegetable intake in older adults. *Appetite, 40*(3), 269-275.

Bakhshi, S., Fei, S., Murrells, T., & While, A. (2015). Nurses' health behaviours and physical activity-related health-promotion practices. *British Journal of Community Nursing*, *20*(6), 289-296. doi: 10.12968/bjcn.2015.20.6.289.

Baldwin, J. N., Bartek, J. K., Scott, D. M., Davis-Hall, R. E., & DeSimone, E. M., II. (2009). Survey of alcohol and other drug use attitudes and behaviors in nursing students. *Substance Abuse*, *30*(3), 230-238. doi: 10.1080/08897070903040964.

Ball, J., & Pike, G. (2009). *Nurses' employment and morale*. London: Royal College of Nursing. Retrieved from: https://www.rcn.org.uk/professional-development/publications/pub-003566.

Barnett, K., Mercer, S. W., Norbury, M., Watt, G., Wyke, S., & Guthrie, B. (2012). Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *The Lancet*, *380*(9836), 37-43.

Baron-Epel, O., Josephsohn, K., & Ehrenfeld, M. (2004). Nursing students' perceptions of smoking prevention. *Nurse Education Today*, *24*(2), 145-151.

Barrett, A. E. (2003). Socioeconomic status and age identity: The role of dimensions of health in the subjective construction of age. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *58*(2), S101-S109.

Barton, J., Spelten, E., Totterdell, P., Smith, L., Folkard, S., & Costa, G. (1995). The Standard Shiftwork Index: a battery of questionnaires for assessing shiftwork-related problems. *Work & Stress*, *9*(1), 4-30.

Bauman, A. E., Reis, R. S., Sallis, J. F., Wells, J. C., Loos, R. J., Martin, B. W., & Lancet Physical Activity Series Working Group. (2012). Correlates of physical activity: why are some people physically active and others not? *The Lancet*, *380*(9838), 258-271.

Bauman, A., Bull, F., Chey, T., Craig, C.L., Ainsworth, B.E., Sallis, J.F., Bowles, H.R., Hagstromer, M., Sjostrom, M., Pratt, M., & The IPS Group. (2009). The international prevalence study on physical activity: results from 20 countries. *International Journal of Behavioral Nutrition & Physical Activity, 6*, 21.

Bazzano, L. A., He, J., Ogden, L. G., Loria, C. M., Vupputuri, S., Myers, L., & Whelton, P. K. (2002). Fruit and vegetable intake and risk of cardiovascular disease in US adults: the first National Health and Nutrition Examination Survey Epidemiologic Follow-up Study. *The American Journal of Clinical Nutrition*, *76*(1), 93-99.

Bécares, L. (2013). *Which ethnic groups have the poorest health? Ethnic health inequalities 1991 to 2011*. Manchester: Centre on Dynamics of Ethnicity. Retrieved from: http://www.ethnicity.ac.uk/medialibrary/briefingsupdated/which-ethnic-groups-have-the-poorest-health.pdf.

Beletsioti-Stika, P., & Scriven, A. (2006). Smoking among Greek nurses and their readiness to quit. *International Nursing Review*, *53*(2), 150-156. doi: 10.1111/j.1466-7657.2006.00483.

Ben-Shlomo, Y., & Kuh, D. (2002). A life course approach to chronic disease epidemiology: conceptual models, empirical challenges and interdisciplinary perspectives. *International Journal of Epidemiology*, *31*(2), 285-293.

Benzeval, M., Bond, L., Campbell, M., Egan, M., Lorenc, T., Petticrew, M., & Popham, F. (2014). How does money influence health? Joseph Rowntree Foundation. Online https://www.jrf.org.uk/sites/default/files/jrf/migrated/files/income-health-poverty-full.pdf.

Berkelmans, A., Burton, D., Page, K., & Worrall-Carter, L. (2011). Registered Nurses' smoking behaviours and their attitudes to personal cessation. *Journal of Advanced Nursing*, *67*(7), 1580-1590.

Berkman, L. F., & Syme, S. L. (1978). Social networks, host resistance, and mortality: a nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology*, *109*(2), 186-204.

Bhopal, R. S. (2007a). Introduction: the concepts of ethnicity and race in health. In R. S. Bhopal (Ed.), *Ethnicity, race, and health in multicultural societies: foundations for better epidemiology, public health, and health care* (1st ed., pp. 1-28). USA: Oxford University Press.

Bhopal, R. S. (2007b). Ethnic inequalities in health and health care. In R. S. Bhopal (Ed.), *Ethnicity, race, and health in multicultural societies: foundations for better epidemiology, public health, and health care* (1st ed., pp. 150-181). USA: Oxford University Press.

Biraghi, E., & Tortorano, A. M. (2010). Tobacco smoking habits among nursing students and the influence of family and peer smoking behaviour. *Journal of Advanced Nursing*, *66*(1), 33-39.

Black, D., Morris, J., Smith, C., & Townsend, P. (1980). *Inequalities in health: report of a Research Working Group*. London: Department of Health and Social Security.

Blake, H., & Harrison, C. (2013). Health behaviours and attitudes towards being role models. *British Journal of Nursing*, *22*(2), 86-94.

Blake, H., Malik, S., Mo, P. K., & Pisano, C. (2011). 'Do as I say, but not as I do': Are next generation nurses role models for health? *Perspectives in Public Health*, *131*(5), 231-239.

Blane, D. (1985). An assessment of the Black Report's explanations of health inequalities. *Sociology of Health & Illness*, *7*(3), 423-445.

Bloomfield, K., Grittner, U., Kramer, S., & Gmel, G. (2006). Social inequalities in alcohol consumption and alcohol-related problems in the study countries of the EU concerted action' Gender, Culture and Alcohol Problems: a Multi-national Study'. *Alcohol and Alcoholism-London-Pergamon Press then Oxford University Press*, *41*(1), i26.

Bloor, M., Samphier, M., & Prior, L. (1987). Artefact explanations of inequalities in health: an assessment of the evidence. *Sociology of Health & Illness*, *9*(3), 231-264.

Bloor, R. N., Meeson, L., & Crome, I. B. (2006). The effects of a non-smoking policy on nursing staff smoking behaviour and attitudes in a psychiatric hospital. *Journal of Psychiatric and Mental Health Nursing*, *13*(2), 188-196.

Bobak, M., Pikhart, H., Hertzman, C., Rose, R., & Marmot, M. (1998). Socioeconomic factors, perceived control and self-reported health in Russia: a cross-sectional survey. *Social Science & Medicine*, *47*(2), 269-279.

Bopp, M., Braun, J., Gutzwiller, F., & Faeh, D. (2012). Health risk or resource? Gradual and independent association between self-rated heath and mortality persists 30 years. *PLoS One, 7*(2), e30795.

Borrelli, B., & Novak, S. P. (2007). Nurses' knowledge about the risk of light cigarettes and other tobacco 'harm reduction' strategies. *Nicotine & Tobacco Research*, *9*(6), 653-661.

Bostic, R. W., & Lee, K. O. (2009). “Homeownership: America’s dream?” In R. M. Blank & M. S. Barr (Eds.), *Insufficient Funds: Savings, assets, credit and banking among low-income households* (1st ed., pp. 218-257). New York: Russell Sage Foundation.

Bostock, L. (2000). Pathways of disadvantage? Walking as a mode of transport among low-income mothers. *Health & Social Care in the Community*, *9*(1), 11-18.

Brown, D. E., James, G. D., Nordloh, L., & Jones, A. A. (2003). Job strain and physiological stress responses in nurses and nurse's aides: predictors of daily blood pressure variability. *Blood Pressure Monitoring*, *8*(6), 237-242.

Bryman, A., & Bell, E. (2011). *Business research methods*. (3rd ed.) Oxford: Oxford University Press.

Buchvold, H. V., Pallesen, S., Oyane, N. M. F., & Bjovatn, B. (2015). Association between night work and BMI, alcohol, smoking, caffeine and exercise - a cross-sectional study. *BMC Public Health*, *15*, 1-8.

Buja, A., Zampieron, A., Mastrangelo, G., Petean, M., Vinelli, A., Cerne, D., & Baldo, V. (2013). Strain and health implications of nurses’ shift work. *International Journal of Occupational Medicine and Environmental Health*, *26*(4), 511-521.

Bukowska, A., Sobala, W., & Peplonska, B. (2015). Rotating night shift work, sleep quality, selected lifestyle factors and prolactin concentration in nurses and midwives. *Chronobiology International*, *32*(3), 318-326.

Bull, F.C., & the Expert Working Groups. (2010). *Physical activity guidelines in the UK: review and recommendations*. Loughborough: School of Sport, Exercise and Health Sciences, Loughborough University. Retrieved from: https://www.ndph.ox.ac.uk/publications/400684.

Burke, E., & McCarthy, B. (2011). The lifestyle behaviours and exercise beliefs of undergraduate student nurses: A descriptive study. *Health Education*, *111*(3), 230-246.

Burns, K., Gross, B., & Zanin, M. (2010). Cardiovascular risk study: a comparison between Northeast Ohio cardiovascular nurses and the nation. *Journal of Community Health Nursing*, *27*(4), 187-196.

Büscher, A., Sivertsen, B., & White, J. (2010). *Nurses and midwives: a force for health*. Copenhagen: World Health Organization. Retrieved from: http://www.euro.who.int/__data/assets/pdf_file/0019/114157/E93980.pdf.

Cacioppo, J. T., & Cacioppo, S. (2014). Social relationships and health: the toxic effects of perceived social isolation. *Social and Personality Psychology Compass*, *8*(2), 58-72.

Callison, M. C., & Nussbaum, M. A. (2012). Identification of physically demanding patient-handling tasks in an acute care hospital. *International Journal of Industrial Ergonomics*, *42*(3), 261-267.

Campos-Matos, I., & Kawachi, I. (2015). Social mobility and health in European countries: Does welfare regime type matter? *Social Science & Medicine*, *142*, 241-248.

Capasso, R., Zurlo, M. C., & Smith, A. P. (2016). Ethnicity and stress at work: a literature review and suggestions for future research. *British Journal of Education, Society & Behavioural Science*, *15*(1), 1-20.

Carballo, M., Divino, J. J., & Zeric, D. (1998). Migration and health in the European Union. *Tropical Medicine & International Health, 3*(12), 936-944.

Carlson, M. D., & Morrison, R. S. (2009). Study design, precision, and validity in observational studies. *Journal of palliative medicine*, *12*(1), 77-82.

Carstairs, V., & Morris, R. (1990). Deprivation and health in Scotland. *Health Bulletin*, *48*(4), 162-175.

Casado, D., González, D. G., & de la Torre Esteve, M. (2015). The social class gradient in health in Spain and the health status of the Spanish Roma. *Ethnicity & Health*, 21(5), 468-479.

Castle, J. E. (2003). Maximizing research opportunities: secondary data analysis. *Journal of Neuroscience Nursing*, *35*(5), 287-290.

Catto, S., Tod, E., & McCartney, G. (2012). Scotland's mental health: adults 2012. Edinburgh: NHS Health Scotland/ ScotPHO. Retrieved from: http://www.scotpho.org.uk/downloads/scotphoreports/scotpho121019_mhadults2012_fullreport.pdf.

Cavalheiro, A. M., Moura, D. F., Jr., & Lopes, A. C. (2008). Stress in nurses working in intensive care units. *Revista Latino-Americana de Enfermagem*, *16*(1), 29-35.

Centre for Workforce Intelligence. (2013). *Future of nursing workforce projections – starting the discussions.* London: Centre for Workforce Intelligence. Retrieved from: http://www.cfwi.org.uk/publications/future-nursing-workforce-projections-starting%20the%20discussion.

Chalmers, K., Seguire, M., & Brown, J. (2002). Tobacco use and baccalaureate nursing students: a study of their attitudes, beliefs and personal behaviours. *Journal of Advanced Nursing*, *40*(1), 17-24.

Chan, J. C.-Y. (2014). Psychological determinants of exercise behavior of nursing students. *Contemporary Nurse*, *49*(1), 60-67.

Chan, S. S. C., Sarna, L., Wong, D. C. N., & Lam, T. (2007). Nurses' tobacco-related knowledge, attitudes, and practice in four major cities in China. *Journal of Nursing Scholarship*, *39*(1), 46-53.

Chartered Institute of Personnel and Development & International Longevity Centre. (2015). *Avoiding the demographic crunch: labour supply and the ageing workforce.* London: Chartered Institute of Personnel and Development & International Longevity Centre. Retrieved from: https://www.cipd.co.uk/knowledge/work/trends/ageing-workforce-report.

Chen, J., Davis, K. G., Daraiseh, N. M., Pan, W., & Davis, L. S. (2014). Fatigue and recovery in 12-hour dayshift hospital nurses. *Journal of Nursing Management*, *22*(5), 593-603.

Chin, D. L., Nam, S., & Lee, S. J. (2016). Occupational factors associated with obesity and leisure-time physical activity among nurses: a cross sectional study. *International Journal of Nursing Studies*, *57*, 60-69.

Chiva-Blanch, G., Arranz, S., Lamuela-Raventos, R. M., & Estruch, R. (2013). Effects of wine, alcohol and polyphenols on cardiovascular disease risk factors: evidences from human studies. *Alcohol and Alcoholism*, *48*(3), 270-277.

Cho, H.C., & Abe, S. (2013). Is two-tailed testing for directional research hypotheses tests legitimate? *Journal of Business Research*, *66*(9), 1261-1266.

Chow, J., & Kalischuk, R. G. (2008). Self-care for caring practice: Student nurses' perspectives. *International Journal for Human Caring*, *12*(3), 31-37.

Clark, A., Fleche, S., Layard, R., Powdthavee, N., & Ward, G. (2016). *Origins of happiness: evidence and policy implications*. London: CEPR. Retrieved from: http://voxeu.org/article/origins-happiness.

Clément, M., Jankowski, L. W., Bouchard, L., Perreault, M., & Lepage, Y. (2002). Health behaviors of nursing students: a longitudinal study. *The Journal of Nursing Education*, *41*(6), 257-265.

Close, C., Kouvonen, A., Bosqui, T., Patel, K., O'Reilly, D., & Donnelly, M. (2016). The mental health and wellbeing of first generation migrants: a systematic-narrative review of reviews. *Globalization & Health*, *12*(1), 47.

Cohen, J. M., Boniface, S., & Watkins, S. (2014). Health implications of transport planning, development and operations. *Journal of Transport & Health*, *1*(1), 63-72.

Colditz, G. A., Bonita, R., Stampfer, M. J., Willett, W. C., Rosner, B., Speizer, F. E., & Hennekens, C. H. (1988). Cigarette smoking and risk of stroke in middle-aged women. *New England Journal of Medicine*, *318*(15), 937-941.

Commission on Social Determinants of Health [CSDH]. (2008). *Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the CSDH*. Geneva: World Health Organization. Retrieved from: http://www.who.int/social_determinants/final_report/csdh_finalreport_2008_execsumm.pdf.

Conner, K.O., Copeland, V.C., Grote, N.K., Koeske, G., Rosen, D., Reynolds III, C.F., & Brown, C. (2010). Mental health treatment seeking among older adults with depression: the impact of stigma and race. *American Journal of Geriatric Psychiatry, 18*(6), 531-543.

Conti-Ramsden, G., Durkin, K., Mok, P. L., Toseeb, U., & Botting, N. (2016). Health, employment and relationships: Correlates of personal wellbeing in young adults with and without a history of childhood language impairment. *Social Science & Medicine*, *160*, 20-28.

Costa, G., Lacerda, A., & Marques, J. (2013). Noise on the hospital context: impact on nursing professionals' health. *Revista CEFAC, 15*(3), 642-652.

Costigliola, V., Frid, A., Letondeur, C., & Strauss, K. (2012). Needlestick injuries in European nurses in diabetes. *Diabetes & Metabolism*, *38*, S9-S14.

Cott, C. A., Gignac, M. A. M., & Badley, E. M. (1999). Determinants of self rated health for Canadians with chronic disease and disability. *Journal of Epidemiology and Community Health, 53*, 731-736.

Cramp, A. G., & Bray, S. R. (2011). Understanding exercise self-efficacy and barriers to leisure-time physical activity among postnatal women. *Maternal and Child Health Journal*, *15*(5), 642-651.

Croucher, K., Mysers, L., & Bretherton, J. (2007). *Greenspace Scotland research report: the links between greenspace and health: a critical literature review*. Stirling: Greenspace Scotland. Retrieved from: https://www.york.ac.uk/media/chp/documents/2008/greenspace2008.pdf.

Cruise, S. M., & O'Reilly, D. (2015). Are the differences in adulthood ill-health across the north-south divide and between Scotland and England also evident in early childhood health indicators? *Social Science & Medicine*, *130*, 277-283.

Curnock, E., Leyland, A. H., & Popham, F. (2014). Do regional labour market conditions affect transitions into employment from health-related inactivity? Multilevel analysis of longitudinal UK Labour Force Survey data. *The Lancet*, *384*, S28.

da Costa, C.M., Maher, C.G., Hancock, M.J., McAuley, J.H., Herbert, R.D., & Costa, L.O. (2012). The prognosis of acute and persistent low-back pain: a meta-analysis. *Canadian Medical Association Journal, 184*, E613-E624.

da Silva Pires, C. G., Mussi, F. C., de Cerqueira, B. B., Gondim Pitanga, F. J., & da Silva, D. O. (2013). Physical activity practice among undergraduate students in nursing. *Acta Paulista de Enfermagem*, *26*(5), 436-443.

da Silva Pires, C.G., Mussi, F.C., de Souza, R.C., da Silva, D.O., & de Souza Teles Santos, C.A. (2015). Consumption of alcohol among nursing students. *Acta Paulista de Enfermagem*, *28*(4), 301-307.

Dąbrowska-Galas, M., Plinta, R., Dąbrowska, J., & Skrzypulec-Plinta, V. (2013). Physical Activity in Students of the Medical University of Silesia in Poland. *Physical Therapy*, *93*(3), 383-392.

Dahlgren, G., & Whihtehead, M. (1991). *Policies and strategies to promote social equity in health.* Stockholm: Institute for Futures Studies.

Darmon, N., & Drewnowski, A. (2008). Des social class predict diet quality? 1,’2’3. *The American Journal of Clinical Nutrition, 87*(5), 1107-1117.

*Data Protection Act 1998.* London: TSO. Retrieved from: http://www.legislation.gov.uk/ukpga/1998/29/pdfs/ukpga_19980029_en.pdf

Davies, R., Jones, M., & Lloyd-Williams, H. (2014). Age and Work-Related Health: Insights from the UK Labour Force Survey. *British Journal of Industrial Relations*, *54*(1), 136-159. doi: 10.1111/bjir.12059.

de Almeida, V.C.F., Zanetti, M.L., & Damasceno, M.M.C. (2011). Occupation and risk factors for type 2 diabetes: a study with health workers. *Revista Latino-Americana de Enfermagem, 19*(3), 476-484.

de Gelder, R., Koster, E. M., van Buren, L. P., van Ameijden, E. J., Harrison, A., Birt, C. A., & Verma, A. (2016). Differences in adults’ health and health behaviour between 16 European urban areas and the associations with socio-economic status and physical and social environment. *The European Journal of Public Health*, *27*(suppl_2), 93-99.

Deasy, C., Coughlan, B., Pironom, J., Jourdan, D., & Mannix-McNamara, P. (2016). Predictors of health of pre-registration nursing and midwifery students: Findings from a cross-sectional survey. *Nurse Education Today*, *36*, 427-433.

Delpisheh, A., Sayehmiri, K., Azizpour, Y., & Montazeri, Z. (2017). Prevalence of low back pain in Iranian nurses: a systematic review and meta-analysis. *BMC Nursing*, *16*(1), 50.

Department for Education. (2013). *School workforce in England: November 2013*. London: Department for Education. Retrieved from: https://www.gov.uk/government/statistics/school-workforce-in-england-november-2013.

Department for Work & Pensions. (2017). *Fuller working lives: a partnership approach*. Department for Work & Pensions. London: Department for Work & Pensions. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/587654/fuller-working-lives-a-partnership-approach.pdf.

Department for Work and Pensions. (2013). *Employing older workers: an employer's guide to today's multi-generational workforce*. London: Department for Work and Pensions. Retrieved from: https://www.gov.uk/government/publications/employing-older-workers-an-employer-s-guide-to-today-s-multi-generational-workforce.

Diabetes UK. (2016). *Facts and stats*. London: Diabetes UK. Retrieved from: https://diabetes-resources-production.s3-eu-west-1.amazonaws.com/diabetes-storage/migration/pdf/DiabetesUK_Facts_Stats_Oct16.pdf.

Dickens, G. L., Stubbs, J. H., & Haw, C. M. (2004). Smoking and mental health nurses: A survey of clinical staff in a psychiatric hospital. *Journal of Psychiatric & Mental Health Nursing*, *11*(4), 445-451.

Doebler, S., & Glasgow, N. (2016). Relationships Between Deprivation and the Self-Reported Health of Older People in Northern Ireland. *Journal of Aging and Health, 29*(4), 594-619.

Doran, T., Drever, F., & Whitehead, M. (2004). Is there a north-south divide in social class inequalities in health in Great Britain? Cross sectional study using data from the 2001 census. *BMJ*, *328*(7447), 1043-1045.

Du, M., Kraft, P., Eliassen, A. H., Giovannucci, E., Hankinson, S. E., & De Vivo, I. (2014). Physical activity and risk of endometrial adenocarcinoma in the Nurses' Health Study. *International Journal of Cancer*, *134*(11), 2707-2716.

Durmaz, A., & Ustün, B. (2006). Determination of smoking habits and personality traits among nursing students. *The Journal of Nursing Education*, *45*(8), 328-333.

Duyn, M. A. S., & Pivonka, E. (2000). Overview of the health benefits of fruit and vegetable consumption for the dietetics professional: selected literature. *Journal of the American Dietetic Association*, *100*(12), 1511-1521.

Dwyer, T., Bradshaw, J., & Happell, B. (2009). Comparison of mental health nurses' attitudes towards smoking and smoking behaviour. *International Journal of Mental Health Nursing*, *18*(6), 424-433.

Edwards, R., Bowler, T., Atkinson, J., & Wilson, N. (2008). Low and declining cigarette smoking rates among doctors and nurses: 2006 New Zealand Census data. *The New Zealand Medical Journal*, *121*(1284), 43-51.

Ellingsen, T., Bener, A., & Gehani, A. A. (2007). Study of shift work and risk of coronary events. *The Journal of the Royal Society for the Promotion of Health*, *127*(6), 265-267.

Elseviers, M. M., Arias-Guillén, M., Gorke, A., & Arens, H. J. (2014). Sharps injuries amongst healthcare workers: review of incidence, transmissions and costs. *Journal of Renal Care*, *40*(3), 150-156.

*Equality Act 2010*. London: TSO. Retrieved from: http://www.legislation.gov.uk/ukpga/2010/15/contents.

Erikson, R., & Goldthorpe, J. (1992). *The constant flux: study of class mobility in industrial societies*. (1st ed.) Oxford: Clarendon Press.

Esposito, E. M., & Fitzpatrick, J. J. (2011). Registered nurses' beliefs of the benefits of exercise, their exercise behaviour and their patient teaching regarding exercise. *International Journal of Nursing Practice*, *17*(4), 351-356.

Evagelou, E., Vlachou, E., Polikandrioti, M., Koutelekos, I., Dousis, E., & Kyritsi, E. (2014). Exploration of Nursing students' dietary habits. *Health Science Journal*, *8*(4), 452-468.

Fair, J. M., Gulanick, M., & Braun, L. T. (2009). Cardiovascular risk factors and lifestyle habits among preventive cardiovascular nurses. *The Journal of Cardiovascular Nursing*, *24*(4), 277-286.

Falkenberg, H., Fransson, E. I., Westerlund, H., & Head, J. A. (2013). Short- and long-term effects of major organisational change on minor psychiatric disorder and self-rated health: results from the Whitehall II study. *Occupational & Environmental Medicine*, *70*(10), 688-696. doi:10.1136/oemed-2013-101385.

Fan, J.Z., Bonauto, D.K., Foley, M.P. Anderson, N.J., Yragui, N.L., & Silverstein, B.A. (2012). Occupation and the prevalence of current depression and frequent mental distress, WA BRFSS 2006 and 2008. *American Journal of Industrial Medicine, 55*(10), 893-903.

Fardet, A., & Boirie, Y. (2014). Associations between food and beverage bands and major diet-related chronic diseases: an exhaustive review of pooled/meta-analyses and systematic reviews. *Nutrition Reviews*, *72*(12), 741-762.

Fathallah, N., Maurel-Donnarel, E., Baumstarck-Barrau, K., & Lehucher-Michel, M.-P. (2012). Three-year follow-up of attitudes and smoking behaviour among hospital nurses following enactment of France's national smoke-free workplace law. *International Journal of Nursing Studies*, *49*(7), 803-810.

Fernandes, J. D. C., Portela, L. F., Rotenberg, L. C., & Griep, R. H. (2013). Working hours and health behaviour among nurses at public hospitals. *Revista Latino-Americana de Enfermagem*, *21*(5), 1104-1111.

Fernandez, D., Martin, V., Molina, A. J., & De Luis, J. M. (2010). Smoking habits of students of nursing: a questionnaire survey (2004-2006). *Nurse Education Today*, *30*(5), 480-484.

Fernández, D., Ordás, B., Álvarez, M. J., & Ordóñez, C. (2015). Knowledge, attitudes and tobacco use among nursing and physiotherapy students. *International Nursing Review*, *62*(3), 303-311.

Ferrie, J. E., Shipley, M. J., Smith, G. D., Stansfeld, S. A., & Marmot, M. G. (2002). Change in health inequalities among British civil servants: the Whitehall II study. *Journal of Epidemiology and Community Health*, *56*(12), 922-926.

Fie, S., Norman, I. J., & While, A. E. (2013). The relationship between physicians' and nurses' personal physical activity habits and their health-promotion practice: a systematic review. *Health Education Journal, 72*(1), 102-119. doi: 10.1177/0017896911430763.

Field, A. (2005). *Discovering statistics using SPSS: (and sex, drugs and rock 'n' roll).* (2nd ed.) London*:* SAGE Publications.

Filandri, M., & Olagnero, M. (2014). Housing inequality and social class in Europe. *Housing Studies*, *29*(7), 977-993.

Fischer, F., & Kraemer, A. (2015). Meta-analysis of the association between second-hand smoke exposure and ischaemic heart diseases, COPD and stroke. *BMC Public Health*, *15*(1), 1.

Fit for Work Scotland. (2016). *Benefits of a healthy workforce*. Edinburgh: Department for Work and Pensions. Retrieved from: http://www.fitforworkscotland.scot/employers/benefits-of-a-healthy-workforce/.

Fit for Work. (2016). *Benefits of a healthy workforce*. London: Department for Work and Pensions. Retrieved from: http://fitforwork.org/employer/benefits-of-a-healthy-workforce/.

Fit for Work. (2017). *Mental health problems*. Edinburgh: Department for Work and Pensions. Retrieved from: https://fitforworkscotland.scot/employees/taking-a-leave-of-absence/causes-of-absence/mental-health-problems/.

Flannery, K., Burket, T. L., & Resnick, B. (2014). Exercise habits of licensed nurses and nursing assistants: Are they meeting national guidelines? *Geriatric Nursing*, 35(2), S17-20. doi: 10.1016/j.gerinurse.2014.02.015.

Francis, R. (2013). *Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry*. London: The Stationery Office. Retrieved from: https://www.gov.uk/government/publications/report-of-the-mid-staffordshire-nhs-foundation-trust-public-inquiry.

Friis, K., Ekholm, O., & Hundrup, Y. A. (2005). Comparison of lifestyle and health among Danish nurses and the Danish female population: is it possible to generalize findings from nurses to the general female population? *Scandinavian Journal of Caring Sciences*, *19*(4), 361-367.

Fronteira, I., & Ferrinho, P. (2011). Do nurses have a different physical health profile? A systematic review of experimental and observational studies on nurses' physical health. *Journal of Clinical Nursing*, *20*(17-18), 2404-2424.

Galobardes, B., Morabia, A., & Bernstein, M. S. (2001). Diet and socioeconomic position: does the use of different indicators matter? *International Journal of Epidemiology*, *30*(2), 334-340.

Gandini, S., Botteri, E., Iodice, S., Boniol, M., Lowenfels, A. B., Maisonneuve, P., & Boyle, P. (2008). Tobacco smoking and cancer: a meta-analysis. *International Journal of Cancer*, *122*(1), 155-164.

General Teaching Council Scotland. (2012). The standards for registration: mandatory requirements for registration with the General Teaching Council for Scotland. Online http://www.gtcs.org.uk/web/FILES/the-standards/standards-for-registration-1212.pdf.

Ghonça, A., Tomassini, C., Toson, B., & Smallwood, S. (2005). Sex differences in mortality, a comparison of the United Kingdom and other developed countries. *Health Statistics Quarterly, 26*(2), 6-16.

Gifford, H., Wilson, D., Boulton, A., Walker, L., & Shepherd-Sinclair, W. (2013). Maori nurses and smoking: what do we know? *The New Zealand Medical Journal*, *126*(1384), 53-63.

Gill, J.S., Donaghy, M., Guise, J., & Warner, P. (2006). Descriptors and accounts of alcohol consumption: methodological issues piloted with female undergraduate drinkers in Scotland. *Health Education Research*, *22*(1), 27-36.

Gnadt, B. (2006). Religiousness, current substance use, and early risk indicators for substance abuse in nursing students. *Journal of Addictions Nursing*, *17*(3), 151-158.

Gorin, S. S. (2001). Predictors of tobacco control among nursing students. *Patient Education & Counseling*, *44*(3), 251-262.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in Qualitative Research. In N. K. Denzin., & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (3rd ed., pp. 105-117). Thousand Oaks, Califonia: Sage.

Gueorguieva, R., Sindelar, J. L., Falba, T. A., Fletcher, J. M., Keenan, P., Wu, R., & Gallo, W. T. (2009). The impact of occupation on self-rated health: cross-sectional and longitudinal evidence from the health and retirement survey. *The Journals of Gerontology Series B: Psychological Sciences & Social Sciences*, *64*(1), 118-124.

Gunnarsdottir, H. K., Sveinsdottir, H., Bernburg, J. G., Fridriksdottir, H., & Tomasson, K. (2006). Lifestyle, harassment at work and self-assessed health of female flight attendants, nurses and teachers. *Work*, *27*(2), 165-172.

Hacking, J. M., Muller, S., & Buchan, I. E. (2011). Trends in mortality from 1965 to 2008 across the English north-south divide: comparative observational study. *BMJ*, *342*, d508.

Haddad, L., Kane, D., Rajacich, D., Cameron, S., & Al-Ma'aitah, R. (2004). A comparison of health practices of Canadian and Jordanian nursing students. *Public Health Nursing*, *21*(1), 85-90.

Hagger-Johnson, G., Carr, E., Murray, E., Stansfeld, S., Shelton, N., Stafford, M., & Head, J. (2017). Association between midlife health behaviours and transitions out of employment from midlife to early old age: Whitehall II cohort study. *BMC Public Health*, *17*(1), 82.

Håkansson, C., Axmon, A., & Eek, F. (2016). Insufficient time for leisure and perceived health and stress in working parents with small children. *Work,* 55(2), 453-461.

Hall, C. (2006). *A picture of the United Kingdom using the National Statistics Socio-economic Classification*. London: Office for National Statistics. Retrieved from: https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwjIs8WmgP_UAhVKIcAKHWl9AnoQFggzMAI&url=https%3A%2F%2Fwww.ncbi.nlm.nih.gov%2Flabs%2Farticles%2F17042311%2F&usg=AFQjCNHOCkFNzHlLaZSgLFAilF9kyifEmg.

Ham, C.D., Przybeck, T., Strickland, J.R., Luke, D.A., Bierut, L.J., & Evanoff, BA. (2011). Occupation and workplace policies predict smoking behaviors: analysis of national data from the current population survey. *Journal of Occupation & Environmental Medicine, 53*(11), 1337-1345.

Hammer, G. P., du Prel, J. B., & Blettner, M. (2009). Avoiding bias in observational studies: part 8 in a series of articles on evaluation of scientific publications. *Deutsches Ärzteblatt International*, *106*(41), 664.

Han, K., Choi-Kwon, S., & Kim, K. S. (2016). Poor dietary behaviors among hospital nurses in Seoul, South Korea. *Applied Nursing Research*, *30*, 38-44.

Han, K., Trinkoff, A. M., Storr, C. L., Geiger-Brown, J., Johnson, K. L., & Park, S. (2012). Comparison of job stress and obesity in nurses with favorable and unfavorable work schedules. *Journal of Occupational and Environmental Medicine*, *54*(8), 928-932.

Hansen, Å. M., Andersen, L. L., Skotte, J., Christensen, U., Mortensen, O. S., Molbo, D., Lund, R., Nilsson, C. J., & Avlund, K. (2014). Social class differences in physical functions in middle-aged men and women. *Journal of Aging & Health*, *26*(1), 88-105.

Hansson, R. O., Robson, S. M., & Limas, M. J. (2001). Stress and coping among older workers. *Work, 17*, 247-256.

Happell, B., Gaskin, C. J., Reid-Searl, K., & Dwyer, T. (2014). Physical and psychosocial wellbeing of nurses in a regional Queensland hospital. *Collegian*, *21*(1), 71-78.

Harrington, J. M. (2001). Health effects of shift work and extended hours of work. *Occupational & Environmental Medicine*, *58*(1), 68-72.

Haw, S. J., & Gruer, L. (2007). Changes in exposure of adult non-smokers to second hand smoke after implementation of smoke-free legislation in Scotland: national cross sectional survey. *BMJ*, *335*(7619), 549-552.

Hawker, C. L. (2012). Physical activity and mental well-being in student nurses. *Nurse Education Today*, *32*(3), 325-331.

*Health Act 2006.* London: TSO. Retrieved from: http://www.legislation.gov.uk/ukpga/2006/28/pdfs/ukpga_20060028_en.pdf

Health and Safety Executive [HSE]. (2016a). *Working days lost*. London: HSE. Retrieved from: http://www.hse.gov.uk/statistics/dayslost.htm.

Health and Safety Executive. (2015). *Work related stress, anxiety and depression statistics in Great Britain 2015*. London: HSE. Retrieved from: https://consult-smp.com/wp-content/uploads/2016/06/report-UK-stress-at-work.pdf.

Health and Safety Executive. (2016b). *Health and social care sector*. London: HSE. Retrieved from: http://www.hse.gov.uk/statistics/industry/healthservices/index.htm.

Health and Social Care Information Centre (HSCIC). (2014). *NHS workforce: summary of staff in the NHS: results from September 2013 census*. Leeds: HSCIC. Retrieved from: http://content.digital.nhs.uk/catalogue/PUB13724/nhs-staf-2003-2013-over-rep.pdf.

Heath, J., & Crowell, N. A. (2007). Factors influencing intentions to integrate tobacco education among advanced practice nursing faculty. *Journal of Professional Nursing*, *23*(4), 189-200.

Heistaro, S., Jousilahti, P., Lahelma, E., Vartiainen, E., & Puska, P. (2001). Self rated health and mortality: a long term prospective study in eastern Finland. *Journal of Epidemiology & Community Health, 55*(4), 227-232.

Hensel, D., Engs, R. C., & Middleton, M. J. (2016). Differences in drinking patterns between female nursing and nonnursing students. *Nurse Educator*, *41*(1), 52-54.

Hensel, D., Middleton, M. J., & Engs, R. C. (2014). A cross-sectional study of drinking patterns, prelicensure nursing education, and professional identity formation. *Nurse Education Today*, *34*(5), 719-723.

Hernan, M.A., Jick, S.S. Logroscino, G., Olek, M.J., Ascherio, A., & Jick, H. (2005). Cigarette smoking and the progression of multiple sclerosis. *Brain*, *128*(6), 1461-1465.

Herron, D. G. (1989). Secondary data analysis: research method for the clinical nurse specialist. *Clinical Nurse Specialist*, *3*(2), 66-69.

Hicks, M., McDermott, L. L., Rouhana, N., Schmidt, M., Seymour, M. W., & Sullivan, T. (2008). Nurses' body size and public confidence in ability to provide health education*. Journal of Nursing Scholarship*, *40*(4), 349-354.

Hiscock, R., Bauld, L., Amos, A., Fidler, J.A., & Munafò, M. (2012). Socioeconomic status and smoking a review. *Annals of the New York Academy of Sciences, 1248*(1), 107-123.

Hodgetts, G., Broers, T., & Godwin, M. (2004). Smoking behaviour, knowledge and attitudes among Family Medicine physicians and nurses in Bosnia and Herzegovina. *BMC Family Practice*, *5*, 12.

Hosseini, M., Ashktorab, T., Taghdisi, M. H., Vardanjani, A. E., & Rafiei, H. (2014). Health-promoting behaviors and their association with certain demographic characteristics of nursing students of Tehran City in 2013. *Global Journal of Health Science*, *7*(2), 264-272.

House of Commons Health Committee. (2013). *Cuts to public health risks widening health inequalities*. London: House of Commons Health Committee. Retrieved from: www.publications.parliament.uk.

Hui, W. C. (2002). The health-promoting lifestyles of undergraduate nurses in Hong Kong. *Journal of Professional Nursing*, *18*(2), 101-111.

Iglesias, M. E. L., de Bengoa Vallejo, R. B., & Fuentes, P. S. (2010). The relationship between experiential avoidance and burnout syndrome in critical care nurses: a cross-sectional questionnaire survey. *International Journal of Nursing Studies*, *47*(1), 30-37.

Information Service Division [ISD]. (2016). *Data tables.* Edinburgh: ISD. Retrieved from: http://www.isdscotland.org/Health-Topics/Workforce/Publications/data-tables.asp.

Information Services Division. (2014a). *NHS Scotland Workforce Statistics*. Edinburgh: ISD. Retrieved from: https://isdscotland.scot.nhs.uk/Workforce/Publications/2014-02-25/Nursing_and_Midwifery_sip_d2013.xls.

Inoue, K., Kakehashi, Y., Oomori, S., & Koizumi, A. (2004). Biochemical hypoglycemia in female nurses during clinical shift work. *Research in Nursing & Health*, *27*(2), 87-96.

Irazusta, A., Gil, S., Ruiz, F., Gondra, J., Jauregi, A., Irazusta, J., & Gil, J. (2006). Exercise, physical fitness, and dietary habits of first-year female nursing students. *Biological Research for Nursing*, *7*(3), 175-186.

ISD. (2014b). *NHS Scotland workforce statistics*. Edinburgh: ISD. Retrieved from: https://isdscotland.scot.nhs.uk/Workforce/Publications/2014-02-25/Nursing_and_Midwifery_SIP_D2013.xls.

James, O. (2007). *Affluenza*. (1st ed.) London: Vermilion.

James, P., Troped, P. J., Hart, J. E., Joshu, C. E., Colditz, G. A., Brownson, R. C., Ewing, R., & Laden, F. (2013). Urban Sprawl, Physical Activity, and Body Mass Index: Nurses' Health Study and Nurses' Health Study II. *American Journal of Public Health*, *103*(2), 369-375.

Jarvis, G. K., & Northcott, H. C. (1987). Religion and differences in morbidity and mortality. *Social Science & Medicine*, *25*(7), 813-824.

Jazwinski, S. M. (1996). Longevity, genes, and aging. *Science*, *273*(5271), 54.

Jeffery, R. W., & French, S. A. (1996). Socioeconomic status and weight control practices among 20-to 45-year-old women. *American Journal of Public Health*, *86*(7), 1005-1010.

Jenkins, K., & Ahijevych, K. (2003). Nursing students' beliefs about smoking, their own smoking behaviors, and use of professional tobacco treatment intervention. *Applied Nursing Research*, *16*(3), 164-172.

Jokela, M., Batty, G. D., Vahtera, J., Elovainio, M., & Kivimäki, M. (2013). Socioeconomic inequalities in common mental disorders and psychotherapy treatment in the UK between 1991 and 2009. *The British Journal of Psychiatry*, *202*(2), 115-120.

Jorm, A. F., Rodgers, B., Henderson, A. S., Korten, A. E., Jacomb, P. A., Christensen, H., & Mackinnon, A. (1998). Occupation type as a predictor of cognitive decline and dementia in old age. *Age & Ageing*, *27*(4), 477-483.

Jylhä, M. (2009). What is self-rated health and why does it predict mortality? Towards a unified conceptual model. *Social Science & Medicine, 69*(3), 307-316.

Kalinowski, P., & Karwat, I. D. (2004). The influence of environmental factors and education on tobacco smoking among students of the Faculty of Nursing, Medical University of Lublin. Annales Universitatis Mariae Curie-Skłodowska. *Medicina*, *59*(2), 124-128.

Kamwendo, K., Faresjö, T., Gustavsson, U., & Jansson, M. (2000). Adherence to healthy lifestyles -- a comparison of nursing and physiotherapy students. *Advances in Physiotherapy*, *2*(2), 63-74.

Kaplan, B., Yogev, Y., Fisher, M., Gall, B., Dekel, A., Sulkes, J., & Rabinerson, D. (2002). Self-health attitudes and practices of obstetrics and gynecology nurses in Israel. *Clinical & Experimental Obstetrics & Gynecology*, *29*(2), 115-116.

Karlsen, S., & Nazroo, J. Y. (2002). Agency and structure: the impact of ethnic identity and racism on the health of ethnic minority people. *Sociology of Health & Illness*, *24*(1), 1-20.

Karlsson, M., Mayhew, L., Plumb, R., & Rickayzen, B. (2006). Future costs for long-term care: cost projections for long-term care for older people in the United Kingdom. *Health Policy*, *75*(2), 187-213.

Karpansalo, M., Manninen, P., Kauhanen, J., Lakka, T. A., & Salonen, J. T. (2004). Perceived health as a predictor of early retirement. *Scandinavian Journal of Work, Environment & Health, 30*(4), 287-292.

Kasmel, A., Helasoja, V., Lipand, A., Prättälä, R., Klymbiene, J., & Pudule, I. (2004). Association between health behaviour and self-reported health in Estonia, Finland, Latvia and Lithuania. *European Journal of Public Health*, *14*(1), 32-36.

Kassel, J.D., Stroud, L.R., & Paronis, C.A. (2003). Smoking, stress, and negative affect: correlation, causation, and context across stages of smoking. *Psychological Bulletin, 129*(2), 270-304.

Kenfield, S. A., Wei, E. K., Rosner, B. A., Glynn, R. J., Stampfer, M. J., & Colditz, G. A. (2010). Burden of smoking on cause-specific mortality: application to the Nurses' Health Study. *Tobacco Control*, *19*(3), 248-254.

Kenna, G. A., & Wood, M. D. (2004). Substance use by pharmacy and nursing practitioners and students in a northeastern state. *American Journal of Health-System Pharmacy*, *61*(9), 921-930.

Kim, M.-J., Son, K.-H., Park, H.-Y., Choi, D.-J., Yoon, C.-H., Lee, H.-Y., Cho, E. Y., & Cho, M.C. (2013). Association between shift work and obesity among female nurses: Korean Nurses' Survey. *BMC Public Health*, *13*(1), 1204.

Kirag, N., & Ocaktan, E. M. (2013). Analysis of health promoting lifestyle behaviors and associated factors among nurses at a university hospital in Turkey. *Saudi Medical Journal*, *34*(10), 1062-1067.

Kirk, M.A., & Rhodes, R.E. (2011). Occupation correlates of adults' participation in leisure-time physical activity: a systematic review. *American Journal of Preventive Medicine, 40*(4), 476-485.

Kirkwood, T. B. (1996). Human senescence. *Bioessays, 18*(2), 1009-1016.

Kitajima, T., Ohida, T., Harano, S., Kamal, A. M. M., Takemura, S., Nozaki, N., Kawahara, K., & Minaowa, M. (2002). Smoking behavior, initiating and cessation factors among Japanese nurses: a cohort study. *Public Health (Nature)*, *116*(6), 347-352.

Kivimäki, M., Head, J., Ferrie, J. E., Shipley, M. J, M., Vahtera, J., & Marmot, M. G. M. (2003). Sickness absence as a global measure of health: evidence from mortality in the Whitehall II prospective cohort study. *The British Medical Journal, 327*(7411), 364.

Kivimäki, M., Jokela, M., Nyberg, S.T., Singh-Manoux, A., Fransson, E.I., Alfredsson, L., Bjorner, J.B., Borritz, M., Burr, H., Casini, A., Clays, E., Bacquer, D.D., Dragano, N., Erbel, R., Geuskens, G.A., Hamer, M., Hooftman, W.E., Houtman, I.L., & Jöckel, K-H. (2015). Long working hours and risk of coronary heart disease and stroke: a systematic review and meta-analysis of published and unpublished data for 603838 individuals. *The Lancet, 386*(10005), 1739-1746.

Kivimäki, M., Nyberg, S. T., Batty, D. G., Fransson, E. I., Heikkilä, K., Alfredssin, L., Bjorner, J. B., Borritz, M., Burr, H., Casini, A., Clays, E., Bacquer, D. D., Dragano, N., Ferrie, J. E., Geuskens, G. A., Goldberg, M., Hamer, M., Hooftman, W. E, & Houtman, I. L. (2012). Job strain as a risk factor for coronary heart disease: a collaborative meta-analysis of individual participant data. *The Lancet, 380*(9852), 1491-1497.

Klainin-Yobas, P., He, H. G., & Lau, Y. (2015). Physical fitness, health behaviour and health among nursing students: A descriptive correlational study. *Nurse Education Today*, *35*(12), 1199-1205.

Komatsu, H., & Yagasaki, K. (2014). The power of nursing: guiding patients through a journey of uncertainty. *European Journal of Oncology Nursing*, *18*(4), 419-424.

Kothari, C. R. (2004). *Research methodology: methods and techniques*. (2nd ed.) New Delhi: New Age International.

Krieger, N., Williams, D. R., & Moss, N. E. (1997). Measuring social class in US public health research: concepts, methodologies, and guidelines. *Annual Review of Public Health, 18*(1), 341-378.

Kuh, D., & Shlomo, Y. B. (2005). Introduction. In D. Kuh., & Y. B. Shlomo. (Eds.), *A life course approach to chronic disease epidemiology*. (2nd ed., pp. 3-14) United States: Oxford University Press.

Kuo, C. T., & Chiang, T. L. (2013). The association between relative deprivation and self-rated health, depressive symptoms, and smoking behavior in Taiwan. *Social Science & Medicine*, *89*, 39-44.

Kutlu, Y., Armstrong, M., Bostanci, N., Yilmaz, S., & Buzlu, S. (2008). The relationships between substance use and psychosocial factors in Turkish nursing students. *Journal of Addictions Nursing*, *19*(4), 201-206.

Kyle, R. G., Neall, R. A., & Atherton, I. M. (2016). Prevalence of overweight and obesity among nurses in Scotland: a cross-sectional study using the Scottish Health Survey. *International Journal of Nursing Studies*, *53*, 126-133.

Lally, R. M., Chalmers, K. I., Johnson, J., Kojima, M., Endo, E., Suzuki, S., Lai, Y. H., Yang., Y. H., Degner, L., Anderson, E., & Molassiotis, A. (2008). Smoking behavior and patient education practices of oncology nurses in six countries. *European Journal of Oncology Nursing*, *12*(4), 372-379.

Layte, R., & Whelan, C. T. (2009). Explaining social class inequalities in smoking: the role of education, self-efficacy, and deprivation. *European Sociological Review, 25*(4), 399–410.

Lee, S. J., Cho, Y. J., Kim, J. G., Ko, Y., Hong, K. S., Park, J. M., Kang, K., Park, T. H., Park, S. S., Lee, K. B., & Cha, J. K. (2015). Moderate alcohol intake reduces risk of ischemic stroke in Korea. *Neurology*, *85*(22), 1950-1956.

Lee, W. L., Tsai, S. H., Tsai, C. W., & Lee, C. Y. (2011). A Study on Work Stress, Stress Coping Strategies and Health Promoting Lifestyle among District Hospital Nurses in Taiwan. *Journal of Occupational Health*, *53*(5), 377-383.

Lehmann, F., von Lindeman, K., Klewer, J., & Kugler, J. (2014). BMI, physical inactivity, cigarette and alcohol consumption in female nursing students: a 5-year comparison. *BMC Medical Education*, *14*, 82-82.

Lelliott, P., Tulloch, S., Boardman, J., Harvey, S., Henderson, M., & Knapp, M. (2008). *Mental health and work: a report for the National Director for Work and Health*. London: Royal College of Psychiatrists. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/212266/hwwb-mental-health-and-work.pdf.

Lenz, B. K. (2008). Beliefs, knowledge, and self-efficacy of nursing students regarding tobacco cessation. *American Journal of Preventive Medicine*, *35*(6, Suppl 1), S494-S500.

Lindström, M., Hanson, B. S., & Östergren, P. O. (2001). Socioeconomic differences in leisure-time physical activity: the role of social participation and social capital in shaping health related behaviour. *Social Science & Medicine*, *52*(3), 441-451.

Linton, S. J. (2000). A review of psychological risk factors in back and neck pain. *Spine, 25*(9), 1148-1156.

Livingston, M., & Lee, D. (2014). "The Glasgow effect?"–The result of the geographical patterning of deprived areas? *Health & Place*, *29*, 1-9.

Lloyd, C. D. (2016). Are spatial inequalities growing? The scale of population concentrations in England and Wales. *Environment and Planning A*, *48*(7), 1318-1336.

Lobelo, F., & de Quevedo, I. G. (2016). The evidence in support of physicians and health care providers as physical activity role models. *American Journal of Lifestyle Medicine*, *10*(1), 36-52.

López-Maldonado, M. C. l., Luis, M. A. V., & Gherardi-Donato, E. C. D. S. (2011). Licit drugs consumption among nursing students at a private university in Bogota, Colombia. *Revista Latino-Americana de Enfermagem*, *19*, 707-713.

Lorenc, T., Petticrew, M., Whitehead, M., Neary, D., Clayton, S., Wright, K., Thomson, H., Cummins, S., Sowden, A., & Renton, A. (2013). Fear of crime and the environment: systematic review of UK qualitative evidence. *BMC Public Health*, *13*(1), 1.

Luttman, A., Jager, D. M., Griefahn, B., Caffier, G., & Liebers, F. (2003). *Preventing musculoskeletal disorders in the workplace*. Geneva: WHO. Retrieved from: http://www.who.int/occupational_health/publications/en/oehmsd3.pdf.

Lynch, J. W., Kaplan, G. A., & Salonen, J. T. (1997). Why do poor people behave poorly? Variation in adult health behaviours and psychosocial characteristics by stages of the socioeconomic lifecourse. *Social Science & Medicine, 44*(6), 809-819.

Lynch, J., Smith, G. D., Harper, S. A., Hillemeier, M., Ross, N., Kaplan, G. A., & Wolfson, M. (2004). Is income inequality a determinant of population health? Part 1. A systematic review. *Milbank Quarterly, 82*(1), 5-99.

Lynn, P. (2006). *Quality profile: British Household Panel Survey. Version 2.0: Waves 1 to 13: 1991-2003.* Colchester: Institute for Social and Economic Research. Retrieved from: https://www/iser.essex.ac.uk/files/bhps/quality-profiles/BHPS-QP-01-03-06-v2.pdf.

Maas, J., Verheij, R. A., Groenewegen, P. P., De Vries, S., & Spreeuwenberg, P. (2006). Green space, urbanity, and health: how strong is the relation?. *Journal of Epidemiology and Community Health*, *60*(7), 587-592.

Macintyre, S., Ellaway, A., Der, G., Ford, G., & Hunt, K. (1998). Do housing tenure and car access predict health because they are simply markers of income or self esteem? A Scottish study. *Journal of Epidemiology and Community Health, 52*, 657-664.

Macintyre, S., Ford, G., & Hunt, K. (1999). Do women 'over-report' morbidity? Men's and women's responses to structured prompting on a standard question on long standing illness. *Social Science & Medicine, 48*(1), 89-98.

Maeno, T., Ohta, A., Hayashi, K., Kobayashi, Y., Mizunuma, H., Nakai, S., Ohashi, Y., & Suzuki, S. (2005). Impact of reproductive experience on women's smoking behaviour in Japanese nurses. *Public Health*, *119*(9), 816-824.

Major, B., & O'Brien, L. T. (2005). The social psychology of stigma. *Annual Review of Psychology*, *56*, 1-659.

Malik, S., Blake, H., & Batt, M. (2011). How healthy are our nurses? New and registered nurses compared. *British Journal of Nursing*, *20*(8), 489-496.

Malkoutzis, N. (2012). *How the 2004 Olympics triggered Greece's decline*. Greece: Bloomberg. Retrieved from: http://www.bloomberg.com/bw/articles/2012-08-02/how-the-2004-olympics-triggered-greeces-decline.

Manderbacka, K., Lundberg, O., & Martikainen, P. (1999). Do risk factors and health behaviours contribute to self-ratings of health? *Social Science & Medicine*, *48*(12), 1713-1720.

Margerison-Zilko, C., & Cubbin, C. (2012). Socioeconomic disparities in tobacco-related health outcomes across racial/ethnic groups in the United States: National Health Interview Survey 2010. *Nicotine & Tobacco Research, 15*(6), 1161-1165.

Marmot Review. (2010). *Fair society, healthy lives*. London: Institute of Health Equity. Retrieved from: www.marmotreview.org.

Marmot, M. (2004). Status syndrome. *Significance*, *1*(4), 150-154.

Marmot, M. G., Rose, G., Shipley, M., & Hamilton, P. J. (1978). Employment grade and coronary heart disease in British civil servants. *Journal of Epidemiology and Community Health, 32*(4), 244-249.

Marmot, M. G., Smith, G. D., Stansfeld, S., Patel, C., North, F., Head, J., White, I., Brunner, E., & Feeney, A. (1991). Health inequalities among British civil servants: the Whitehall II study. *The Lancet, 337*(8754), 1387-1393.

Marsh, A., Gordon, D., Heslop, P., & Patazis, C. (2000). Housing deprivation and health: a longitudinal analysis. *Housing Studies, 15*(3), 411-428.

Martin, A., Panter, J., Suhrcke, M., & Ogilvie, D. (2015). Impact of changes in mode of travel to work on changes in body mass index: evidence from the British Household Panel Survey. *Journal of Epidemiology & Community Health*, 69(8), 753-761. doi:10.1136/jech-2014-205211.

Matheson, A., O'Brien, L., & Reid, J. A. (2014). The impact of shiftwork on health: a literature review. *Journal of Clinical Nursing*, *23*(23-24), 3309-3320.

Matute, R. C., & Pillon, S. C. (2008). Alcohol consumption by nursing students in Honduras. *Revista Latino-Americana De Enfermagem*, *16*(Special), 584-589.

McCann, T. V., Clark, E., & Rowe, K. (2005). Undergraduate nursing students' attitudes towards smoking health promotion. *Nursing & Health Sciences*, *7*(3), 164-174.

McDonald, E. W. (2013). *Spatial-temporal analysis of endocrine disruptor pollution, neighbourhood stress, maternal age and related factors as potential determinants of birth sex ratio in Scotland*. (PhD thesis). Stirling: University of Stirling. Retrieved from: https://dspace.stir.ac.uk/bitstream/1893/16044/1/FINALTHESIS_EMcDonald_310713.pdf.

McElligott, D., Siemers, S., Thomas, L., & Kohn, N. (2009). Health promotion in nurses: is there a healthy nurse in the house? *Applied Nursing Research*, *22*(3), 211-215.

McKenna, H., Slater, P., McCance, T., Bunting, B., Spiers, A., & McElwee, G. (2001). Qualified nurses' smoking prevalence: their reasons for smoking and desire to quit. *Journal of Advanced Nursing*, *35*(5), 769-775.

McKenna, H., Slater, P., McCance, T., Bunting, B., Spiers, A., & McElwee, G. (2003). The role of stress, peer influence and education levels on the smoking behaviour of nurses. *International Journal of Nursing Studies*, *40*(4), 359-366.

McLaren, E. (2016)*. Statistical bulletin: marriages in England and Wales: 2013*. London: Office for National Statistics. Retrieved from: https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/marriagecohabitationandcivilpartnerships/bulletins/marriagesinenglandandwalesprovisional/2013#main-points.

McManus. S., Meltzer, H., Brugha, T., Bebbington, P., & Jenkins, R. (2009). *Adult psychiatric morbidity in England 2007: results of a household survey*. Leeds: NHS Information Centre for Health and Social Care. Retrieved from: http://www.hscic.gov.uk/pubs/psychiatricmorbidity07.

McPherson, M., Janssen, I., Grundy, A., Tranmer, J., Richardson, H., & Aronson, K. J. (2011). Physical activity, sedentary behavior, and melatonin among rotating shift nurses. *Journal of Occupational & Environmental Medicine*, *53*(7), 716-721.

Meijer, E., Gebhardt, W, A., van Laar, C., Kawpis, R., & Beijk, S. C. M. (2016). Socio-economic status in relation to smoking: the role of (expected and desired) social support and quitter identity. *Social Science & Medicine, 162*, 41-49.

Melani, A. S., Verponziani, W., Boccoli, E., Trianni, G. L., Federici, A., Amerini, R., Vichi, M. G., & Sestini, P. (2000). Tobacco smoking habits, attitudes and beliefs among nurse and medical students in Tuscany. *European Journal of Epidemiology*, *16*(7), 607-611.

Merrill, R. M., Gagon, H., Harmon, T., & Milovic, I. (2010a). The importance of tobacco cessation training for nurses in Serbia. *The Journal of Continuing Education in Nursing*, *41*(2), 89-96.

Merrill, R. M., Madanat, H., & Kelley, A. T. (2010b). Smoking prevalence, attitudes, and perceived smoking prevention and control responsibilities and practices among nurses in Amman, Jordan. *International Journal of Nursing Practice*, *16*(6), 624-632.

Mertens, D. M. (2010). *Research and evaluation in education and psychology: integrating diversity with quantitative, qualitative, and mixed methods* (3rd ed.). USA: Sage.

Miilunpalo, S., Vuori, I., Oja, P., Pasanen, M., & Urponen, H. (1997). Self-rated health status as a health measure: the predictive value of self-reported health status on the use of physician services and on mortality in the working-age population. *Journal of Clinical Epidemiology*, *50*(5), 517–528.

Milner, A., Page, A., & LaMontagne, A. D. (2013). Long-term unemployment and suicide: a systematic review and meta-analysis. *PloS one*, *8*(1), e51333.

Ministerial Taskforce on Health Inequalities. (2012). *Ministerial task force on health inequalities – meeting papers*. *Paper 3b.* Edinburgh: Scottish Government. Retrieved from: http://www.gov.scot/Resource/0041/00412228.pdf.

Misevičienė, I., Strumylaitė, L., Pajarskienė, B., & Zalnieraitienė, K. (2013). What are the predictors of self-assessed health in Lithuanian health professionals? *Medicina*, *49*(1), 23-28.

Mishra, S., & Carleton, R. N. (2015). Subjective relative deprivation is associated with poorer physical and mental health. *Social Science & Medicine*, *147*, 144-149.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of Internal Medicine*, *151*(4), 264-269.

Mokdad, A. H., Ford, E. S., Bowman, B. A., Dietz, W. H., Vinicor, F., Bales, V. S., & Marks, J. S. (2003). Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001. *Journal of the American Medical Association*, *289*(1), 76-79.

Molin, S., Bauer, A., Schnuch, A., & Geier, J. (2014). Occupational contact allergy in nurses: results from the Information Network of Departments of Dermatology 2003–2012. *Contact Dermatitis*, *72*(3), 164-171.

Montalvo-Prieto, A., & Castillo-Ávila, I. Y. (2013). Knowledge, attitudes, and practices regarding legal and illegal substances by nursing students from Cartagena (Colombia). *Investigacion & Educacion en Enfermeria*, *31*(1), 63-69.

Moon, H. J., Lee, S. H., Lee, H. S., Lee, K. J., & Kim, J. J. (2015). The association between shift work and depression in hotel workers. *Annals of Occupational and Environmental Medicine*, *27*(1), 1.

Mørch, L. S., Johansen, D., Løkkegaard, E., Hundrup, Y. A., & Grønbaek, M. (2008). Drinking pattern and mortality in Danish nurses. *European Journal of Clinical Nutrition*, *62*(6), 817-822.

Morch, L. S., Johansen, D., Thygesen, L. C., Tjonneland, A., Lokkegaard, E., Stahlberg, C., & Gronbaek, M. (2007). Alcohol drinking, consumption patterns and breast cancer among Danish nurses: a cohort study. *European Journal of Public Health*, *17*(6), 624-629.

Müller, C.P., & Schumann, G. (2011). Drugs as instruments: a new framework for non-addictive psychoactive drug use. *Behavioral and Brain Science, 34*(6), 293-310.

Munn, Z., Moola, S., Riitano, D., & Lisy, K. (2014). The development of a critical appraisal tool for use in systematic reviews addressing questions of prevalence. *International Journal of Health Policy and Management, 3*(3), 123.

Murray, E. T., Head, J., Shelton, N., Hagger-Johnson, G., Stansfeld, S., Zaninotto, P., & Stafford, M. (2016). Local area unemployment, individual health and workforce exit: ONS Longitudinal Study. *The European Journal of Public Health*, *26*(3), 463-469.

Nagel, G., Peter, R., Braig, S., Hermann, S., Rohrmann, S., & Linseisen J. (2008). The impact of education on risk factors and the occurrence of multimorbidity in the EPIC-Heidelberg cohort. *BioMed Central Public Health, 8*(1), 384.

Nahm, E.-S., Warren, J., Zhu, S., An, M., & Brown, J. (2012). Nurses' self-care behaviors related to weight and stress. *Nursing Outlook*, *60*(5), e23-31.

Najimi, A., Goudarzi, A. M., & Sharifirad, G. (2012). Causes of job stress in nurses: a cross-sectional study. *Iranian Journal of Nursing & Midwifery* Research, *17*(4), 301-305.

Nandi, A., Glymour, M. M., & Subramanian, S. V. (2014). Association among socioeconomic status, health behaviors, and all-cause mortality in the United States. *Epidemiology*, *25*(2), 170-177.

National Careers Service. (2016). *Secondary school teacher*. Newcastle Upon Tyne: National Careers Service. Retrieved from: https://nationalcareersservice.direct.gov.uk/job-profiles/secondary-school-teacher.

Neall, R. A., Atherton, I. M., & Kyle, R. G. (2016). Nurses' health-related behaviours: protocol for a quantitative systematic review of prevalence of tobacco smoking, physical activity, alcohol consumption and dietary habits. *Journal of Advanced Nursing,* 72(1), 197-204. doi:10.111/jan.12739.

Nejati, A., Shepley, M., & Rodiek, S. (2016). A review of design and policy interventions to promote nurses' restorative breaks in health care workplaces. *Workplace Health & Safety*, *64*(2), 70-77.

Nettleton, S., & Burrows, R. (1998). Mortgage debt, insecure home ownership and health: an exploratory analysis. *Sociology of Health & Illness*, *20*(5), 731-753.

Ng, T.W.H., & Feldman, D.C. (2013). Employee age and health. *Journal of Vocational Behavior, 83*(3), 336-345.

Ngan, K., Drebit, S., Siow, S., Yu, S., Keen, D., & Alamgir, H. (2010). Risks and causes of musculoskeletal injuries among health care workers. *Occupational Medicine*, *60*(5), 389-394.

NHS Digital. (2017). *Statistics on obesity, physical activity and diet*. Leeds: Health and Social Care Information Centre. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/613532/obes-phys-acti-diet-eng-2017-rep.pdf.

NHS Improvement. (2016). *Evidence from NHS Improvement on clinical staff shortages: a workforce analysis*. London: NHS Improvement. Retrieved from: https://www.gov.uk/government/publications/evidence-from-nhs-improvement-on-clinical-staff-shortages.

NHS. (2015). *Manual handling*. Leeds: NHS Employers. Retrieved from: http://www.nhsemployers.org/~/media/Employers/Publications/Manual%20handling.pdf.

NHS. (2016). *NHS workforce statistics: May 2016, provisional statistics*. Leeds: NHS Digital. Retrieved from: http://content.digital.nhs.uk/catalogue/PUB21381/nhs-work-stat-may-2016-pdf.pdf.

Nia, H. S., Haghdoost, A. A., beheshti, Z., Soleymani, M. A., Bahrami, N., Hojjati, H., & Hosseine, F. H. (2013). Relationship between backache and psychological and psychosocial job factors among the nurses. *International Journal of Nursing & Midwifery*, *3*(7), 86-91.

Nicholson, P. J., Llewellyn, D., & English, J. S. (2010). Evidence-based guidelines for the prevention, identification and management of occupational contact dermatitis and urticaria. *Contact Dermatitis*, *63*(4), 177-186.

Nielsen, S. S., & Krasnik, A. (2010). Poorer self-perceived health among migrants and ethnic minorities versus the majority population in Europe: a systematic review. *International Journal of Public Health, 55*, 357-371.

Niemann, Y. F., Romero, A. J., Arredondo, J., & Rodriguez, V. (1999). What does it mean to be “Mexican”? Social construction of an ethnic identity. *Hispanic Journal of Behavioral Sciences*, *21*(1), 47-60.

Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implementation Science*, *10*(1), 1.

Nursing and Midwifery Council (NMC). (2008). *The Code: Standards of Conduct, Performance and Ethics for Nurses and Midwives*. London: NMC. Retrieved from: https://www.nmc.org.uk/standards/code/.

Nursing and Midwifery Council. (2015). The code: professional standards of practice and behaviour for nurses and midwives. London: NMC. Online https://www.nmc.org.uk/globalassets/sitedocuments/nmc-publications/nmc-code.pdf.

Nursing and Midwifery Council. (2017). The NMC register 2012/13 – 2016/17. Retrieved from: https://www.nmc.org.uk/globalassets/sitedocuments/other-publications/nmc-register-2013-2017.pdf.

O'Donovan, G. (2009). Smoking prevalence among qualified nurses in the Republic of Ireland and their role in smoking cessation. *International Nursing Review*, *56*(2), 230-236.

O'Donovan, G., Lee, I. M., Hamer, M., & Stamatakis, E. (2017). Association of "weekend warrior" and other leisure time physical activity patterns with risks for all-cause, cardiovascular disease, and cancer mortality. *JAMA Internal Medicine, 177*(33), 335-342.

Office for National Statistics [ONS]. (2015). *National life tables, United Kingdom: 2012-2014*. London: ONS. Retrieved from: http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/bulletins/nationallifetablesunitedkingdom/2015-09-23.

Office for National Statistics., & Social Survey Division. (2016, July). *Annual Population Survey, January - March 2016* [computer file]. Colchester, Essex: UK Data Archive [distributor]. SN: 8003. Retrieved from: http://dx.doi.org/10.5255/UKDA-SN-8003-1.

Office for National Statistics., Social Survey Division, Northern Ireland Statistics and Research Agency., & Central Survey Unit. (2016). *Quarterly Labour Force Survey, January - March, 2016*. [data collection]. (2nd ed.) UK Data Service. SN: 7985. Retrieved from: http://dx.doi.org/10.5255/UKDA-SN-7985-2.

Office of the Chief Statistician. (2004). *Scottish neighbourhood statistics data zone. Background information*. Edinburgh: Scottish Executive. Retrieved from: http://www.gov.scot/Topics/Statistics/sns/SNSRef/SNSPapDatZon.

Office of the Chief Statistician. (2005). *Scottish neighbourhood statistics. Intermediate geography background information*. Edinburgh: The Scottish Government. Retrieved from: http://www.gov.scot/Topics/Statistics/sns/SNSRef/SNSPaperIntGeo.

Ohida, T., Kamal, A. A., Takemura, S., Sone, T., Minowa, M., & Nozaki, S. (2001). Smoking behavior and related factors among Japanese nursing students: a cohort study. *Preventive Medicine*, *32*(4), 341-347.

Ohida, T., Kawahara, K., Osaki, Y., Sone, T., Kamal, A. M., Kawaguchi, T., Sekiyama, M., Harita, A., & Minowa, M. (2000). Behaviors and attitudes towards smoking among the nurses in Japan. *Journal of Epidemiology*, *10*(5), 344-348.

Oksuzyan, A., Juel, K., Vaupel, J.W., & Christensen, K. (2008). Men: good health and high mortality. Sex differences in health and aging. *Aging Clinical & Experimental Research, 20*(2), 91-102.

Omoniyi, M. B. I., & Ongunsanmi, J. O. (2012). Sex, marital status and years of experience as correlates of stress among academic staff in south west Nigeria. *European Scientific Journal*, *8*(10), 25-34.

ONS. (2000). *Standard Occupational Classification 2000*. London: ONS. Retrieved from: https://www.ons.gov.uk/file?uri=/methodology/classificationsandstandards/standardoccupationalclassificationsoc/socarchive/soc2000tcm771813161.pdf.

ONS. (2001). *Psychiatric morbidity among adults living in private households*. London: The Stationery Office. Retrieved from: https://www.ons.gov.uk/ons/rel/psychiatric-morbidity/psychiatric-morbidity-among-adults-living-in-private-households/2000/psychiatric-morbidity-among-adults-living-in-private-households.pdf?format=print.

ONS. (2010). *Standard Occupational Classification 2010*. London: ONS. Retrieved from: https://www.ons.gov.uk/methodology/classificationsandstandards/standardoccupationalclassificationsoc/soc2010.

ONS. (2016). *Statistical bulletin: UK labour market: February 2016*. London: ONS. Retrieved from: http://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/uklabourmarket/february2016#main-points-for-october-to-december-2015.

ONS. (2017a). *Population estimates for UK, England and Wales, Scotland and Northern Ireland.* London: ONS. Retrieved from: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates.

ONS. (2017b). *Alcohol-related deaths in the UK: registered in 2015.* London: ONS. Retrieved from: https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/causesofdeath/bulletins/alcoholrelateddeathsintheunitedkingdom/registeredin2015.

Orchard, C. (2014). *Compendium: adult smoking habits in Great Britain, 2013*. London: ONS. Retrieved from: https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifeexpectancies/compendium/opinionsandlifestylesurvey/2015-03-19/adultsmokinghabitsingreatbritain2013.

Orford, S., Dorling, D., Mitchell, R., Shaw, M., & Smith, G. D. (2002). Life and death of the people of London: a historical GIS of Charles Booth's inquiry. *Health & Place*, 8(1), 25-35.

Organisation for Economic Co-operation and Development. [OECD]. (2012). *Inequalities in labour income – what are its drivers and how can it be reduced?* OECD Economics Department Policy Notes, No. 8. January 2012. Paris: OECD. Retrieved from: https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjN3aPVmIHVAhXFPRQKHbX8BRgQFggmMAA&url=https%3A%2F%2Fwww.oecd.org%2Feco%2Fpublic-finance%2F49417273.pdf&usg=AFQjCNHlZC80OvKRuu6bDQ3sTOL9HClDjg.

Ôstlin, P. (1990). Occupational history, self reported chronic illness, and mortality: a follow up of 25 586 Swedish men and women. *Journal of Epidemiology & Community Health, 44*(1), 12-16.

Öztürk, C., Bektaş, M., Yilmaz, E., Salman, F., Şahin, T., İlmek, M., & Göke, G. (2011). Smoking status of Turkish nursing students and factors affecting their behavior. *Asian Pacific Journal of Cancer Prevention*, *12*(7), 1687-1692.

Painter, J.E., Borba, C.P.C., Hynes, M., Mays, D., & Glanz, K. (2008). The use of theory in health behaviour research from 2000 to 2005: a systematic review. *Annals of Behavioral Medicine, 35*(3), 348-362.

Pampel, F. C., Krueger, P. M., & Denney, J. T. (2010). Socioeconomic disparities in health behaviors. *Annual review of sociology*, *36*, 349-370.

Pappas, N. A., Alamanos, Y., & Dimoliatis, I. D. K. (2005). Self-rated health, work characteristics and health related behaviours among nurses in Greece: a cross sectional study. *BMC Nursing, 4*(1), 8.

Parasuramalu, B. G., Huliraj, N., Kumar, S. P., Masthi, N. R., & Babu, C. S. (2014). Prevalence of chronic obstructive pulmonary disease and its association with tobacco smoking and environmental tobacco smoke exposure among rural population. *Indian Journal of Public Health*, *58*(1), 45.

Park, D.-I., Choi-Kwon, S., & Han, K. (2015). Health behaviors of Korean female nursing students in relation to obesity and osteoporosis. *Nursing Outlook*, *63*(4), 504-511.

Patkar, A. A., Hill, K., Batra, V., Vergare, M. J., & Leone, F. T. (2003). A comparison of smoking habits among medical and nursing students. *CHEST*, *124*(4), 1415-1420.

Pavot, W. & Diener, E. (2009). Review of the satisfaction with life scale. In E. Diener (Ed.), *Assessing well-being: the collected works of Ed Diner (Social Indicators Research Series)* (1st ed., pp. 101-117). Netherlands: Springer Science and Business Media.

Pavot, W., & Diener, E. (1993). Review of the satisfaction with life scale. *Psychological Assessment*, *5*(2), 164.

Pearlin, L. I. (1989). The sociological study of stress. *Journal of Health & Social Behavior*, *30*(3), 241-256.

Pell, J. P., Haw, S., Cobbe, S., Newby, D. E., Pell, A. C., Fischbacher, C., McConnachie, A., Pringle, S., Murdoch, D., Dunn, F., & Oldroyd, K. (2008). Smoke-free legislation and hospitalizations for acute coronary syndrome. *New England Journal of Medicine*, *359*(5), 482-491.

*Pensions Act 2014.* London: TSO. Retrieved from: http://www.legislation.gov.uk/ukpga/2014/19/contents.

Perera, S., Sardeshmukh, S. R., & Kulik, C. T. (2015). In or out: job exits of older workers. *Asia Pacific Journal of Human Resources, 53*(1), 4-21.

Perry, L., Gallagher, R., & Duffield, C. (2015). The health and health behaviours of Australian metropolitan nurses: an exploratory study. *BMC Nursing*, *14*(1), 45.

Petch-Levine, D., Cureton, V. Y., Canham, D., & Murray, M. (2003). Health practices of school nurses. *The Journal of School Nursing*, *19*(5), 273-280.

Piko, B. F. (2002). Does knowledge count? Attitudes toward smoking among medical, nursing, and pharmacy students in Hungary. *Journal of Community Health*, *27*(4), 269-276.

Pillai, J. A., & Verghese, J. (2009). Social networks and their role in preventing dementia. *Indian Journal of Psychiatry*, *51*(5), 22.

Pirie, K., Peto, R., Reeves, G. K., Green, J., Beral, V., & Million Women Study Collaborators. (2013). The 21st century hazards of smoking and benefits of stopping: a prospective study of one million women in the UK. *The Lancet*, *381*(9861), 133-141.

Poulsen, K., Cleal, B., Clausen, T., & Andersen, L. L. (2014). Work, diabetes and obesity: a seven year follow-up study among Danish health care workers. *PLoS One*, *9*(7), e103425.

Preechawong, S., Panpakdee, O., Pitayarangsarit, S., Palipudi, K. M., & Sinha, D. N. (2014). Tobacco Use, Exposure to Second Hand Smoke and Cessation Training among Nursing Students: Thailand Global Health Professions Student Survey, 2006–2011. *International Journal of Nursing Research*, *18*(2), 88-99.

Protheroe, J., Whittle, R., Bartlam, B., Estacio, E. V., Clark, L., & Kurth, J. (2016). Health literacy, associated lifestyle and demographic factors in adult population of an English city: a cross-sectional survey. *Health Expectations, 20*(1), 112-119.

Prüss-Ustün, A., Wolf, J., Corvalán, C., Neville, T., Bos, R., & Neira, M. (2016). Diseases due to unhealthy environments: an updated estimate of the global burden of disease attributable to environmental determinants of health. *Journal of Public Health*, 1-12. doi: 10.1093/pubmed/fdw085.

Public Health England. (2014). *Briefing 8: local action on health inequalities: improving access to green spaces*. London: Public Health England. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/355792/Briefing8_Green_spaces_health_inequalities.pdf.

Purcell, C., Moyle, W., & Evans, K. (2006). An exploration of modifiable health associated risk factors within a cohort of undergraduate nursing students. *Contemporary Nurse*, *23*(1), 100-110.

Quattrin, R., Zanini, A., Zamolo, E., & Brusaferro, S. (2010). Are Italian nursing students healthy and having protective lifestyle behaviours? A pilot study. *Medicina Preventiva E Di Comunità*, *22*(1), 83-88.

Rabanales Sotos, J., López Gonzalez, Á., Párraga Martínez, I., Campos Rosa, M., Simarro Herraez, M. J., & López-Torres Hidalgo, J. (2015). Prevalence of hazardous drinking among nursing students. *Journal of Advanced Nursing*, *71*(3), 581-590.

Ramond, A., Bouton, C., Richard, I., Roquelaure, Y., Baufreton, C., Legrand, E., & Huez, J. F. (2011). Psychosocial risk factors for chronic low back pain in primary care—a systematic review. *Family Practice*, *28*(1), 12-21.

Rana, S., Tran, T., Luo, W., Phung, D., Kennedy, R., & Venkatesh, S. (2014). Predicting unplanned readmission after Myocardial Infarction from Routinely Collected Administrative Hospital Data. *Australian Health Review*, *38*(4), 377-382.

Ravesteign, B., van Kippersluis, H., & van Doorslaer, E. (2013). *The wear and tear on health: what is the role of occupation?* Berlin: German Socio-Economic Panel Study. Retrieved from: https://mpra.ub.uni-muenchen.de/55330/1/MPRA_paper_55330.pdf.

RCN. (2015). *NHS pay scales 2016-17*. London: RCN. Retrieved from: https://www.rcn.org.uk/employment-and-pay/nhs-pay-scales-2016-17.

Rechel, B., Mladovsky, P., Deville, W., Rijks, B., Petrova-Benedict, R., & McKee, M. (2011). *Migration and health in the European Union*. (2nd ed.) Berkshire: Open University Press.

Rechel, B., Mladovsky, P., Ingleby, D., Mackenbach, J. P., & McKee, M. (2013). Migration and health in an increasingly diverse Europe. *The Lancet*, *381*(9873), 1235-1245.

Reeuwijk, K. G., van Klaveren, D., van Rijn, R. M., Burdorf, A., & Robroek, S. J. (2017). The influence of poor health on competing exit routes from paid employment among older workers in 11 European countries. *Scandinavian Journal of Work, Environment & Health*, *43*(1), 24-33.

Regier, D. A., Farmer, M. E., Rae, D. S., Locke, B. Z., Keith, S. J., Judd, L. L., & Goodwin, F. K. (1990). Comorbidity of mental disorders with alcohol and other drug abuse: results from the Epidemiologic Catchment Area (ECA) study. *Journal of American Medical Association, 264*(19), 2511-2518.

Rehm, J., Mathers, C., Popova, S., Thavorncharoensap, M., Teerawattananon, Y., & Patra, J. (2009). Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet, 373*(9682), 2223-2233.

Reme, S. E., Shaw, W. S., Boden, L. I., Tveito, T. H., O'Day, E. T., Dennerlein, J. T., & Sorensen, G. (2014). Worker assessments of organizational practices and psychosocial work environment are associated with musculoskeletal injuries in hospital patient care workers. *American Journal of Industrial Medicine*, *57*(7), 810-818.

Richards, L., & Paskov, M. (2016). Social class, employment status and inequality in psychological well-being in the UK: cross-sectional and fixed effects analyses over two decades. *Social Science & Medicine*, *167*, 45-53.

Riese, H., Van Doornen, L. J., Houtman, I. L., & De Geus, E. J. (2004). Job strain in relation to ambulatory blood pressure, heart rate, and heart rate variability among female nurses. *Scandinavian Journal of Work, Environment & Health*, *30*(6), 477-485.

Rijn, R. M., Robroek, S. J., Brouwer, S., & Burdorf, A. (2014). Influence of poor health on exit from paid employment: a systematic review. *Occupational & Environmental Medicine*, *71*(4), 295-301.

Ritchie, K. A., Macdonald, E. B., Gilmour, W. H., & Murray, K. J. (1999). Analysis of sickness absence among employees of four NHS trusts. *Occupational & Environmental Medicine*, *56*(10), 702-708.

Robards, J., Evandrou, M., Falkingham, J., & Vlachantoi, A. (2012). Marital status, health and mortality. *Maturitas, 73*(4), 295-299.

Robertson, A. (2014). *2013 social services workforce statistics for Scotland released*. Dundee: Scottish Social Services Council. Retrieved from: http://www.sssc.uk.com/about-the-sssc/multimedia-library/publications/press-releases/september-2014-2013-social-services-workforce-statistics-for-scotland-released-today.

Robles, T. F., Slatcher, R. B., Trombello, J. M., & McGinn, M. M. (2014). Marital quality and health: A meta-analytic review. *Psychological Bulletin*, *140*(1), 140.

Rodgers, S., Stenhouse, R., McCreaddie, M., & Small, P. (2013). Recruitment, selection and retention of nursing and midwifery students in Scottish Universities. *Nurse Education Today*, *33*(11), 1301-1310.

Roerecke, M., & Rehm, J. (2012). The cardioprotective association of average alcohol consumption and ischaemic heart disease: a systematic review and meta-analysis. *Addiction*, *107*(7), 1246-1260.

Roerecke, M., & Rehm, J. (2014). Alcohol consumption, drinking patterns, and ischemic heart disease: a narrative review of meta-analyses and a systematic review and meta-analysis of the impact of heavy drinking occasions on risk for moderate drinkers. *BMC Medicine*, *12*(1), 182.

Rogers, A. E., Hwang, W. T., & Scott, L. D. (2004). The effects of work breaks on staff nurse performance. *Journal of Nursing Administration*, *34*(11), 512-519.

Ronksley, P. E., Brien, S. E., Turner, B. J., Mukamal, K. L., & Ghali, W. A. (2011). Association of alcohol consumption with selected cardiovascular disease outcomes: a systematic review and meta-analysis. *BMJ, 342*, d671.

Rose, D., & Harrison, E. (2011). *Social class in Europe: an introduction to the European socio-economic classification*. (1st ed.) London and New York: Routledge Taylor & Francis Group.

Ross, C. E., & Mirowsky, J. (1999). Refining the association between education and health: the effects of quantity, credential, and selectivity. *Demography*, *36*(4), 445-460.

Ross, C. E., & Wu, C. l. (1995). The links between education and health. *American Sociological Review, 60*(5), 719-745.

Saleh, M., & Almasri, N. A. (2014). Use of the Measure of Processes of Care (MPOC-20) to evaluate health service delivery for children with cerebral palsy and their families in Jordan: validation of Arabic-translated version (AR-MPOC-20). *Child: Care, Health & Development*, *40*(5), 680-688.

Sampselle, C. M., Harris, V., Harlow, S. D., & Sowers, M. (2002). Midlife development and menopause in African American and Caucasian women. *Health Care for Women International*, *23*(4), 351-363.

Sanderson, D. M., Ekholm, O., Hundrup, Y. A., & Rasmussen, N. K. (2005). Influence of lifestyle, health, and work environment on smoking cessation among Danish nurses followed over 6 years. *An International Journal Devoted to Practice and Theory*, *41*(3-4), 757-760.

Santin, G., Cohidon, C., Goldberg, M., & Imbernon, E. (2009). Depressive symptoms and atypical jobs in France, from the 2003 Decennial Health Survey. *American Journal of Industrial Medicine, 52*(10), 799-810.

Sarna, L., Bialous, S. A., Cooley, M. E., Jun, H. J., & Feskanich, D. (2008i). Impact of smoking and smoking cessation on health-related quality of life in women in the Nurses' Health Study. *Quality of Life Research*, *17*(10), 1217-1227.

Sarna, L., Bialous, S. A., Jun, H., Wewers, M. E., Cooley, M. E., & Feskanich, D. (2008ii). Smoking trends in the Nurses' Health Study (1976-2003). *Nursing Research*, *57*(6), 374-382.

Sarna, L., Bialous, S. A., Nandy, K., & Yang, Q. (2012). Are quit attempts among U.S. female nurses who smoke different from female smokers in the general population? An analysis of the 2006/2007 tobacco use supplement to the current population survey. *BMC Women's Health*, *12*(1), 4.

Sarna, L., Bialous, S. A., Wells, M. J., Kotlerman, J., Froelicher, E. S., & Wewers, M. E. (2009). Do you need to smoke to get a break? Smoking status and missed work breaks among staff nurses. *American Journal of Preventive Medicine*, *37*(2 suppl), S165-S171.

Sarna, L., Bialous, S. A., Zou, X. N., Wang, W., Hong, J., Chan, S., Wells, M. J., & Brook, J. (2016). Helping smokers quit: behaviours and attitudes of Chinese Registered Nurses. *Journal of Advanced Nursing*, *72*(1), 107-117.

Schell, E., Theorell, T., Nilsson, B., & Saraste, H. (2012). Work health determinants in employees without sickness absence. *Occupational Medicine, 63*(1), 17-22.

Schultz, A. S. H., Hossain, S., & Johnson, J. L. (2009). Modeling influences on acute care nurses' engagement in tobacco use reduction. *Research in Nursing & Health*, *32*(6), 621-633.

Schwensen, J. F., Friis, U. F., Menné, T., & Johansen, J. D. (2013). One thousand cases of severe occupational contact dermatitis. *Contact Dermatitis*, *68*(5), 259-268.

ScotCen Social Research. (2015, December). *Scottish Health Survey, 2012 - 2014* [computer file]. Colchester, Essex: UK Data Archive [distributor]. SN: 7851. Retrieved from: http://dx.doi.org/10.5255/UKDA-SN-7851-1.

ScotPHO. (2014). *The Scottish Health Survey.* Glasgow: Scottish Public Health Observatory. Retrieved from: http://www.scotpho.org.uk/publications/overview-of-key-data-sources/surveys-crosssectional/.

Scott, I., & Mazhindu, D. (2014). *Statistics for healthcare professionals: an introduction*. (2nd ed.) London: SAGE Publications.

Scottish Government. (2008). *Equally well: report of the ministerial task force on health inequalities*. Edinburgh: Scottish Government. Retrieved from: https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0ahUKEwicp_boqIHVAhVMCBoKHQTAA2UQFgg4MAE&url=http%3A%2F%2Fwww.gov.scot%2FPublications%2F2008%2F06%2F25104032%2F4&usg=AFQjCNFAzRY79QFrWOsqmd2FZrL3CLK-Aw.

Scottish Government. (2016a). *Drinking guidelines: UK Chief Medical Officers' Alcohol Guidelines Review*. Edinburgh: Scottish Government. Retrieved from: http://www.gov.scot/Topics/Health/Services/Alcohol/safer-drinking.

Scottish Government. (2016b). *Health of Scotland's population – smoking*. Edinburgh: Scottish Government. Retrieved from: http://www.gov.scot/Topics/Statistics/Browse/Health/TrendSmoking.

Seaman, R., Mitchell, R., Dundas, R., Leyland, A. H., & Popham, F. (2015). How much of the difference in life expectancy between Scottish cities does deprivation explain? *BMC Public Health*, *15*(1), 1057.

Sezer, H., Guler, N., & Sezer, R. E. (2007). Smoking among nurses in Turkey: comparison with other countries. *Journal of Health, Population, & Nutrition*, *25*(1), 107-111.

Sheard, M., Huntington, A., & Gilmour, J. (2014). A study of alcohol consumption in a cohort of military nurses. *Journal of Military & Veterans' Health*, *22*(3), 25-33.

Shield, K. D., Parry, C., & Rehm, J. (2014). Chronic diseases and conditions related to alcohol use. *Alcohol Research: Current Reviews, 35*(2), 155-171.

Shiroma, E. J., Sesso, H. D., Buring, J. E., & Lee, I. M. (2014). Do moderate-intensity and vigorous-intensity physical activities reduce mortality rates to the same extent? *Journal of the American Heart Association, 3*(5), e000802.

Shishani, K., Nawafleh, H., & Froelicher, E. S. (2008). Jordanian nurses' and physicians' learning needs for promoting smoking cessation. *Progress in Cardiovascular Nursing*, *23*(2), 79-83.

Shouls, S., Congdon, P., & Curtis, S. (1996). Modelling inequalities in reporting long term illness in the UK: combining individual and area characteristics. *Journal of Epidemiology and Community Health, 50*, 366-376.

Shriver, C. B., & Scott-Stiles, A. (2000). Health habits of nursing versus non-nursing students: a longitudinal study. *The Journal of Nursing Education*, *39*(7), 308-314.

Singh-Manoux, A., Martikainen, P., Ferrie, J., Zins, M., Marmot, M. & Goldberg, M. (2006). What does self rated health measure? Results from the British Whitehall II and French Gazel cohort studies. *Journal of Epidemiology & Community Health, 60*(4), 364-372.

Sluik, D., van Lee, L., Engelen, A. I., & Feskens, E. J. M. (2016). Total, free, and added sugar consumption and adherence to guidelines: the Dutch National Food Consumption Survey 2007-2010. *Nutrients, 8*(2), 70.

Smedley, J., Egger, P., Cooper, C., & Coggon, D. (1995). Manual handling activities and risk of low back pain in nurses. *Occupational and Environmental Medicine*, *52*(3), 160-163.

Smith, D. R. (2007). Longitudinal trends of alcohol and tobacco consumption among Australian physicians and nurses, 1989-2005. *Journal of Substance Use*, *12*(4), 267-280.

Smith, D. R., & Leggat, P. A. (2007). Tobacco smoking habits among a complete cross-section of Australian nursing students. *Nursing & Health Sciences, 9*(2), 82-89.

Smith, D. R., Adachi, Y., Mihashi, M., Ueno, C., & Ishitake, T. (2006). Tobacco smoking habits among a cross-section of rural Japanese nurses. *Australian Journal of Advanced Nursing*, *24*(2), 33-37.

Smith, D. R., Wei, N., & Wang, R. (2005). Contemporary smoking habits among nurses in mainland China. *Contemporary Nurse: A Journal for the Australian Nursing Profession*, *20*(2), 258-266.

Smith, D. R., Zhao, I., & Wang, L. (2013). Smoking rates among hospital nurses in Longkou City, China. *Nursing & Health Sciences*, *15*(1), 109-112.

Smith, G. D., Bartley, M., & Blane, D. (1990). The Black report on socioeconomic inequalities in health 10 years on. *BMJ: British Medical Journal*, *301*(6748), 373.

Smith, L., & Foxcroft, D. (2009). *Drinking in the UK. An exploration of trends.* York: Joseph Rowntree Foundation. Retrieved from: https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwiC4vWxqoHVAhUsJsAKHTumCp4QFggrMAA&url=https%3A%2F%2Fwww.jrf.org.uk%2Freport%2Fdrinking-uk-exploration-trends&usg=AFQjCNHFxzkXdM6Sg0ZVU3l5QS1N2tFEDQ.

Smith, W. C., Anderson, E., Salinas, D., Horvatek, R., & Baker, D. P. (2015). A meta-analysis of education effects on chronic disease: The causal dynamics of the Population Education Transition Curve. *Social Science & Medicine*, *127*, 29-40.

Sofi, F., Cesari, F., Abbate, R., Gensini, G.F., & Casini, A. (2008). Adherence to Mediterranean diet and health status: meta-analysis. *British Medical Journal, 337*, a1344.

Sorensen, H. T., Sabroe, S., & Olsen, J. (1996). A framework for evaluation of secondary data sources for epidemiological research. *International Journal of Epidemiology*, *25*(2), 435-442.

Sørensen, K., Van den Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Slonska, Z., & Brand, H. (2012). Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health*, *12*(1), 1.

Sreetheran, M., & van den Bosch, C. C. K. (2014). A socio-ecological exploration of fear of crime in urban green spaces - a systematic review. *Urban Forestry & Urban Greening*, *13*(1), 1-18.

Stafford, M., & Marmot, M. (2003). Neighbourhood deprivation and health: does it affect us all equally? *International Journal of Epidemiology*, *32*(3), 357-366.

Stahl, C. H., Novak, M., Hansson, P. O., Lappas, G., Wilhelmsen, L., & Rosengren, A. (2014). Incidence of Type 2 diabetes among occupational classes in Sweden: a 35-year follow-up cohort study in middle-aged men. *Diabetic Medicine, 31*, 674-680.

Stamatopoulou, E., Stamatiou, K., Voulioti, S., Christopoulos, G., Pantza, E., Stamatopoulou, A., & Giannopoulos, D. (2014). Smoking behavior among nurses in rural Greece. *Workplace Health & Safety*, *62*(4), 132-134.

Stamnes, J. H., & Mykletun, A. (2000). Prevalence of alcohol consumption among Norwegian nursing students, nursing students for the mentally disabled and teaching students (NNT students). A preliminary study. *Nordic Journal of Nursing Research & Clinical Studies*, *20*(2), 9-14.

Stanton, R., Happell, B., & Reaburn, P. (2015). Investigating the exercise-prescription practices of nurses working in inpatient mental health settings. *International Journal of Mental Health Nursing, 24*(2), 112-120.

Stuart, H. (2006). Mental illness and employment discrimination. *Current Opinion in Psychiatry*, *19*(5), 522-526.

Sun, Q., Townsend, M. K., Okereke, O. I., Rimm, E. B., Hu, F. B., Stampfer, M. J., & Grodstein, F. (2011). Alcohol consumption at midlife and successful ageing in women: a prospective cohort analysis in the nurses' health study. *Plos Medicine*, *8*(9), e1001090-e1001090.

Suzuki, K., Ohida, T., Yokoyama, E., Kaneita, Y., & Takemura, S. (2005). Smoking among Japanese nursing students: Nationwide survey. *Journal of Advanced Nursing*, *49*(3), 268-275.

Sveinsdóttir, H., & Gunnarsdóttir, H. K. (2008). Predictors of self-assessed physical and mental health of Icelandic nurses: results from a national survey. *International Journal of Nursing Studies*, *45*(10), 1479-1489.

Swinburn, B. A., Caterson, I., Seidell, J. C., & James, W. P. T. (2004). Diet, nutrition and the prevention of excess weight gain and obesity. *Public Health Nutrition*, *7*(1a), 123-146.

Szumilas, M. (2010). Explaining odds ratios. *Journal of Canadian Academy of Child & Adolescent Psychiatry, 19*(3), 227-229.

Tada, Y., Kawano, Y., Maeda, I., Yoshizaki, T., Sunami, A., Yokoyama, Y., Matsumoto, H., Hida, A., Komatsu, T., & Togo, F. (2014). Association of body mass index with lifestyle and rotating shift work in Japanese female nurses. *Obesity*, *22*(12), 2489-2493.

Thacker, K., Brancato, V., Greenawald, D., Stavarski, D. H., & Flay, C. (2016). CE: original research: an investigation into the health-promoting lifestyle practices of RNs. *The American Journal of Nursing*, *116*(4), 24-30.

The Information Centre. (2008). *The Health Survey for England 2006: volume 1 cardiovascular disease and risk factors in adults.* London: National Statistics. Retrieved from: http://content.digital.nhs.uk/catalogue/PUB01213/heal-surv-cvd-risk-obes-ad-ch-eng-2006-rep-v1.pdf.

The Scottish Government. (2010). *Long-term monitoring of health inequalities*. Edinburgh: The Scottish Government. Retrieved from: http://www.gov.scot/Publications/Recent.

The World Bank. (2015). *Country and lending groups*. Washington: The World Bank. Retrieved from: http://data.worldbank.org/about/country-and-lending-groups#Low_income.

Thomson, H., Petticrew, M., & Morrison, D. (2001). Health effects of housing improvement: systematic review of intervention studies. *BMJ*, *323*(7306), 187-190.

Tolstrup, J. S., Hvidtfeldt, U. A., Flachs, E. M., Spiegelman, D., Heitmann, B. L., Bälter, K., Goldbourt, U., Hallmans, G., Knekt, P., Liu, S., & Pereira, M. (2014). Smoking and risk of coronary heart disease in younger, middle-aged, and older adults. *American Journal of Public Health*, *104*(1), 96-102.

Trinkoff, A. M., Geiger-Brown, J. M., Caruso, C. C., Lipscobm, J. A., Johantgen, M., Nelson, A. L., Sattler, B. A., & Selby, L. (2008). Personal safety for nurses. In R. G. Hughes. (Ed.) *Patient safety and quality: an evidence-based handbook for nurses*. (1st ed., no page numbers) Rockville: Agency for Healthcare Research and Quality.

Trinkoff, A. M., Lipscomb, J. A., Geiger-Brown, J., Storr, C. L., & Brady, B. A. (2003). Perceived physical demands and reported musculoskeletal problems in registered nurses. *American Journal of Preventive Medicine*, *24*(3), 270-275.

Trinkoff, A. M., Zhou, Q., Storr, C. L., & Soeken, K. L. (2000). Workplace access, negative proscriptions, job strain, and substance use in registered nurses. *Nursing Research*, *49*(2), 83-90.

Trost, S.G., Owen, N., Bauman, A.E., Sallis, J.F., & Brown, W. (2002). Correlates of adults' participation on physical activity: review and update. *Medicine & Science in Sports & Exercise, 34*(12), 1996-2001.

Tse, M., & Benzie, I. (2006). Perspectives of nursing students in Hong Kong on diet and health: implications for nurse education. *Asian Journal of Nursing*, *9*(2), 74-77.

Tselebis, A., Panaghiotou, A., Theotoka, I., & Ilias, I. (2001). Nursing staff anxiety versus smoking habits. *International Journal of Nursing Practice*, *7*(3), 221-223.

Tucker, S. J., Weymiller, A. J., Cutshall, S. M., Rhudy, L. M., & Lohse, C. M. (2012). Stress Ratings and Health Promotion Practices Among RNs: A Case for Action. *Journal of Nursing Administration*, *42*(5), 282-292.

Tunstall, H., Mitchell, R., Gibbs, J., Platt, S., & Dorling, D. (2011). Socio-demographic diversity and unexplained variation in death rates among the most deprived parliamentary constituencies in Britain. *Journal of Public Health*, *34*(2), 296-304.

Tunstall, R., Bevan, M., Bradshaw, J., Croucher, K., Duffy, S., Hunter, C., Jones, A., Rugg, J., Wallace, A., & Wilcox, S. (2013). *The links between housing and poverty: an evidence review*. York: Joseph Rowntree Foundation. Retrieved from: https://www.jrf.org.uk/sites/default/files/jrf/migrated/files/poverty-housing-options-full.pdf.

UK Data Archive. (2016). *Annual Population Survey*. Colchester: UK Data Archive. Retrieved from: htttp://discover.ukdataservice.ac.uk/series/?sn=200002#years.

UK Data Archive. (2017). *Create and manage data*. Colchester: UK Data Archive. Retrieved from: http://www.data-archive.ac.uk/create-manage/consent-ethics/anonymisation.

Undertaking Nursing Interventions Through Europe (UNITE) Study Group. (2002). A survey of coronary risk factors in a cohort of cardiac nurses from Europe: do nurses practise what they preach? *European Journal of Cardiovascular Nursing*, *1*(1), 57-60.

United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Ageing 2015 (ST/ESA/SER.A/390).

University of Essex., Institute for Social and Economic Research., & NatCen Social Research and Kantar Public. (2016, November). *Understanding Society: Waves 1-6, 2009-2015* [computer file]. (8th ed.) Colchester, Essex: UK Data Archive [distributor]. SN: 6614. Retrieved from: http://dx.doi.org/10.5255/UKDA-SN-6614-9.

US Department of Health and Human Services. (2004). *The health consequences of smoking: a report of the Surgeon General*. Atlanta: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. Retrieved from: https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwj46Pf5r4HVAhXGAcAKHe2gCd8QFgg1MAI&url=https%3A%2F%2Fwww.ncbi.nlm.nih.gov%2Fpubmed%2F20669512&usg=AFQjCNFMhGzaxik8MoyjRsSw6gmxb-i1vw.

Vaez, M., Josephson, M., Vingård, E., & Voss, M. (2014). Work-related violence and its association with self-rated general health among public sector employees in Sweden. *Work, 49*, 163-171.

van den Berg, M., Wendel-Vos, W., van Poppel, M., Kemper, H., van Mechelen, W., & Maas, J. (2015). Health benefits of green spaces in the living environment: a systematic review of epidemiological studies. *Urban Forestry & Urban Greening*, *14*(4), 806-816.

van der Noordt, M., IJzelenberg, H., Droomers, M., & Proper, K.I. (2014). Health effects of employment: a systematic review of prospective studies. *Occupational & Environmental Medicine, 71*, 730-736.

van Kippersluis, H,, van Ourti, T., O'Donnell, O., & van Doorslaer, E. (2009). Health and income across the life cycle and generations in Europe. *Journal of Health Economics, 28*(4), 818-830.

van Rijn, R. M., Robroek, S. J., Brouwer, S., & Burdorf, A. (2014). Influence of poor health on exit from paid employment: a systematic review. *Occupational and environmental medicine*, *71*(4), 295-301.

Vanassche, S., Swicegood, G., & Matthijs, K. (2013). Marriage and children as a key to happiness? Cross-national differences in the effects of marital status and children on well-being. *Journal of Happiness Studies*, *14*(2), 501-524.

Verbrugge, L. M. (1979). Marital status and health. *Journal of Marriage and the Family, 41*(2), 267-285.

Virtanen, M., Jokela, M., Nyberg, S. T., Madsen, I. E. H., Lallukka, T., Ahola, K., Alfredsson, L., Batty, D. G., Bjorner, J. B., Borritz, M., Burr, H., Casini, A., Clays, E., de Bacquer, D., Dragano, N., Erbel, R., Ferrie, J. E., Fransson, E. I., Hamer, M., Heikkilä, K., Jöckel, K. H., Kittel, F., Kuntssin, A., Koskenvuo, M., Ladwig, K. H., Lunau, T., Nielsen, M. L., Nordin, M., Oksanen, T., Pejtersen, J. H., Pentti, J., Rugulies, R., Salo, P., Schupp, J., Siegrist, J., Singh-Manoux, A., Steptoe, A., Suominen, S. B., Theorell, T., Vahtera, J., Wagner, G. G., Westerholm, P. J. M., Westerlund, H., & Kivimäki, M. (2015). Long working hours and alcohol use: systematic review and meta-analysis of published studies and unpublished individual participant data. *BMJ, 350*, g7772.

Vitzthum, K., Koch, F., Groneberg, D. A., Kusma, B., Mache, S., Marx, P., Hartmann, T., & Pankow, W. (2013). Smoking behaviour and attitudes among German nursing students. *Nurse Education in Practice*, *13*(5), 407-412.

Vlassoff, C. (2007). Gender differences in determinants and consequences of health and illness. *Journal of Health, Population & Nutrition*, 25(1), 47-61.

von Bonsdorff, M. B., Kuh, D., von Bonsdorff, M. E., & Cooper, R. (2016). Mid-career work patterns and physical and mental functioning at age 60-64: evidence from the 1946 British birth cohort. *European Journal of Public Health,* 26(3), 486-491.

Waddell, G., & Burton, A. K. (2006). *Is work good for your health and well-being?* London: TSO. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/214326/hwwb-is-work-good-for-you.pdf.

Walsh, R. A., Cholowski, K., Tzelepis, F., & Stojanovski, E. (2012). Smoking prevalence, attitudes, and confidence about tobacco roles among Australian nursing students. *Journal of Addictions Nursing*, *23*(3), 181-190.

Wang, X. S., Armstrong, M. E. G., Cairns, B. J., Key, T. J., & Travis, R. C. (2011). Shift work and chronic disease: the epidemiological evidence. *Occupational Medicine*, *61*(2), 78-89.

Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *Canadian Medical Association Journal*, *174*(6), 801-809.

Ward, B.W., Clarke, T.C., Nugent, C.N., Schiller, J.S. (2016). Early release of selected estimates based on data from the 2015 National Health Interview Survey. US: National Center for Health Statistics. Retrieved from: http://www.cdc.gov/nchs/nhis.htm.

Wardle, J., Waller, J., & Jarvis, M. J. (2001). Sex differences in the association of socioeconomic status with obesity. *American Journal of Public Health*, *92*(8), 1299-1304.

Warr, P. (1987). *Work, unemployment, and mental health*. (1st ed.) New York: Oxford University Press Work.

Warren, C. W., Sinha, D. N., Lee, J., Lea, V., & Jones, N. R. (2009). Tobacco use, exposure to secondhand smoke, and training on cessation counselling among nursing students: cross-country data from the Global Health Professions Student Survey (GHPSS), 2005-2009. *International Journal of Environmental Research & Public Health*, *6*(10), 2534-2549.

Weaver, K., & Olson, J. K. (2006). Understanding paradigms used for nursing research. *Journal of Advanced Nursing,* 53(4), 459-469.

Webber, D. J., Page, D., Veliziotis, M., & Johnson, S. (2015). *Does poor health affect employment transitions?* York: Joseph Rowntree Foundation. Retrieved from: https://www.jrf.org.uk/file/47491/download?token=ijU9TbQy&filetype=full-report.

Weyman, A., Buckingham, A., & Roy, D. (2016). *Extending Working Life-Health Professionals Late Career Transitions, a Demographic Time Bomb for the UKs National Health Service*. In European Academy of Occupational Health Psychology Conference, 11-13 April 2016, Royal Olympic Hotel, Athens.

White, C. M., John, P. D. S, Cheverie, M. R., Iraniparast, M., & Tyas, S. L. (2015). The role of income and occupation in the association of education with healthy aging: results from a population-based, prospective cohort study. *BMC Public Health, 15*(1), 1.

WHO. (2004). *Global strategy on diet, physical activity and health.* Switzerland: WHO. Retrieved from: http://www.who.int/dietphysicalactivity/strategy/eb11344/strategy_english_web.pdf.

WHO. (2005i). *The commission on social determinants of health – what, why and how*? Switzerland: WHO. Retrieved from: http://www.who.int/social_determinants/thecommission/finalreport/about_csdh/en. P42.

WHO. (2005ii). *Fruit and vegetables for health. Report of a joint FAO/WHO workshop, 1-3 September 2004, Kobe, Japan.* Switzerland: WHO. Retrieved from: http://www.who.int/dietphysicalactivity/publications/fruit_vegetables_report.pdf.

WHO. (2009). *Women and health: today's evidence, tomorrow's agenda*. Switzerland: WHO. Retrieved from: http://whqlibdoc.who.int/publications/2009/9789241563857_eng.pdf?ua=1.

WHO. (2014). *Global status report on alcohol and health 2014*. Retrieved from: http://www.who.int/substance_abuse/publications/global_alcohol_report/msb_gsr_2014_1.pdf.

WHO. (2015). *Noncommunicable diseases: fact sheet*. Switzerland: WHO. Retrieved from: http://www.who.int/mediacentre/factsheets/fs355/en/.

WHO. (2016). *Life expectancy, data by country*. Switzerland: WHO. Retrieved from: http://apps.who.int/gho/data/node.main.688.

WHO. (2017a). *Noncommunicable diseases*. Switzerland: WHO. Retrieved from: http://www.who.int/mediacentre/factsheets/fs355/en/.

WHO. (2017b). *Social determinants of health*. Switzerland: WHO. Retrieved from: http://www.who.int/social_determinants/thecommission/finalreport/key_concepts/en/.

Wilkinson, R., & Marmot, M. (2003). *Social determinants of health: the solid facts*. (2nd ed.) Copenhagen: WHO Regional Office for Europe.

Woodrow, C., & Guest, D. E. (2012). Public violence, staff harassment and the wellbeing of nursing staff: an analysis of national survey data. *Health Services Management Research*, *25*(1), 24-30.

World Health Organisation [WHO]. (2013). *Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020*. Switzerland: WHO. Retrieved from: http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236_eng.pdf?ua=1.

World Health Organisation [WHO]. (2014). *Global strategy on diet, physical activity and health: what is moderate-intensity and vigorous-intensity physical activity?* Switzerland: WHO. Retrieved from: http://www.who.int/dietphysicalactivity/physical_activity_intensity/en/.

World Health Organisation. (2010). *Global Strategy to reduce harmful use of alcohol.* Switzerland: WHO. Retrieved from: http://www.who.int/substance_abuse/publications/global_strategy_reduce_harmful_use_alcohol/en/.

Wynd, C. A., Cihlar, C., Graor, C. H., Imani, J., & McDougal, M. (2007). Employee health fair data: evidence for planning health promotion programs. *Clinical Nurse Specialist: The Journal for Advanced Nursing Practice*, *21*(5), 255-263.

Xu, H., Wen, L. M., & Rissel, C. (2013). The relationships between active transport to work or school and cardiovascular health or body weight a systematic review. *Asia-Pacific Journal of Public Health*, *25*(4), 298-315.

Yamashita, K., Saito, M., & Takao, T. (2012). Stress and coping styles in Japanese nursing students. *International Journal of Nursing Practice*, *18*(5), 489-496.

Yang, M. S., Yang, M. J., & Pan, S. M. (2001). Prevalence and correlates of substance use among clinical nurses in Kaohsiung city. *The Kaohsiung Journal of Medical Sciences*, *17*(5), 261-269.

Yen, I. H., & Syme, S. L. (1999). The social environment and health: a discussion of the epidemiologic literature. *Annual Review of Public Health*, *20*(1), 287-308.

Yiğitalp, G. (2015). Factors Affecting Smoking Status of Nursing Students and Their Addiction Levels. *Turkish Thoracic Journal*, *16*(3), 121-127.

Yildiz, F. A., & Esin, M. N. (2009). Self-reported gastrointestinal and cardiovascular symptoms in female Turkish nurses. *International Nursing Review*, *56*(4), 491-497.

Zapka, J. M., Lemon, S. C., Magner, R. P., & Hale, J. (2009). Lifestyle behaviours and weight among hospital-based nurses. *Journal of Nursing Management*, *17*(7), 853-860.

Zhao, I., & Turner, C. (2008). The impact of shift work on people's daily health habits and adverse health outcomes. *Australian Journal of Advanced Nursing, 25*(3), 8.

Zheng, H., & Thomas, P. A. (2013). Marital status, self-rated health, and mortality: overestimation of health or diminishing protection of marriage? *Journal of Health and Social Behavior, 54*(1), 128-143.

# Appendix i Occupational groups used in each study and dataset

| Study | Dataset | Sample | Occupations used | Independent Variables |
|---|---|---|---|---|
| 2 | Annual Population Survey – drawn from data from the Labour Force Survey | Unclustered sample of 197,867 residents selected from private addresses across the UK. Ages 17-69. | • Health professionals;<br>• Therapy professionals;<br>• Nursing and midwifery professionals;<br>• Caring personal services;<br>• Health and social service managers and directors;<br>• Managers & proprietors in health and care services;<br>• Teaching and educational professionals;<br>• Other occupations. | Age, gender, hours worked. |
| 3 | Labour Force Survey | 61,921 selected from private addresses across the UK. Ages 17-69. | As above | As above |
| 4 | Scottish Health Survey | A clustered stratified multi-stage sample. 13,597 people aged 17-69. | • Nurses;<br>• Other health professionals;<br>• Care workers;<br>• Teachers;<br>• *Other occupations*. | Age, gender, occupation, smoking status, drinking status, portions of fruit and vegetables consumed. |
| 5 | British Household Panel Survey (BHPS) and Understanding Society | 5659 people from the BHPS –from 2002-2009 and Understanding Society 2010-2016 | • Nursing and midwifery professionals;<br>• Nursing auxiliaries<br>• Care assistants and home carers;<br>• Primary and nursery education teaching professionals;<br>• Secondary education teaching professionals. | Age, gender, smoking status and life satisfaction. |

# Appendix ii    Published protocol in the Journal of Advanced Nursing

**Title of article: Nurses' health-related behaviours: protocol for a quantitative systematic review of prevalence of tobacco smoking, physical activity, alcohol consumption and dietary habits.**

ABSTRACT

**Aim**: To enumerate nurses' health-related behaviour by critically appraising studies on tobacco smoking, physical activity, alcohol consumption and dietary habits.

**Background**: Nurses represent the largest occupational group in healthcare systems internationally and have an established and expanding public health role. Nurses own health-related behaviour is known to impact nurses' ability and confidence to engage in health promotion, as well as how patients receive and respond to advice and guidance nurses' give. However, there has been no comprehensive and comparable assessment of evidence on nurses' health-related behaviours.

**Design:** Quantitative systematic review of prevalence of tobacco smoking, physical activity, alcohol consumption and dietary habits.

**Methods**: Systematic searches for literature published between January 2000 and February 2015 and indexed in Medical Literature Analysis and Retrieval System, Cumulative Index to Nursing and Allied Health Literature, and Psychological Information. Eligibility criteria will be applied to titles and abstracts by two reviewers independently. Full text will be reviewed and the same criteria and process applied.

Two reviewers will independently assess study quality guided by the Joanna Briggs Institute handbook for the systematic review of prevalence and incidence data. Discrepancies in eligibility or quality assessment will be resolved through discussion and, where required, a third reviewer. Data synthesis will be conducted and findings reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses checklist.

**Discussion**: Enumerating prevalence of nurses' health-related behaviours is crucial to direct future research, inform public health policy, particularly around health promotion, and to better support the nursing workforce through the development of behaviour change interventions.

**PROSPERO registration:** CRD42015016751

**Summary Statement:**

Why this review is needed:

- Nurses are the largest occupational group in international healthcare systems and play an important role in health promotion in support of public health policy.
- Evidence suggests that nurses' own health-related behaviours impact on their ability and confidence to conduct health promotion with patients.
- However, international evidence on nurses' health behaviours is sporadic and a clear and comparable appraisal of nurses' health-related behaviour internationally is required to better understand and support nurses' health.

## INTRODUCTION

Nurses represent the largest occupational group in the National Health Service (NHS) in the United Kingdom (Health and Social Care Information Centre 2014, Information Services Division 2014) and healthcare systems internationally (Agrawal et al. 2012). Given the size of the global nursing workforce and the regularity with which nurses have direct patient contact, nurses are increasingly involved in health promotion and patient education, especially to encourage changes in behaviours known to be associated with ill-health, such as tobacco smoking, limited physical activity, excess alcohol consumption and certain dietary habits including excess consumption of foods high in sugar and fat, and low fruit and vegetable intake. Consequently, nurses have been described by the World Health Organisation (WHO) as a 'force for change' within communities and society (Büscher et al 2009). Role-modelling is regarded as an important mechanism through which nurses can effect change, with nurses often considered a 'point of reference' for individuals' health-related behaviours (Blake et al. 2011). However, nurses' own health-related behaviours are known to impact the extent to which nurses engage in patient education and counselling (Lobelo & de Quevedo 2014, Fie et al. 2012) and whether patients accept the advice and guidance given (Hicks et al. 2008). Existing evidence points to a pattern of poor health-related behaviour among nurses, with many reporting smoking (Baer et al. 2011), low levels of physical activity (Malik et al. 2011), excessive alcohol consumption (Bellis and Harkins 2011, Blake et al. 2011) and diets high in sugar and fat, and low fruit and vegetable intake (Baer et al. 2011, Blake et al. 2011). It is important, then, that nurses are supported to maintain a healthy lifestyle for the inherent health benefits to themselves, as well as to enhance their role-modelling to patients in support of health promotion.

However, international evidence around the prevalence of health behaviours among nurses has not previously been reviewed. This has prevented comprehensive and comparable assessment of nurses' health-related behaviours internationally, as well as the development of supportive behaviour change interventions among the nursing workforce. To address this deficit, this paper outlines a protocol for a quantitative systematic review of research reporting nurses' prevalence of tobacco smoking, physical activity, alcohol consumption and dietary habits, specifically sugar, fat and fruit and vegetable intake.

**Background**

Poor health behaviour among nurses may have several implications at an individual and societal level including increasing nurses' long-term risk of developing chronic conditions and potentially hampering nurses' health promotion efforts. Nurses with poor health behaviours may be more likely to experience poorer health. Health behaviours such as tobacco smoking, physical inactivity, excess alcohol consumption and diets high in sugar and fat, and low fruit and vegetable intake are known risk factors for chronic diseases, including, vascular disease (Mendis et al. 2011), diabetes mellitus (Abdullah et al. 2010), and cancer and lung disease (Pirie et al. 2013). For example, current smokers are thirty-five times more likely than non-smokers to develop lung disease and twenty-one times more likely to develop lung cancer (Pirie et al. 2013). Obese individuals have seven times the risk of developing diabetes mellitus than their normal weight counterparts (Abdullah et al. 2010). Excess alcohol consumption has been found to increase relative risk of more than 200 health conditions, including certain cancers, neuropsychiatric conditions and numerous cardiovascular and digestive diseases (Shield et al. 2014). Due to the known link between lifestyle factors and chronic disease it is important to understand the prevalence of these behaviours among the nursing workforce to promote behaviour change and healthy lifestyle choices among the profession.

Nurses have a long-standing and increasingly prominent public health role (Royal College of Nursing 2012, Büscher et al 2009). Nurses are encouraged to promote and support healthy lifestyles through delivery of smoking cessation, physical activity, alcohol brief interventions, and dietary advice. However, nurses' health behaviours may also adversely affect nurses' engagement with health promotion and the credibility of patient counselling around these behaviours, as well as the likelihood that patients will accept and act on nurses' advice. Studies have found an association between nurses' own health behaviour and the extent to which they engage in patient education and counselling. For example, nurses' own levels of physical activity are linked with nurses' level of engagement in health promotion on exercise with their patients (Lobelo & de Quevedo 2014, Fie et al. 2012), and patients have been found to be less likely to accept health education about diet and physical activity from overweight nurses (Hicks et al. 2008).

***Previous systematic review on nurses' health-related behaviours***

One systematic review by Smith (2007) has been identified that examined tobacco smoking among nursing students. Smith's study critically reviewed 35 English-language studies published between 1990 and 2005. Smoking was found to be common among nursing students and prevalence ranged between 1% and 65% across reviewed studies from 14 countries predominantly in Europe (Scotland, Great Britain, Italy, Albania, Bosnia/Herzegovina, Greece, Hungary), but also from North America (United States, Canada), Australasia (Australia), Africa (Uganda), Asia (Japan) and the Middle East (Israel, Iran). The review concluded that tobacco smoking was common among nursing students and that future research was needed to further understand why individuals engage in this unhealthy behaviour.

***Rationale***

Due to the potential negative impact of nurses' health-related behaviours on their own and the public's health there is an urgent need to appraise international evidence around nurses' health behaviours in order to better understand the health of nurses and support the nursing workforce. Systematic reviews of nurses' health are scarce and to date have focused only on non-behavioural aspects (e.g., physical health [Fronteira & Ferrinho 2011]) or on one specific aspect of nurses' health-related behaviour (e.g., tobacco smoking [Smith 2007]).

This paper outlines a protocol for a quantitative systematic review to appraise international evidence on nurses' health-related behaviour. Specifically, the review will enumerate the prevalence of four key health behaviours known to be associated with chronic ill-health and around which nurses have an established health promotion role, namely tobacco smoking, physical activity, excess alcohol consumption and dietary habits, specifically, sugar, fat and fruit and vegetable intake.

THE STUDY

**Aim**

The aim of this study is to enumerate prevalence of nurses' health-related behaviours by critically appraising international studies on tobacco smoking, physical activity, alcohol consumption and dietary habits, making this the first systematic review in this field. The specific review question being answered is: what is the prevalence of tobacco smoking, physical activity, alcohol consumption and certain dietary habits, specifically sugar, fat and fruit and vegetable intake, among nurses' internationally?

**Methodology**

This quantitative systematic review was designed in accordance with the Joanna Briggs Institute (JBI) guide for prevalence and incidence studies handbook (Munn et al. 2014). Systematic review processes will follow this handbook, and reporting will adhere to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist (Moher et al. 2009).

**Inclusion/exclusion criteria**

Retrieved literature will be assessed for eligibility using the following predetermined criteria (Table 1). We will include cohort studies, case control studies, and cross-sectional studies. These studies will be included because they provide quantitative

**Table 1**: Inclusion/exclusion criteria

| | Inclusion criteria | Exclusion criteria |
|---|---|---|
| Study type | Cohort studies, case control studies, and cross-sectional studies | Qualitative studies and systematic reviews |
| Participants | Qualified (post-registration) and student (pre-registration) nurses | All other participant type |
| Outcome | Tobacco smoking, physical activity, alcohol consumption and dietary habits (fruit and vegetables, sugar and fat intake) | Studies not focusing on one or more of the inclusion outcomes |
| Language | English | Any language other than English |
| Publication date | 1 January 2000 to 28 February 2015 | Studies published before 1 January 2000 and after the 28 February 2015 |

data enabling assessment of prevalence rather than qualitative findings describing behavioural motivations and attitudes, ensuring that the research question can be addressed. The study population will consist of qualified (post-registration) and student (pre-registration) nurses. The outcome of interest is the percentage of nurses who engage in health-related behaviours including tobacco smoking, physical activity, alcohol consumption and dietary habits. These health behaviours were selected as they are key behavioural risk factors associated with chronic disease. Dietary habits included in the review are sugar, fat and fruit and vegetable intake. Each of these health-related behaviours has been selected because international guidelines (World Health Organisation 2014, World Health Organisation 2010) have been published, and are frequently adopted by Governments (Scottish Government 2013, Scottish Government 2012, Scottish Government 2008) as part of health promotion strategies. Studies will be restricted to the English language published between 1 January 2000 and 28 February 2015 in order to obtain recent literature while ensuring retrieval of a sufficient number of studies for review.

Retrieved literature will be screened in a four-stage process. First, all retrieved literature will be imported into Endnote (Thomson Reuters, Philadelphia, PA, USA) to facilitate the identification and removal of duplicates. Second, the two reviewers (RAN and RGK) will independently assess all retrieved literature (100%) for eligibility by title and abstract using the inclusion checklist to ensure accuracy (Figure 1). Any discrepancies in reviewer selections will be resolved through discussion and settled where necessary by a third reviewer (IMA). Third, full text will be obtained for all remaining citations and reviewed for eligibility by two reviewers (RAN, RGK) and any discrepancies in selection resolved through discussion and recourse to a third reviewer (IMA), where required. The PRISMA search flow chart will be used to record the number of studies included and excluded at each stage of the review process.

| | | | | | |
|---|---|---|---|---|---|
| 1. Is the study a cohort, case control, or cross-sectional study? | | | | | |
| Yes | □ | Go to question 2 | No | □ | Reject |
| 2. Is the population qualified or student nurses? | | | | | |
| Yes | □ | Go to question 3 | No | □ | Reject |
| 3. Does the study measure tobacco smoking, physical activity, alcohol consumption or dietary habits among nurses? | | | | | |
| Yes | □ | Include study | No | □ | Reject |

**Figure 1**: Inclusion checklist

**Search methods**

Three electronic databases will be systematically searched: Medical Literature Analysis and Retrieval System (MEDLINE), Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Psychological Information (PsycINFO). To ensure literature saturation, we will hand-search reference lists of retrieved publications to identify additional evidence.

Medical Subject Heading (MeSH) terms (MEDLINE, CINAHL) and Major Subject Headings (PsycINFO) will be used to identify relevant search terms. Boolean operators 'AND' and 'OR' will be used to combine synonyms of the term nurses with terms describing the four health behaviours. The search strategy for MEDLINE is shown in Table 2.

**Table 2**: Draft MEDLINE search strategy

| | **Advanced search** |
|---|---|
| 1 | *Nurses+ |
| 2 | *Students, Nursing+ |
| 3 | 1 or 2 |
| 4 | *Life Style |
| 5 | 3 and 4 |
| 6 | Health Status |
| 7 | 3 and 6 |
| 8 | *Health Behavior |
| 9 | 3 and 8 |
| 10 | *Physical Fitness or *Exercise |
| 11 | 3 and 10 |
| 12 | *Alcohol Drinking |
| 13 | 3 and 12 |
| 14 | *Substance Abuse |
| 15 | 3 and 14 |
| 16 | *Smoking or *Smoking Cessation |
| 17 | 3 and 16 |
| 18 | *Food Habits |
| 19 | 3 and 18 |
| 20 | *Diet |
| 21 | 3 and 20 |
| 22 | *Body Weight+ |
| 23 | 3 and 22 |
| 24 | 5 or 7 or 9 or 11 or 13 or 15 or 17 or 19 or 21 or 23 |

Note: An asterisk (*) denotes that terms are used as Major Headings.

**Data abstraction**

A data extraction form was adapted to meet the specific objective of this review and pilot-tested on ten randomly selected studies that reported the prevalence of health behaviours in the nursing workforce and was revised following this exercise (Table 3). This form was based on guidance from the JBI Data Extraction Form for Prevalence and Incidence Studies (2014). The form will be transferred into Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) where one reviewer (RAN) will record the extracted information and a second reviewer (RGK) will validate the extracted data. Discrepancies will be discussed by the two reviewers and if no agreement is reached, a third reviewer (IMA) will be consulted. Data will be extracted on the following: publication details, study design, participants, outcomes and authors' conclusions (Table 3).

**Table 3**: Data extraction form

| Data category | Data extracted |
|---|---|
| Study details | Study title |
| | Author |
| | Year |
| | Journal |
| Study characteristics | Study type |
| | Data collection method |
| | Year of data collection |
| | Setting |
| Participant characteristics | Type of participants |
| | Sample size |
| | Characteristics |
| | Gender |
| | Age bands |
| | Nationality |
| | Nursing speciality |
| Outcomes and authors conclusions | Response rates |
| | Health behaviour measured |
| | Prevalence of health behaviour |
| | Unit of measurement |

**Quality appraisal**

Study quality and assessment of risk of bias will be independently conducted by two reviewers (RAN, RGK). Any discrepancies will be discussed and if required, the third reviewer (IMA) will be consulted. The risk of bias within included studies will be assessed using a tool for conducting quality appraisal of studies in systematic reviews of prevalence data created and piloted by a working group within the JBI (Munn et al. 2014). This instrument will be used to facilitate assessment of all study designs, including, cohort studies, case control studies, and cross-sectional studies. We chose the JBI tool because it best suits the scope of our review and because using one quality assessment tool on all study types will increase consistency and replicability.

**Synthesis**

Synthesis of results will be presented in three stages. First, a descriptive summary presenting relevant data extracted from eligible studies will be presented, tabulating details about study type, outcome measures, geography and quality assessment. Second, a narrative synthesis will be presented on tobacco smoking, physical activity, alcohol consumption and the three dietary habits among the global nursing workforce. Third, health related behaviours among qualified and student nurses will be narratively compared and subgroup analysis reported by gender and country. Finally, strengths and limitations of the review will be reported and the implications of the review's findings for future research, education, policy and practice will be discussed.

***Subgroup analysis***

Subgroup analysis will be conducted for gender and country. Gender subgroup analysis will be conducted for male versus female nurses and nursing students. Countries will be grouped using a three-fold classification based on aggregation of The World Bank country classification by gross national income (GNI) per capita for the 2015 fiscal year (World Bank 2015). High, medium and low income countries will be defined as follows: high-income (GNI per capita over $12,745), medium-income (between $1,045 and $12,745), low-income (below $1,045).

**Ethical considerations**

This systematic review relies solely on data obtained from published research literature and therefore obtaining institutional ethical approval is not required. We do not anticipate any ethical concerns with this study.

**Validity and rigour**

Four steps have been taken to increase the rigour of the review. First, expert advice from an experienced subject librarian was consulted prior to the development of the search strategy and will be available to support the systematic review throughout. Second, validity was ensured through the use of a validated tool for quality appraisal and data extraction (Joanna Briggs Institute 2014) and use of the PRISMA guidelines (Moher et al. 2009) to ensure transparent reporting of the review process and findings. Third, reliability will be improved through two reviewers independently assessing all retrieved studies for inclusion based on title and abstract, and then full text. Fourth, quality assessment will be conducted independently by two reviewers and (where required) discrepancies resolved by a third reviewer.

DISCUSSION

This paper outlines a protocol for a quantitative systematic review that aims to enumerate the prevalence of four health behaviours among nurses: tobacco smoking, physical activity, alcohol consumption and dietary habits. Enumerating prevalence is crucial to inform public policy, particularly around health promotion, and to better support the nursing workforce through the development of supportive behaviour change interventions. Evidence has shown that nurses' health behaviours have implications for health promotion and education. Providing a clear and comparable review of international evidence around nurses' health-related behaviours will enable researchers to identify gaps in the knowledge base to direct future research and aid policy makers to develop supportive behaviour change interventions among the nursing workforce.

**Limitations**

To our knowledge, this is the first protocol for a systematic review of international evidence around prevalence of tobacco smoking, physical activity, alcohol consumption and dietary habits among the nursing workforce. However, our review has a number of limitations. First, formulating search terms to only capture nurses' health-related behaviours, rather than nurses' engagement with patients' health-related behaviours, proved challenging. However, by working closely with an experienced subject librarian, a highly sensitive search strategy was developed to mitigate the risk of omission of important studies. Second, the review will only include studies published in the English language. Inclusion of studies in languages other than English is beyond the scope of the review because the review team are not fluent in languages other than English, and funding constraints prevent translation. Hence, this limitation may bias understanding of the prevalence of nurses' health-related behaviours towards studies conducted in the Anglo-American academy, specifically, the UK, USA, Canada, Australia and New Zealand, as well as certain European and Asian countries whose academics routinely publish in the English language. This limitation cannot be mitigated in this study and hence will be acknowledged as a limitation in the final systematic review.

CONCLUSION

The health-related behaviours of the nursing workforce may impact on both nurses' own health and that of the general public through nurses' role modelling and public health role. In order to better support the nursing workforce, it is important to first enumerate and understand the prevalence of health-related behaviours. This protocol outlines a quantitative systematic review to determine prevalence of four health behaviours, specifically, tobacco smoking, physical activity, alcohol consumption and dietary habits. The findings of this review will direct future research and workforce interventions to promote health and wellbeing among the international nursing workforce.

**REFERENCES**

Abdullah, A., Peeters, A., De Courten, M., & Stoelwinder, J. (2010) The magnitude of association between overweight and obesity and the risk of diabetes: a meta-analysis of prospective cohort studies. *Diabetes research and clinical practice*, 89(3), pp. 309-319.

Agrawal, V., Berlin, B., Grote, K., & Scheidler. (2012) Creating and sustaining change in nursing care delivery. *Health International,* 12, pp. 52-63.

Baer, H. J., Glynn, R. J., Hu, F. B., Hankinson, S. E., Willett, W. C., Colditz, G. A., Stampfer, M., & Rosner, B. (2011) Risk factors for mortality in the nurses' health study: a competing risks analysis. *American Journal Of Epidemiology*, 173(3), pp. 319-329.

Bellis, M., & Harkins, C. (2011) Know your limits. *Nursing Standard*, 25(24), pp. 22-23.

Blake, H., Malik, S., Mo, P. K., & Pisano, C. (2011) 'Do as I say, but not as I do': Are next generation nurses role models for health? *Perspectives in public health*, *131*(5), pp. 231-239.

Büscher A, Sivertsen B, White J (2009) Nurses and midwives: a force for health. World Health Organisation (Europe): Geneva.

Fie, S., Norman, I. J., & While, A. E. (2012) The relationship between physicians' and nurses' personal physical activity habits and their health-promotion practice: A systematic review. *Health Education Journal,* doi: 10.1177/0017896911430763

Fronteira, I., & Ferrinho, P. (2011) Do nurses have a different physical health profile? A systematic review of experimental and observational studies on nurses' physical health. *Journal of clinical nursing, 20*(17-18), pp. 2404-2424.

Health and Social Care Information Centre (HSCIC). (2014) *NHS workforce: summary of staff in the NHS: results from September 2013 census*. HSCIC; Leeds.

Hicks, M., McDermott, L. L., Rouhana, N., Schmidt, M., Seymour, M. W., & Sullivan, T. (2008) Nurses' body size and public confidence in ability to provide health education. *Journal of Nursing Scholarship*, 40(4), pp. 349-354.

Information Services Division. (2014) *NHS Scotland workforce statistics*. Retrieved from https://isdscotland.scot.nhs.uk/Workforce/Publications/2014-02-25/Nursing_and_Midwifery_sip_d2013.xls on 21 March 2014.

Joanna Briggs Institute. (2014) *Joanna Briggs Institute reviewers' manual: 2014 edition*. Joanna Briggs Institute; Australia.

Lobelo, F., & de Quevedo, I. G. (2014) The evidence in support of physicians and health care providers as physical activity role models. *American Journal of Lifestyle Medicine*, 1559827613520120.

Malik S, Blake H, Batt M (2011) How healthy are our nurses? New and registered nurses compared. *British Journal of Nursing*, 20(8): 489-496.

Mendis, S., Puska, P., & Norrving, B. (2011) *Global atlas on cardiovascular disease prevention and control*. World Health Organization; Geneva.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of internal medicine*, *151*(4), pp. 264-269.

Munn, Z., Moola, S., Riitano, D., & Lisy, K. (2014) The development of a critical appraisal tool for use in systematic reviews addressing questions of prevalence. *International journal of health policy and management,* 3(3), pp. 123.

Pirie, K., Peto, R., Reeves, G. K., Green, J., Beral, V., & Million Women Study Collaborators. (2013) The 21st century hazards of smoking and benefits of stopping: a prospective study of one million women in the UK. *The Lancet*, *381*(9861), pp. 133-141.

Royal College of Nursing (RCN). (2012) *Going upstream: nursing's contribution to public health*. London; RCN.

Scottish Government. (2013) *Revised dietary goals for Scotland*. Retrieved from http://www.gov.scot/Resource/0042/00421385.pdf on 04 June 2015.

Scottish Government. (2012) *Framework for action: changing Scotland's relationship with alcohol.* Retrieved from http://www.gov.scot/resource/0039/00395549.pdf on 04 June 2015.

Scottish Government. (2008) *Scotland's future is smoke-free: a smoking prevention action plan.* Edinburgh; Scottish Government.

Shield, Kevin D., Parry, Charles, & Rehm, Jürgen. (2014) Chronic diseases and conditions related to alcohol use. *Alcohol Research : Current Reviews, 35*(2), pp. 155-171.

Smith, D. R. (2007) A systematic review of tobacco smoking among nursing students. *Nurse Education in Practice*, *7*(5), pp. 293-302.

The World Bank. (2015) *Country and lending groups*. Retrieved from http://data.worldbank.org/about/country-and-lending-groups#Low_income on 30 May 2015.

World Health Organisation. (2010) *Global recommendations on physical activity for health.* Swirtzerland; World Health Organisation.

World Health Organisation. (2014) *Global strategy to reduce harmful use of alcohol.* Italy; World Health Organisation.

# Appendix iii Quality Appraisal Tool

1. **Was the sample representative of the target population?**

   (Calculation: if 1a = yes then 1 = yes else 1 = no).

   a. What the sample representative of the study aims? Yes/No/Don't know.

2. **Were participants recruited in an appropriate way?**

   (Calculation: if 2a = yes or 2b = yes then 2 = yes else 2 = no).

   a. Was the data used census or routinely collected data? Yes/No/Don't know.

   b. Were registrant lists sampled at random or in whole? Yes/No/Don't know.

3. **Was the sample size adequate?**

   (Calculation: if 3a = yes or 3b = yes then 3 = yes else 3 = no).

   a. Are sample size calculations reported? Yes/No/Don't know.

   b. Was the sample from a National survey (if so sample size calculations are not required)? Yes/No/Don't know.

4. **Were the study subjects and the setting described in detail?**

   (Calculation: if 4a = yes and 4b = yes then 4 = yes else 4 = no).

   a. Were sample characteristics reported? Yes/No/Don't know.

   b. Were setting characteristics reported? Yes/No/Don't know.

5. **Was the data analysis conducted with sufficient coverage of the identified sample?**

   (Calculation: if 5a = yes and 5b = yes then 5 = yes else 5 = no).

   a. Was the response rate reported? Yes/No/Don't know.
   b. Are response rates acceptable for the method used? Yes/No/Don't know.
   c. Are non-responses explained and justified? Yes/No/Don't know.

6. **Were objective and standard criteria used for the measurement of the condition under study?**

   (Calculation: if 6a = yes and 6b = yes then 6 = yes else 6 = no).

   a. Were validated instruments used? Yes/No/Don't know.
   b. Were standard criteria used? Yes/No/Don't know.

7. **Was the condition under study measured reliably?**

   (Calculation: if 7a = yes then 7 = yes; or 7a = yes and 7c = yes then 7 = yes; or 7b = yes and 7c = yes then 7 = yes).

   a. Was the condition under study measured by the interviewer? Yes/No/Don't know.
   b. Was the condition measured using self-reports? Yes/No/Don't know.
   c. Was the method of measurement justified? Yes/No/Don't know.

8. **Was there appropriate statistical analysis?**

   (Calculation: if 8a = yes and 8b = yes and 8c = yes then 8 = yes else 8 = no).

   a. Was there an adequate description of measures? Yes/No/Don't know.
   b. Was there appropriate use of statistical methods? Yes/No/Don't know.
   c. Is there a description of how missing data was handled? Yes/No/Don't know.

9. **Are all important confounding factors/subgroups/differences identified and accounted for?**

   (Calculation: if 9a = yes and 9b = yes then 9 = yes else 9 = no).

   a. Are potential confounder identified? Yes/No/Don't know.
   b. Is there statistical modelling conducted to control for confounders? Yes/No/Don't know.

10. **Were subpopulations identified using objective criteria?**

    (Calculation: if 10a = yes then 10 = yes else 10 = no).

    a. Were subgroups created using objective criteria? Yes/No/Don't know.

# Appendix iv Tobacco Smoking Prevalence

| | | | Participant characteristics | | | | | |
|---|---|---|---|---|---|---|---|---|
| Country | Study | World Bank classification | Sample size | Female | Male | Qualified nurse | Student nurse | Prevalence |
| Germany | Lehmann et al. (2014) | High | 266 in 2008 and 259 in 2013 | ✓ | ✓ | | ✓ | 59% reported to smoke in 2008 and 57.1% in 2013. Of smokers, 31.2% in 2008 and 29% in 2013 reported to smoke <10 per day, and 9.4% in 2008 and 13.9% in 2013 ≥10 per day. |
| | Vitzthum et al. (2013) | High | 148 | ✓ | ✓ | | ✓ | 29.1% of respondents reported to smoke (25.4% female, 41.2% male). |
| Spain | Fernandez et al. (2010) | High | 854 | ✓ | ✓ | | ✓ | 28.8% of respondents reported to be smokers (28.6% female, 30.3% male). |
| | Fernández et al. (2015) | High | 138 | ✓ | ✓ | | ✓ | 19.6% of respondents reported to be smokers (20% female, 17.8% male). 69.5% smoked 1-10 cigarettes per day, 34.6% 11-20, and 3.8% 21-30. |
| | Iglesias et al. (2010) | High | 80 | ✓ | ✓ | ✓ | | 58.8% of respondents reported to be smokers. |
| | Rabanales Sotos et al. (2015) | High | 1060 | ✓ | ✓ | | ✓ | 27.4% of respondents reported to be smokers (27.7% female, 26.0% male). |
| Japan | Inoue et al. (2004) | High | 568 | ✓ | | ✓ | | 8.8% of case respondents reported to smoke and 19.2% of control respondents. |
| | Kitajima et al. (2002) | High | 1195 | ✓ | | ✓ | | 32% of 1st year respondents reported to smoke, of which 21% were daily smokers and 11% occasional smokers. 34% of 2nd year |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | respondents reported to smoke, of which 23% were daily smokers and 10% occasional smokers. |
| | Maeno et al. (2005) | High | 1748 | ✓ | | ✓ | | 19.8% of respondents reported to smoke. |
| | Ohida et al. (2001) | High | 539 | | | | ✓ | Smoking at beginning of survey: Vocational schools of nursing: all 21%, first year 18%, second year 23%. Nursing colleges/universities: all 9%, first year 5%, second year 12%. Change in smoking status in the 1 year: vocational schools of nursing: continued smoker 18%, new smoker 13%, quitter 3%, non-smoker 67%. Nursing colleges/universities: continued smoker 7%, new smoker 5%, quitter 2%, non-smoker 87%. |
| | Ohida et al. (2000) | High | 1152 | | | ✓ | | 18.5% of females and 67.8% of males in the Nationwide Survey were smokers. 14.6% of females and 75.0% of males in the Regional Survey were smokers. Among females, 15.7% hospital and 9.1% of clinic nurses smoked. |
| | Smith et al. (2006) | High | 1,162 | | | ✓ | | 10.9% of respondents reported to be smokers (10.8% female, 18.7% male). |
| | Suzuki et al. (2005) | High | 3729 | ✓ | ✓ | | ✓ | 23.5% of females and 52.4% of males were smokers (16.3% first year females, 42.9% first year males, 26.1% second year females, 57.9% second year males, 31.5% third year females, 57.5% third year males). |
| | Tada et al. (2014) | High | 2758 | ✓ | | ✓ | | 22.5% of day worker and 30.1% of shift workers were habitual smokers. |
| Italy | Andrea et al. (2001) | High | 250 in 1992 and 205 in 1999 | ✓ | ✓ | | ✓ | 50.8% in 1992 and 43.4% in 1999 reported to smoke (female [48% 1992, 42% 1999], male [60% 1992, 49% 1999]). |
| | Biraghi & Tortorano (2010) | High | 812 | ✓ | ✓ | | ✓ | 44.2% of respondents reported to smoke (39% female, 53% male). |
| | Buja et al. (2013) | High | 455 | ✓ | ✓ | ✓ | | 21.7% of non-shift workers, 18.1% of non-night shift workers and 20.3% of night shift workers reported to smoke. |

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| | Melani et al. (2000) | High | 205 | ✓ | ✓ | | ✓ | 43% of respondents reported to smoke (42% female, 49% male). |
| | Quattrin et al. (2010) | High | 149 | ✓ | ✓ | | ✓ | 31.5% of respondents reported to smoke. |
| Hungary | Piko (2002) | High | 100 | | | | ✓ | 48.2% of respondents reported to smoke. |
| Greece | Beletsioti-Stika & Scriven (2006) | High | 308 | ✓ | ✓ | ✓ | | 46% of respondents reported to be current smokers. |
| | Evagelou et al. (2014) | High | 435 | ✓ | ✓ | | ✓ | 32.5% of females and 36.1% of males reported to smoke. |
| | Stamatopoulou et al. (2014) | High | 220 | | | ✓ | | 32% of respondents reported to smoke. |
| | Tselebis et al. (2001) | High | 114 | ✓ | | ✓ | | 46% of respondents reported to smoke. |
| Israel | Baron-Epelet al. (2004) | High | 782 | ✓ | ✓ | | ✓ | 21.7% of respondents reported to smoke (20% female, 29.6% male). |
| | Kaplan et al. (2002) | High | 290 | | | ✓ | | 44.8% of respondents reported to smoke. |
| USA | Abarca & Pillon (2008) | High | 264 | ✓ | | | ✓ | 38.5% of the regular plan group and 20.1% of the professional plan group reported to be smokers. |
| | Adderley-Kelly & Green (2000) | High | 214 | ✓ | ✓ | | ✓ | Respondents reporting to smoke by health group were as follows: 88% excellent, 0% good, 4% health risk apparent, and 8% serious risk. |
| | Baldwin et al. (2009) | High | 929 | ✓ | ✓ | | ✓ | 37% of respondents reported to smoke (49.1% PN, 37.6% DIP/ADN, 32.1% BSN). |
| | Borrelli & Novak (2007) | High | 178 | ✓ | ✓ | ✓ | | 10% of respondents reported to smoke. |

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| Fair et al. (2009) | High | 1,345 | ✓ | ✓ | ✓ | | 2.6% of respondents reported to smoke between 1 and 10 cigarettes per day (2.6% female, 2% male) and 1% >10 cigarettes per day (1% female, 2% male). |
| Gorin (2001) | High | 476 | ✓ | | | ✓ | 24% reported to smoke. |
| Han et al. (2012) | High | 1724 | | | ✓ | | 14% of favourable work schedule and 13.1% unfavourable work schedule respondents reported to smoke. |
| Heath & Crowell (2007) | High | 161 | ✓ | ✓ | ✓ | | 29.2% of respondents reported a history of tobacco use (28.9% nurse practitioners, 23.5% clinical nurse specialists, 22.2% nurse midwifery, 44% nurse anaesthetists). |
| James et al. (2013) | High | 69,253 in 2000 and 67339 in 2001 | ✓ | | ✓ | | 9% of respondents in 2000 and 8% in 2001 reported to smoke. |
| Jenkins & Ahijevych (2003) | High | 200 | ✓ | ✓ | | ✓ | 6% reported to smoke. |
| Kenfield et al. (2010) | High | 102,635 | ✓ | | ✓ | | 28.1% in 1980, 17.6% in 1990, and 11.7% in 2000 reported to smoke. |
| Kenna & Wood (2004) | High | 129 qualified nurses, 51 student nurses | ✓ | ✓ | ✓ | ✓ | 70.5% of nurses and 80.4% of student nurse reported to smoke during their lifetime, and 11.6% of nurses reported to smoke in the past-month. |
| Lenz (2008) | High | 657 | ✓ | ✓ | | ✓ | 91.8% consider self a smoker. 7.6% smoker and 9.7% occasional smoker. |
| Montalvo-Prieto & Castillo-Ávila (2013) | High | 689 | ✓ | ✓ | | ✓ | 1.9% reported to smoke. |
| Patkar et al. (2003) | High | 126 | ✓ | ✓ | | ✓ | 13.5% reported to smoke. |

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| | Petch-Levine et al. (2003) | High | 388 | ✓ | ✓ | ✓ | | 26.0% former smoker. |
| | Sarna et al. (2009) | High | 2589 | ✓ | ✓ | ✓ | | 9.7% reported to smoke (9.4% female, 14.6% male). |
| | Sarna et al. (2008i) | High | 158,736 | | | ✓ | | 12.5% reported to smoke. |
| | Sarna et al. (2008ii) | High | 237,648 | ✓ | | ✓ | | 33.2% in NHS 1976, 13.5% NHS II 1989, 16.5% in 1988/1989, and 8.4% in 2002/2003 reported to be smokers. |
| | Sarna et al. (2012) | High | 2,566 | ✓ | | ✓ | | 12.1% respondents reported to smoke. |
| | Shriver & Scott-Stiles (2000) | High | 71 | ✓ | ✓ | | ✓ | 7% in time 1 and 8.8% in time 2 reported to be a daily smoker. |
| | Sun et al. (2011) | High | 13,894 | ✓ | | ✓ | | 13.6% successful agers and 19.9% usual agers reported to smoke. |
| | VanDevanter et al. (2016) | High | 828 | ✓ | ✓ | | ✓ | 32.7% smoked once or more in their lives, 5.9% in the last year, 7.9% in the past 30 days and 53.5% never smoked. |
| | Zapka et al. (2009) | High | 194 (baseline) and 287 (part two) | ✓ | ✓ | ✓ | | 5.9% of respondents reported to smoke. |
| England | Bakhshi et al. (2015) | High | 623 | ✓ | ✓ | ✓ | | 11% reported to be current smokers. |
| | Blake et al. (2011) | High | 325 | ✓ | ✓ | | ✓ | 18.8% reported to smoke. |
| | Bloor et al. (2006) | High | 92 | ✓ | ✓ | ✓ | | 34.8% reported to smoke. |
| | Malik et al. (2011) | High | 551 qualified nurses and | ✓ | ✓ | | ✓ | 18.9% reported to smoke (19.2% registered nurse, 18.5% pre-registered nurse). |

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| | | | 325 student nurses | | | | | |
| France | Fathallah et al. (2012) | High | 607 | ✓ | ✓ | ✓ | | 30.1% reported to smoke (29.8% female, 32.2% male, day workers 31.7%, night workers 25.3%). |
| Turkey | Durmaz & Ustün (2006) | High | 253 | ✓ | ✓ | | ✓ | 29.2% of respondents reported to be smokers. |
| Australia | Berkelmanset al. (2011) | High | 1,029 | ✓ | ✓ | ✓ | | 10.4% of females and 22.4% of males reported to smoke. |
| | Dwyer et al. (2009) | High | 289 | ✓ | ✓ | ✓ | | 16% of respondents reported to smoke (13% female, 21% male). |
| | Purcell et al. (2006) | High | 94 | ✓ | ✓ | | ✓ | 19.1% of respondents reported to smoke. |
| | Smith (2007) | High | 54,000 participants (nurses and physicians) | | | ✓ | | 29.1% 1989-1990, 18% 1995, 21.3% 2001, and 28% 2004-2005 reported to smoke. |
| | Smith & Leggat (2007) | High | 270 | ✓ | ✓ | | ✓ | 10.9% reported to smoke (10.8% female, 18.7% male). |
| | Walsh et al. (2012) | High | 381 | ✓ | ✓ | | ✓ | 21.0% reported to smoke (20.1% female, 31.1% male, 20.3% first year, 20.3% second year, 22.4% third year). |
| Poland | Bukowska et al. (2015) | High | 657 nurses and midwives | ✓ | | ✓ | | 22% of premenopausal female day shift workers reported to smoke and 31% of rotating night shift workers. 32% of postmenopausal day shift workers and 40% of rotating night shift workers reported to smoke. |
| | Kalinowski & Karwat (2004) | High | 109 | ✓ | ✓ | | ✓ | 27.0% of respondents reported to smoke. |
| Ireland | Burke & McCarthy (2011) | High | 118 | ✓ | ✓ | | ✓ | 19.5% of respondents reported to smoke (females 18.0%, males 33.0%, third years 25.0%, first years 14.5%). |

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| | Deasy et al. (2016) | High | 406 | ✓ | ✓ | | ✓ | 73.0% reported not to smoke, 14.3% reported to smoke 1-5 cigarettes, and 12.7% reported to smoke 6+ cigarettes a day. |
| | McCann et al. (2005) | High | 366 | ✓ | ✓ | | ✓ | 24.1% of respondents reported to smoke. |
| | McKenna et al. (2001) | High | 1,074 | ✓ | ✓ | ✓ | | 25.8% of respondents reported to smoke. |
| | McKenna et al. (2003) | High | 1,074 | ✓ | ✓ | ✓ | | 25.8% of respondents reported to smoke. |
| | O'Donovan (2009) | High | 300 | ✓ | ✓ | ✓ | | 21% of respondents reported to smoke (20.6% female, 25% male). |
| Denmark | Friis et al. (2005) | High | 22,715 | ✓ | | ✓ | | 23.4% reported to smoke. |
| | Sanderson et al. (2005) | High | 4731 | ✓ | | ✓ | | 24% reported to smoke in 1993, 23% aged 45-56 and 26% 57-66. |
| Canada | Chalmers et al. (2002) | High | 282 | ✓ | ✓ | | ✓ | 12.9% reported to smoke. |
| | Chow & Kalischuk (2008) | High | 211 | ✓ | ✓ | | ✓ | 8% occasional, 5% frequent, 2% heavy smoker. |
| | Clément et al. (2002) | High | 52 | | | | ✓ | Percentage of student nurses reporting not to smoke was 88% 1992, 88% 1993 and 90% 1994. Percentage of education students reporting not to smoke was 83% 1992, 81% 1993, and 82% 1994. |
| | McPherson et al. (2011) | High | 118 | ✓ | | ✓ | | 40% reported to have smoked at some point in their lives. |
| | Schultz et al. (2009) | High | 214 | ✓ | ✓ | ✓ | | 17% reported to smoke. |
| New Zealand | Edwards et al. (2008) | High | 35,151 | ✓ | ✓ | ✓ | | 13.2% pf females (15.8% aged 15-24, 13.8% 25-44, 12.6% 45-64, 9.7% > 65) and 19.6% of males (23.8% 15-24, 18.6% 25-44, 20.8% 45-64, 11.8% > 65) reported to be smokers. Smokers by |

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| | | | | | | | | occupation were as follows: female (15.3% principal nurse, 12.8% registered nurse, 30.0% psychiatric nurse, 10.9% public health and district nurse, 13.8% occupational health nurse, 9.3% midwife), male (21.6% principal nurse, 17.6% registered nurse, 26.3% psychiatric nurse, 15.4% other male nurse). |
| | Gifford et al. (2013) | High | 410 | ✓ | ✓ | ✓ | ✓ | 21.5% of respondents were smokers, of which 75% smoked ≤10 cigarettes a day (20% nurses, 32% student nurses). |
| UK | Blake & Harrison (2013) | High | 540 | ✓ | ✓ | | ✓ | 16.3% of respondents reported to be smokers. |
| | Dickens et al. (2004) | High | 167 | | | ✓ | | 17.4% of respondents reported to be smokers. |
| UK, China, USA | Undertaking Nursing Interventions Throught Europe (UNITE) Study Group (2002) | High | 130 | ✓ | ✓ | ✓ | | 7% of female and 17% of males respondents reported to be smokers. |
| Iceland | Gunnarsdottir et al. (2006) | High | 394 | ✓ | | ✓ | | 15% of respondents reported to smoke. |
| | Sveinsdóttir & Gunnarsdóttir (2008) | High | 394 | ✓ | | ✓ | | The percentage of respondents reporting to have never smoked was reported by self-assessed health: 58.6% very good/ good physical health, 46.4% very poor/ poor physical health, 57.6% very good/ good mental health, 46.4% very poor/ poor mental health. |
| Sweden | Kamwendo et al. (2000) | High | 115 | | | | ✓ | 12.5% of respondents reported to be smokers. |
| Lithuania | Misevičienė et al. (2013) | High | 739 | ✓ | ✓ | ✓ | | 8.9% of respondents were smokers. |
| Korea | Park et al. (2015) | High | 160 | ✓ | | | ✓ | 1.3% of respondents were smokers. |

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| | Kim et al. (2013) | High | 9,989 | ✓ | | ✓ | | 1.2% of respondents were smokers (1.2% current shift worker, 1% non-current shift worker). |
| | Han et al. (2016) | High | 340 | | | ✓ | | 0.3% smoked. |
| Taiwan | Yang et al. (2001) | High | 907 | ✓ | | ✓ | | 0.2% of respondents reported to be smokers. |
| Norway | Buchvold et al. (2015) | High | 2059 | ✓ | ✓ | ✓ | | Mean cigarettes smoked 9.4 (SD 5.2) among daily smokers. |
| Serbia | Merrill et al. (2010a) | Middle | 230 | ✓ | ✓ | ✓ | | 47.1% of respondents were smokers (46.7% female, 51.9% male). |
| Turkey | Kutlu et al. (2008) | Middle | 835 | ✓ | ✓ | | ✓ | 22.7% of respondents were smokers. |
| | Öztürk et al. (2011) | Middle | 220 | ✓ | ✓ | | ✓ | 14.1% of females and 43.2% of males reported to be smokers. |
| | Yiğitalp (2015) | Middle | 326 | ✓ | ✓ | | ✓ | 12% of respondents reported to still smoke (3.5% female, 21.9% male). |
| | Yildiz & Esin (2009) | Middle | 400 | ✓ | | ✓ | | 37.9% of medical unit and 29.8% of intensive care unit nurses reported to smoke. |
| | Sezer et al. (2007) | Middle | 239 | ✓ | ✓ | ✓ | | 45% of respondents reported to smoke. |
| Jordan | Merrill et al. (2010b) | Middle | 266 | ✓ | ✓ | ✓ | | Current occasional smoker (10.7% all, 6.7% female, 13.7% male), current everyday smoker (18.4% all, 5.8% female, 28.1% male). |
| | Shishani et al. (2008) | Middle | 164 | ✓ | ✓ | ✓ | | 41.5% of respondents reported to be smokers. |
| Iran | Ahmadi et al. (2004) | Middle | 400 | ✓ | ✓ | | ✓ | 25.3% of respondents were smokers (19.4% female, 59.3% male). |
| Brazil | Fernandes et al. (2013) | Middle | 2,279 | ✓ | ✓ | ✓ | | 23.7% of females and 29.5% of males reported to be former or current smokers. |

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| China | An et al. (2014) | Middle | 799 | ✓ | ✓ | ✓ | | 7.6% of respondents reported to be smokers (2.1% female, 48.9% male, 38.6% registered nurse, 3.5% nursing officer, 91.2% psychiatric nurse). |
| | Chan et al. (2007) | Middle | 1,690 | ✓ | ✓ | ✓ | | 2.2% of respondents reported to be smokers. |
| | Sarna et al. (2016) | Middle | 2440 (1404 Beijing, 1036 Hefei) | ✓ | ✓ | ✓ | | 97.7% never (96.9% Beijing, 98.7% Hefei), 1.4% former smoker (1.9% Beijing, 0.8% Hefei), and 0.9% current smoker (1.2% Beijing, 0.5% Hefei). |
| | Smith et al. (2005) | Middle | 509 | ✓ | ✓ | ✓ | | 2.6% of respondents reported to be a smoker (52.2% male). |
| | Smith et al. (2013) | Middle | 83 | ✓ | ✓ | ✓ | | 1% of respondents reported to be a smoker. |
| Thailand | Preechawong et al. (2014) | Middle | 1,845 | ✓ | ✓ | | ✓ | 0.5% of respondents were smokers. |
| | Klainin-Yobas et al. (2015) | Middle | 335 | ✓ | ✓ | | ✓ | 0.3% reported to smoke. |
| Syria | Asfar et al. (2011) | Low | 96 | ✓ | ✓ | ✓ | | 26% of respondents reported to smoke (17.4% female, 48.1% male). |
| Balkans | Hodgetts et al. (2004) | | 97 | | | ✓ | | 50.5% of respondents reported to smoke. |
| UK, Taiwan, Japan, Korea, Canada, USA | Lally et al. (2008) | | 759 | | | ✓ | | 4.5% of respondents reported to smoke (13.9% UK, 0.85% Taiwan, 8% Japan, 0% Korea, 6.3% Canada, 2.1% US). |
| Unknown | Burns et al. (2010) | | 103 | ✓ | ✓ | ✓ | | 4% of respondents reported to smoke (4% female, 0% male). |

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| Warren et al. (2009) | 21,741 | ✓ | ✓ | | ✓ | Respondents reporting to smoke by region, and gender are as follows: African Region [Algeria 2.4% all, 1.3% female, 8.5% male, Ghana 0.8% all, 0.0% female, 0.0% male, Kenya 7.5% all, 4.3% female, 13.5% male, Uganda 0.5% all, 0.0% female, 3.3% male], Eastern Mediterranean Region [Gaza Strip/West Bank 25.0% all, 19.9% female, 33.9% male, Iran 4.4% all, 1.6% female, 17.4% male, Iraq 18.7% all, 7.4% female, 31.8% male, Jordan 43.9% all, 16.0% female, 62.2% male, Lebanon 26.9% all, 21.5% female, 43.0% male, Sudan 4.8% all, 0.9% female, 21.6% male, Syrian Arab Republic 19.3% all, 7.0% female, 49.8% male, Tunisia 26.2% all, 14.7% female, 57.9% male], European Region [Albania 41.5% all, 36.4% female, 57.5% male, Armenia 5.7% all, 2.4% female, 48.6% male, Bosnia and Herzegovina 33.0% all, 34.8% female, 27.3% male, Czech Republic 32.7% all, 33.2% female, - male, Greece 33.5% all, 32.5% female, 40.0% male, Kyrgyzstan 9.5% all, 9.7% female, 9.3% male, Lithuania 36.2% all, 36.6% female, 32.5% male, Republic of Moldova 20.2% all, 19.4% female, 28% male, Serbia 33.8% all, 34.1% female, 32.4% male, Slovakia 32.2% all, 31.7% female, 41.8% male], Region of the Americas [Argentina 36.4% all, 36.0% female, 38.4% male, Bolivia 21.3% all, 19.5% female, 36.8% male, Brazil 12.5% all, 12.9% female, 10.8% male, Chile 46.6% all, 47.6% female, 40.2% male, Costa Rica 24.0% all, 23.3% female, 25.8% male, Cuba 39.8% all, 38.2% female, 62.5% male, Jamaica 5.1% all, 5.3% female, - male, Panama 3.4% all, 3.5% female, 3.2% male, Peru 25.0% all, 22.0% female, 42.0% male, Trinidad and Tobago 5.7% all, 4.8% female, 16.1% male, Uruguay 41.9% all, 44.7% female, 23.9% male], South-East Asia Region [Bangladesh 4.0% all, 0.3% female, 49.5% male, India 3.4% all, 1.1% female, 19.9% male, Sri Lanka 1.0% all, 0.3% female, 7.6% male, Thailand 1.1% all, 0.5% female, 9.8% male], Western Pacific Region [Cambodia 4.3% all, 0.0 female, 12.3% male, Mongolia 19.9% all, 11.0% female, 53.9% male, South Korea 4.2% all, 3.6% female, 13.1% male]. |

# Appendix v Physical Activity Prevalence

| Country | Study | World Bank classification | Participant characteristics: Sample size | Female | Male | Qualified nurse | Student nurse | Prevalence |
|---|---|---|---|---|---|---|---|---|
| Australia | Purcell et al. (2006) | High | 94 | ✓ | ✓ | | ✓ | No physical activity of at least 15 minutes 9.5%, mild physical activity 15.9%, moderate physical activity at least 3 times a week 34%, strenuous physical activity greater than 3 times a week 38.2%. |
| | Stanton et al. (2015) | High | 34 | | | ✓ | | 56% high level of physical activity, 18% moderate, 26% low. Mean weekly expenditure 4039 (S.D. 2935). |
| | Happell et al. (2014) | High | 52 | ✓ | ✓ | ✓ | | Median times in last week: 4 walking, 5 moderate activity, 1 vigorous gardening, 3 vigorous activity, 8 total activity. Median minutes per week: 175 walking, 180 moderate activity, 70 vigorous gardening, 120 vigorous activity, 360 total activity. |
| Canada | Chow & Kalischuk (2008) | High | 211 | ✓ | ✓ | | ✓ | 27% consistently, 44% occasionally, 25% rarely, 4% no exercise at all. 47% exercised 2-3 times per week for 30 to 60 minutes. |
| | Clément et al. (2002) | High | 52 | | | | ✓ | The percentage of students reporting to engage in some form of physical activity by year was as follows: student nurses - 81% |

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| | | | | | | | | 1992, 81% 1993, 67% 1994; and education students - 65% 1992, 72% 1993, 69% 1994. |
| | McPherson et al. (2011) | High | 118 | ✓ | | ✓ | | Mean MET. min per day of each intensity of activity for 24 hour study period (7am to 7am) and biological relevant time frame (3pm to 7am): day shift 7am to 7am (858 sedentary, 673 low, 284 moderate to vigorous intensity physical activity (MVPA)), day shift 3pm to 7am (423 sedentary, 252 low, 143 MVPA), night shift 7am to 7am (852 sedentary, 580 low, 206 MVPA), night shift 3pm to 7am: (770 sedentary, 548 low, 162 MVPA). |
| Denmark | Friis et al. (2005) | High | 22,715 | ✓ | | ✓ | | Engaged in heavy exercise ≥4 hours per week was 25.1% among nurses and 9.9% among the female population. The percentage employed in a mainly sedentary occupation was 8.0% for nurse and 23.0% for female population. |
| England | Bakhshi et al. (2015) | High | 623 | ✓ | ✓ | ✓ | | Respondents reported engaging in physical activity levels as follows: 75% physically active; 29% moderate-intensity exercise for less than one hour daily; and 7% 1-2 hours daily. 42% did strength exercises for less than 1 hour daily. |
| | Blake et al. (2011) | High | 325 | ✓ | ✓ | | ✓ | 46.0% engaged in physical activity. |
| | Malik et al. (2011) | High | 551 qualified nurses and 325 student nurses | ✓ | ✓ | ✓ | ✓ | 51.4% of respondents engaged in physical activity ≥30 minutes most days of week (54.6% registered nurse, 46% pre-registered nurse). |

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| Germany | Lehmann et al. (2014) | High | 266 in 2008 and 259 in 2013 | ✓ | ✓ | | ✓ | The number of hours respondents reported to engage in physical activity per week was as follows: 0>1 was 12.8% in 2008 and 14.3% in 2013; 1-2 was 36.1% 2008 and 33.6% 2013; 2<4 was 20.3% 2008 and 26.3% 2013; and >4 was 30.5% 2008 and 25.5% 2013. |
| Iceland | Gunnarsdottir et al. (2006) | High | 394 | ✓ | | ✓ | | 76% reported to exercise at least once a week. |
| | Sveinsdóttir & Gunnarsdóttir (2008) | High | 394 | ✓ | | ✓ | | Respondents reporting to exercise three times a week or more was reported by self-assessed health - 50.0% very good/ good physical health and 27.4% very poor/ poor physical health; and 48.2% very good/ good mental health, and 26.8% very poor/ poor mental health. |
| Ireland | Burke & McCarthy (2011) | High | 118 | ✓ | ✓ | | ✓ | 73% of respondents reported to exercise 2-5 times per week (94% female, 100% male). |
| | Deasy et al. (2016) | High | 406 | ✓ | ✓ | | ✓ | 10.4% of respondents reported to be very active, 55.3% active, and 34.3% not active or unsure. |
| Israel | Kaplan et al. (2002) | High | 290 | | | ✓ | | 44% of respondents engaged in regular sports activity, 36.4% walked, 28% did gymnastics, 19% swam and 16.7% engaged in other types of sport. |
| Italy | Buja et al. (2013) | High | 455 | ✓ | ✓ | ✓ | | The percentage of respondents reporting frequency of physical activity was reported by shift type as follows: never - no shift 19.6%, no night shift 22.3% and night shift 22.7%; < once a week - no shift 30.4%, no night shift 35.2% and night shift 39.0%; and ≥ once a week - no shift 50.0%, no night shift 42.5% and night shift 38.3%. |

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| | Quattrin et al. (2010) | High | 149 | ✓ | ✓ | | ✓ | 66.4% reported to engage in physical activity. 26.8% of respondents played sports with 40.6% of males and 23.1% of female 23.1% reporting to have a sport. |
| Japan | Inoue et al. (2004) | High | 568 | ✓ | | ✓ | | Respondents reporting to engage in ≥ 3 hr/week was 17.5% for case and 11.0% control(OR 0.60, 95% CI 0.29-1.26, p 0.176) and < 3 hr/week was 82.5% case and 88.6% control. |
| | Tada et al. (2014) | High | 2758 | ✓ | | ✓ | | The mean physical activity in MET-h/week reported by respondents was 41.5 (SD 59.9) for day worker and 42.4 (SD 59.0) for shift worker (p = 0.672). |
| | Yamashita et al. (2012) | High | 1,324 | ✓ | ✓ | | ✓ | 38.6% of respondents reported to engage in regular exercise. |
| Korea | Park et al. (2015) | High | 160 | ✓ | | | ✓ | 63.1% of respondents reported not to engage in regular exercise.  Of those engaging in regular exercise, 36.9% exercised 1.25 times per week in average.  Of those engaging in non-regular exercise, 89.1% did no exercise at all. |
| | Kim et al. (2013) | High | 9,989 | ✓ | | ✓ | | 44.1% of respondents engaged in regular exercise (41.2% current shift worker, 47.3% non-current shift worker). |
| | Han et al. (2016) | High | 340 | | | ✓ | | The level of regular exercise reported by respondents was as follows: moderate or vigorous 17.1% (rotating with night 17.1%, rotating without night 20.0%, fixed no night 15.1%); vigorous 14.1% (rotating with night 14.3%, rotating without night 14.3%, fixed no night 13.2%); moderate 5.0% (rotating with night 4.4%, rotating without night 5.7%, fixed no night 7.5%); walking 60.3% (rotating with |

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| | | | | | | | | night 64.3%, rotating without night 60.0%, fixed no night 41.5%). |
| Kuwait | Al-Kandari & Vidal (2007) | High | 224 | ✓ | ✓ | | ✓ | The mean physical activity frequency engaged in was 2.2 (SD 0.709) - 2.09 (SD 0.68) females and 2.44 (SD 0.75) males. [2] |
| Norway | Buchvold et al. (2015) | High | 2059 | ✓ | ✓ | ✓ | | Sweaty exercise %>1 hour per week (0 night shifts worked in last year 64.1% (95% CI: 60.0, 68.1), 1-30 night shifts (67.4%, 95% CI 64.2, 70.1), >30 65.7%, 95% CI 65.7%, 95% CI 61.2, 69.5). |
| Poland | Bukowska et al. (2015) | High | 657 nurses and midwives | ✓ | | ✓ | | The mean MET hours engaged in among premenopausal women was 198.1 (SD 83.3) in day shift workers and 249.6 (SD 79.1) in rotating night shift workers. Among postmenopausal women it was 202.6 (SD 90.7) for day shift workers and 225.6 (SD 76.4) in rotating night shift workers. |
| | Dąbrowska-Galas et al. (2013) | High | 44 | ✓ | | | ✓ | 50% of respondents reported to be physically active. 6% of respondents reported low level of physical activity (individuals who did not meet the criteria for moderate or high physical activity level), 68% moderate level of physical activity (meet one of the criteria: (1) 3 or more days of vigorous activity for at least 20 minutes per day, (2) 5 or more days of moderate-intensity activity or walking for at least 30 minutes per day, or (3) 5 or more days of any combination of walking, moderate-intensity activity, or vigorous-intensity activity, achieving a minimum of at least 600 MET-min/week), and 8% high level of physical activity (meet one of the criteria: (1) participate in vigorous-intensity activity a |

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| | | | | | | | | minimum of 3 days per week, accumulating not less than 1500 MET-min/week, or (2) 7 or more days of any combination of walking, moderate-intensity activity, or vigorous-intensity activity, achieving a minimum of 3,000 MET-min/week). |
| Spain | Irazusta et al. (2006) | High | 46 | ✓ | | | ✓ | Respondents were categorised by physical activity level as follows: sedentary respondents included 50% 1st year, 47.5% final year and 43.6% other students; irregularly active included 32.6% 1st year, 32.8% final year and 30.9% other students; and active included 17.4% 1st year, 19.7% final year and 25.5% other students. |
| | Rabanales Sotos et al. (2015) | High | 1060 | ✓ | ✓ | | ✓ | 42.6% of respondents reported sedentary activity (47.1% female, 25.6% male), 41.0% partially active (40.8% female, 42.0% male), and 15.6% reported to be active (11.3% female, 32.0% male). |
| Sweden | Kamwendo et al. (2000) | High | 115 | | | | ✓ | The activities respondents reported to engage in was as follows: 21.3% of nurses and 3.3% physiotherapists in school gymnastics; 44.4% nurses and 27.2% physiotherapists in recreational sports activities; 31.5% nurses and 46.7% physiotherapists in competitive sports activities; and 2.8% nurses and 22.8% physiotherapists competed at a national level. |
| Taiwan | Lee et al. (2011) | High | 360 | ✓ | | ✓ | | The mean times respondents reported to engage in physical activity was 2.42 using a scale with 0 being never to 3 always. |

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| UK | Blake & Harrison (2013) | High | 540 | ✓ | ✓ | | ✓ | 55.1% of respondents meet recommendations for physical activity. Respondents reporting to exercise 30 minutes most days of week for > 6 months was 37.2%; < 6months 17.2%; no but intend to in next month 17.2%; no used to 10.7%; no but intend to in next 6 months 12.4%; and no do not intent to was 4.1%. |
| UK, China, USA | Undertaking Nursing Interventions Throught Europe (UNITE) Study Group (2002) | High | 130 | ✓ | ✓ | ✓ | | Respondents reporting regular activity was 49% for females and 50% for males; occasionally was 42% females and 50% males; and never 4% females and 0% males. |
| USA | Adderley-Kelly & Green (2000) | High | 214 | ✓ | ✓ | | ✓ | Using a scale of 0 to 10 with 0 being low and 10 being high, 16% of respondents reported excellent, 33% good, 32% health risk apparent, and 19% serious risk. |
| | Chen et al. (2014) | High | 130 | ✓ | | ✓ | | 58% of respondents reported to exercise weekly. |
| | Du et al. (2014) | High | 71,570 | ✓ | | ✓ | | The mean recreational activity (MET-hours/week)reported by respondents was: 1.3(SD 0.9)< 3, 13.1 (SD 2.7)9 to < 18, and 47.3 (SD 19.4) ≥ 27. |
| | Esposito & Fitzpatrick (2011) | High | 112 | ✓ | ✓ | ✓ | | Using a range of 8-32 with the higher the score the greater the exercise - the mean exercise score was 18.6. |
| | Fair et al. (2009) | High | 1,345 | ✓ | ✓ | ✓ | | The number of times respondents reported to engage in physical activity per week was as follows: 11.7% none (11.9% female, 7.8% male); 31.7% 1-2 (31.5% female, 37.3% male); 35.9% 3-4 (36.1% female, 31.4% male); and 19.7% ≥5 (19.6% female, 21.6% male). |

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| Flannery et al. (2014) | High | 40 | | ✓ | 89.2%.* The minutes of activity engaged in were reported as follows: 52.8% of nurses and 56.5% of nursing assistants ≥300 min of moderate physical activity weekly; 19.4% of nurses and 30.4% of nursing assistants ≥840 min of moderate physical activity weekly; and 2.7% of nurses and 14.3% of nursing assistants no moderate or vigorous physical activity weekly. Respondents reported that their work was mostly: sitting or standing (16.2% nurse, 11.5% nursing assistants); walking (73.0% nurse, 57.7% nursing assistants); and physically demanding labour (10.8% nurse, 23.1% nursing assistants). |
| Han et al. (2012) | High | 1724 | | ✓ | The number of days per week respondents reporting vigorous exercise was as follows: favourable work schedules (56.4% <1 , 20.9% 1-2, 15.9% 3-4, 6.8% 5-7) and unfavourable work schedules (54.1% <1, 22.2% 1-2, 18% 3-4, 5.8% 5-7). |
| James et al. (2013) | High | 69,253 in 2000 and 67339 in 2001 | ✓ | ✓ | In 2000 the mean metabolic equivalent hours per week was 17.1 and in 2001 21.0. |
| Kenfield et al. (2010) | High | 102,635 | ✓ | ✓ | Respondents reporting exercise that produces sweat at least once per week with activity ≥4 METs (1980) or METs/week, mean was as follows: never (25.1% 1980, 14.3% 1990, 15.9% 2000), former (30.7% 1980, 15.5% 1990, 16.7% 2000), and current (23% 1980, 12.5% 1990, 12.7% 2000). |

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| Nahm et al. (2012) | High | 183 | ✓ | ✓ | ✓ | | 72.2% of respondents felt that they were not getting enough exercise. 43.2% performed ≥100 min PA per week (excluding time spent working as a nurse). The mean average minutes per week for vigorous level activities was 42.41 (SD 80.2) and moderate level exercise was 113 (SD 118.2). The mean total average minutes per week for exercise was 97 (SD 116.9). |
| Petch-Levine et al. (2003) | High | 388 | ✓ | ✓ | ✓ | | 26% of respondents reported to almost always engaged in moderate daily activity and 22% aerobic activity at least three times per week. |
| Shriver & Scott-Stiles (2000) | High | 71 | ✓ | ✓ | | ✓ | 22.5% of nurses and 45.8% of non-nurses in time 1 reported to exercise at least three times per week and 29.8% of nurses and 50.0% of non-nurses in time 2. |
| Sun et al. (2011) | High | 13,894 | ✓ | | ✓ | | Mean successful agers was 2.7 (SD 2.3) and usual agers 2.4 (SD 2.2).[2] |
| Tucker et al. (2012) | High | 2,242 | ✓ | ✓ | ✓ | | Mean 2.47 [2] |
| Wynd et al. (2007) | High | 1,295 | ✓ | ✓ | ✓ | | On a scale of 1-5 with 1 being very poor and 5 excellent, the mean was 2.98 (2.90 2003, 2.95 2004, 3.09 2005). |
| Zapka et al. (2009) | High | 194 (baseline) and 287 (part two) | ✓ | ✓ | ✓ | | The mean number of flights of stairs gone up per day was 2.82 and flights down per day was 3.28. 89.5% of respondents reported that they did not walk during their break on any days per week and 0.5% reported to do so on ≥ 1 day. |
| Thacker et al. (2016) | High | 494 | ✓ | ✓ | ✓ | | Mean 17.67(SD 5.64).[2] |

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| | Chin et al. (2016) | High | 394 | ✓ | ✓ | ✓ | | Aerobic physical activity in minutes per week: 9.5% no activity, 49.2% <150 min a week, 28.0% 150-300 min per week, 13.3% ≥300 min a week. Muscle strengthening physical activity: 32.7% none, 10.6% 1 day a week, 56.6% ≥ 2 days a week. |
| Wales | Hawker (2012) | High | 215 | ✓ | ✓ | | ✓ | The physical activity reported over a week was as follows: total activity min METs 0, max METs 16,398, and mean min METs 27,882.9 (SD 2436.8); vigorous activity min METs 0, max METs 10,080, mean METs 919.4 (SD 1558.4); moderate activity min METs 0, max METs 5040, mean METs 456.2 (SD 770.4); walking min METs 0, max METs 4158, mean METs 1467.6 (SD 1317.5); and sitting min METs 30, max METs 999, mean METs 311.2 (SD 180). |
| Brazil | da Silva Pires et al. (2013) | Middle | 154 | ✓ | ✓ | | ✓ | Physical activity was reported by respondents as follows: sedentary activity - 87.6% work-related physical activity (88.6% freshmen, 86.5% seniors); 61.7% transport-related (60.4% freshmen, 63.5% senior); 82.5% domestic (84.6% freshmen, 70.4% seniors); 57.8% leisure time and sport and exercise (61.5% freshmen, 53.4% seniors); and 82.5% sitting time (89% freshmen, 73% seniors). 25.3% of respondents reported insufficient active (23.1% freshmen, 28.6% seniors). |
| | Fernandes et al. (2013) | Middle | 2,279 | ✓ | ✓ | ✓ | | 49.1% of females and 41.8% of males reported to engage in physical activity. |
| China | Chan (2014) | Middle | 195 | ✓ | ✓ | | ✓ | The mean exercise duration in minutes reported by respondents was 101.74 (SD |

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| | | | | | | | | 172.38; female 73.45 (SD 125.44); male 154.32 (SD 234.02); p = 0.010). |
| | Hui (2002) | Middle | 169 | ✓ | ✓ | | ✓ | Mean 1.78 [2] |
| Iran | Hosseini et al. (2014) | Middle | 404 | ✓ | ✓ | | ✓ | Mean: all 2.03 (SD 0.55); females 1.96 (SD 0.51); male 2.23 (SD 0.62; p 0.001); first year 2.10 (SD 0.61); second year 1.94 (SD 0.53); third year 2.05 (SD 0.56); and fourth year 2.04 (SD 0.49; p 0.197).[2] |
| Thailand | Klainin-Yobas et al. (2015) | Middle | 335 | ✓ | ✓ | | ✓ | 68.1% exercised regularly. |
| Turkey | Alpar et al. (2008) | Middle | 57 | ✓ | | | ✓ | Mean on entrance to school 10.40 (SD 2.37) and at graduation 12.14 (2.42). [2] |
| | Kirag & Ocaktan (2013) | Middle | 270 | ✓ | | ✓ | | Mean physical activity reported was 15.6 very good, 14.2 good and 13.4 bad. |
| | Yildiz & Esin (2009) | Middle | 400 | ✓ | | ✓ | | 76.7% reported not to exercise regularly. |
| Canada and Jordan | Haddad et al. (2004) | | 93 | ✓ | | | ✓ | Canada mean 2.42 (SD 0.73) and Jordan mean 2.12 (SD 0.46).[2] |
| | McElligott et al. (2009) | | 149 | | | ✓ | | Mean 2.39 [2] |

* Met government guidelines of thirty minutes five times a week.

[2] 1=never, 2=sometimes, 3=often, 4=routinely.

# Appendix vi Alcohol Consumption Prevalence

| | | | Participant characteristics | | | | | |
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| Country | Study | World Bank classification | Sample size | Female | Male | Qualified nurse | Student nurse | Alcohol consumption |
| Ireland | Burke & McCarthy (2011) | High | 118 | ✓ | ✓ | | ✓ | 92% of females and 100% of males reported to consume alcohol. 75.9% of respondents consumed 1-14 units per week and 15.8% 15-80 units per week. The mean units of alcohol consumed by respondents was 9.77 (SD 9.5). No males exceeded recommended weekly units compared to 19.2% females reported drinking above the recommended levels. |
| | Deasy et al. (2016) | High | 406 | ✓ | ✓ | | ✓ | 79.7% of respondents reported to consume alcohol ≤2 days per week and 20.3% ≥3 days per week. |
| USA | Abarca & Pillon (2008) | High | 264 | ✓ | | | ✓ | 22.7% of the regular plan group reported to consume alcohol and 21.1% of the professional plan group. |
| | Baldwin et al. (2009) | High | 929 | ✓ | ✓ | | ✓ | 84% of respondents reported to consume alcohol (77.7% PN, 87.2% DIP/ADN, 84.3% BSN). 44.6% of respondents consumed 0-2 drinks per typical occasion (48.2% PN,47.2% DIP/ADN, 41.7% BSN), 36.8% 3-4 drinks per typical occasion (30% PN, 35.5% DIP/ADN, 40% BSN), and 18.7% ≥5 drinks per typical occasion (21.8% PN, 17.4% DIP/ADN, 18.3% BSN). |

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| Du et al. (2014) | High | 71,570 | ✓ | | ✓ | | Respondents were categorised based on total recreational activity (MET-hours/week) and cover lowest < 3, middle 9 to < 18, and highest ≥ 27. The mean grams per day of alcohol consumed was 5.2 (SD 10.6) in lowest MET category, 5.8 (SD 9.9) in middle and 6.8 (SD 10.5) in highest category. |
| Fair et al. (2009) | High | 1,345 | ✓ | ✓ | ✓ | | The frequency respondents reported to consume alcohol was: 22.6% never (22.2% female, 33.3% male); 31.7% 1-2 per month (32.1% female, 21.6% male); 19.9% 1-2 per week (20.2% female, 11.8% male); 16.4% 3-4 per week (16.3% female, 17.6% male); 8.3% 1-2 per day (8.1% female, 11.8% male); and 0.7% ≥5 per day (0.5% female, 3.9% male). The percentage of respondents reporting to consume each alcohol type by gender was: red wine - 34.5% female, 23.5% male; white wine - 24.3% female, 9.8% male; spirits - 8.9% female, 15.7% male; and beer - 11.1% female, 17.6% male. |
| Gnadt (2006) | High | 241 | ✓ | ✓ | | ✓ | 82% of respondents reported to consume alcohol. |
| Han et al. (2012) | High | 1724 | | | ✓ | | Respondents reporting to consume ≥5 drinks per occasion last year by work schedule was: favourable work schedules - 70.5% never, 14.9% 1-2, 7.3% 3-5, 3.5% 6-10, 3.8% ≥11; and unfavourable work schedules - 66.5% never, 16.5% 1-2, 8.2% 3-5, 3.6% 6-10, 5.2% ≥11. |
| Hensel et al. (2014) | High | 333 | ✓ | ✓ | | ✓ | Respondents were categorised by type of drinker and are as follows: 7.8% abstainer (3.5% 2nd year, 5.5% 3rd year, 12% 4th year); 59.1% moderate (52.2% 2nd year, 59.7% 3rd year, 64% 4th year); and 33.0% heavy drinker (44.0% 2nd year, 34.7% 3rd year, 25.0% 4th year). |
| Kenfield et al. (2010) | High | 102,635 | ✓ | | ✓ | | The percentage of respondents consuming >15g of alcohol per day was divided into never, former and current. The figures are as follows: 4.9% never in 1980, 3.2% 1990, 3.6% |

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| | | | | | | | 2000; 12.2% former in 1980, 8.4% 1990, 9.4% 2000; and 14.4% current in 1980, 10.4% 1990, 11.1% 2000. |
| Kenna & Wood (2004) | High | 129 qualified nurses, 51 student nurses | ✓ | ✓ | ✓ | ✓ | The percentage of respondents reporting lifetime use of alcohol was as follows: any use - 93% nurse, 83.5% student nurse, 93.2% pharmacists, 85.9% general population; and heavy episodic use - 66.6% nurse, 80.5% pharmacists. Respondents were categorised based on alcohol use in the past-month: heavy episodic use - 8.5% nurse, 35.6% student nurse, 12.0% pharmacists, 19.1% general population; and heavy use - 0.8% nurse, 0% pharmacists, 4.8% general population. |
| López-Maldonado et al. (2011) | High | 237 | ✓ | ✓ | | ✓ | 18% of respondents reported never to consumed alcohol and 82% reported to consume alcohol. Of those who consumed alcohol, 54.6% consumed it ≤once a month, 39.2% 2-4 times a month 39.2%, 5.7% 2-4 times a week, and 0.5% ≥4 times a week. |
| Matute & Pillon (2008) | High | 191 | ✓ | ✓ | | ✓ | 74.9% of respondents were abstainers, 22.0% low risk (consume alcohol once a month, 1-2 drinks), 3.1% risky (>3 drinks consumed) drinkers. |
| Montalvo-Prieto & Castillo-Ávila (2013) | High | 689 | ✓ | ✓ | | ✓ | 10.7% of respondents reported to currently consume alcohol, 6.2% formerly consume, and 52.4% occasional consume alcohol. |
| Petch-Levine et al. (2003) | High | 388 | ✓ | ✓ | ✓ | | 21.9% of respondents report not to consume alcohol, 63.7% were light drinkers, 14.4% moderate drinkers, and 0.0% heavy drinkers. |
| Shriver & Scott-Stiles (2000) | High | 71 | ✓ | ✓ | | ✓ | Respondents reporting to consume alcohol 1-3 times a week at time 1 was 9.9% nursing and 38.6% non-nursing, and time 2 was 8.8% nursing and 45.0% non-nursing. |
| Sun et al. (2011) | High | 13,894 | ✓ | | ✓ | | 25.1% of respondents were non drinkers (22.4% successful agers, 25.4% usual agers). Respondents consuming ≤ 5.0 g of alcohol (1 drink) was 37.6% for successful agers and 37.7% for usual agers. Other figures include: 26.4% |

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| | | | | | | | | successful agers and 24.2% usual agers for 5.1-15.0 g (less than one drink); 9.8% all, 10.7% successful agers, 9.7% usual agers for 15.1-30.0 g (1-2 drinks); and 3.0% all, 2.9% successful agers, 3.1% usual agers for 30.1-45.0 g (2-3 drinks per day). |
| | Trinkoff et al. (2000) | High | 2,600 | ✓ | ✓ | ✓ | | 17% of respondents reported heavy alcohol use. The mean number of days in the past year where >5 drinks/occasion were consumed was 0.57 (SD 1.96). |
| England | Bakhshi et al. (2015) | High | 623 | ✓ | ✓ | ✓ | | In accordance with the Alcohol Use Disorder Identification Test, 22% of respondents reported to never consume alcohol. Of respondents who reported to consume alcohol, 25% were at risk of hazardous drinking or active alcohol use disorders. Of high risk drinkers, 20% reported to consume alcohol 4 or more times a week compared to 1% of low-risk drinkers. 88% of respondents consumed 1-4 drinks per typical occasion. |
| | Blake et al. (2011) | High | 325 | ✓ | ✓ | | ✓ | The frequency that respondents reported to consume alcohol was: 5.8% never; 9.1% ≤ monthly; 27.8% 2-4 times a month; 43% 2-3 times a week; and 14.2% ≥4 times a week. The number of drinks consumed on typical drinking day was 14.5% 1-2, 22.2% 3-4, 27.7% 5-6, 21.5% 7-9, and 11.6% ≥10. |
| UK | Blake & Harrison (2013) | High | 540 | ✓ | ✓ | | ✓ | 7.2% of respondents reported to never have consumed alcohol, 13.9% consumed alcohol monthly or less, 40.4% 2-4 times a month, 33.5% 2-3 times a week, and 5% ≥4 times a week. The number of standard drinks consumed on typical drinking day was reported at: 7.2% do not drink; 22% 1-2; 31.1% 3-4; 23.1% 5-6; 10% 7-9; and 6.5% ≥10. |
| Australia | Purcell et al. (2006) | High | 94 | ✓ | ✓ | | ✓ | The percentage of respondents classified as abstainers were: 7.8% all; 3.5% 2nd year; 5.5% 3rd year; and 12% 4th year students. The percentage of respondents classified as moderate drinkers were: 59.1% all; 52.2% 2nd year; 59.7% 3rd year; and 64% 4th year students. The percentage of |

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| | | | | | | | | respondents classified as heavy drinkers were: 33% all; 44% 2nd year; 34.7% 3rd year; and 25% 4th year students. |
| | Smith (2007) | High | 54,000 participants (nurses and physicians) | | | ✓ | | The percentage of nurses classified as medium-to-high-risk alcohol consumers were: 7.9% in 1989-1990; 5.8% in 1995; 5.5% in 2001; and 11.2% in 2004-2005. |
| Spain | Rabanales Sotos et al. (2015) | High | 1060 | ✓ | ✓ | | ✓ | The number of occasions respondents consumed alcohol in the last month was: 7.8% never (5.7% female, 2.1% male); 18.2% ≤ once per month (15.7% female, 2.5% male); 49.2% 2-4 times per month (41.4% female, 7.9% male); 22.2% 2-3 times per week (15.3% female, 6.9% male); and 2.5% ≥ 4 times per week (1.1% female, 1.4% male). The number of drinks consumed per typical day when drinking was: 35.6% 0-2 (28.4% female, 7.2% male); 35.2% 3-4 (30.7% female, 4.5% male); 21.4% 5-6 (16.6% female, 4.8% male); 5.8% 7-9 (3.1% female, 2.7% male); and 2.0% ≥ 10 (0.6% female, 1.4% male). |
| Canada | Chow & Kalischuk (2008) | High | 211 | ✓ | ✓ | | ✓ | 59% of respondents were occasional drinkers and 35% never consumed alcohol. The number of drinks consumed per week was: 38% none; 38% ≤2; 19% 2.5-6; and 5% >6. The mean drinks consumed per week was 2. |
| | Clément et al. (2002) | High | 52 | | | | ✓ | The percentage of student nurses reporting moderate alcohol consumption was 80% in 1992, 91% in 1993 and 93% in 1994. |
| Denmark | Friis et al. (2005) | High | 22,715 | ✓ | | ✓ | | Respondents reporting to consume no alcohol was 46.3% among nurse and 63.7% among the female population. The percentage of respondents reporting to consume 1-2 drinks was 32.2% among nurse and 25.0% female population. Those consuming ≥5 was 8.2% among nurse and 3.1% among the female population. |

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| | Mørch et al. (2008) | High | 15,412 | ✓ | | ✓ | | 18% of respondents reported to be non-drinkers and 32% stated they did not consume alcohol during the weekdays. 3% did not consume alcohol last weekend. The mean number of drinks consumed on last weekday was 10.5. The mean number of drinks consumed on the last weekend was 26.8. |
| | Morch et al. (2007) | High | 17,647 | ✓ | | ✓ | | 19% of respondents reported to be non-drinkers, 22% consumed over >14 and 5% >27. 39% of respondents did not consume alcohol on the last weekday and 4% on the last weekend. 10% of respondents were classified as binge drinkers - consumed more than four drinks per weekday or more than ten drinks per weekend. |
| Korea | Park et al. (2015) | High | 160 | ✓ | | | ✓ | 73.8% of respondents reported to consume alcohol. |
| | Kim et al. (2013) | High | 9,989 | ✓ | | ✓ | | 48.5% of respondents reported to be regular drinker. Of those 53.5% were current shift workers and 42.9% were non-current shift worker. |
| Germany | Lehmann et al. (2014) | High | 266 in 2008 and 259 in 2013 | ✓ | ✓ | | ✓ | The percentage of: abstainers was 21.8% in 2008 and 26.6% in 2013; less risk drinkers was 66.5% in 2008 and 52.9% in 2013; and at-risk drinkers was 11.3% in 2008 and 19.7% in 2013. |
| Italy | Buja et al. (2013) | High | 455 | ✓ | ✓ | ✓ | | The percentage of respondents consuming alcohol by shift type was: 63.0% no shift work, 54.3% no night shift work and 65.3% night shift work. The percentage of respondents consuming no alcohol by shift type was: 37.0% no shift work; 44.7% no night shift work and 34.7% night shift. |
| | Quattrin et al. (2010) | High | 149 | ✓ | ✓ | | ✓ | 53.7% of respondents reported to consume alcohol and 46.3% reported not to consume alcohol. Respondents were classified according to amount of alcohol consumed: 24.2% of respondents reported to never have consumed alcohol, 24.2% consumed alcohol at least once. |

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| Japan | Inoue et al. (2004) | High | 568 | ✓ | | ✓ | | The percentage of respondents reporting to be current drinkers were: 64.9% case, 65.8% control, OR 0.96, 95% CI 0.59-1.83, p 0.898. |
| | Tada et al. (2014) | High | 2758 | ✓ | | ✓ | | Respondents reporting to be habitual drinker based on the national health and nutrition survey definitions was 13.7% for day worker and 18.3% for shift worker 18.3%. |
| Taiwan | Yang et al. (2001) | High | 907 | ✓ | | ✓ | | 46.2% of respondents reported to never have consumed alcohol, 40.8% consumed alcohol, 9.2% occasionally consumed alcohol and 3.8% regularly consumed alcohol. |
| Lithuania | Misevičienė et al. (2013) | High | 739 | ✓ | ✓ | ✓ | | 29.4% of respondents reported to consume alcohol >once a month. |
| Iceland | Gunnarsdottir et al. (2006) | High | 394 | ✓ | | ✓ | | 21% of respondents reported to consume alcohol once a week or more. |
| | Sveinsdóttir & Gunnarsdóttir (2008) | High | 394 | ✓ | | ✓ | | Respondents reporting to use alcohol was reported in relation to self-assessed health: 90.8% very good/ good physical health; 80.1% very poor/ poor physical health; 88.9% very good/ good mental health; and 87.3% very poor/ poor mental health. |
| Norway | Stamnes & Mykletun (2000) | High | 1923 | ✓ | ✓ | | ✓ | The percentage of respondents reporting to have tasted alcohol was: all 92.8%; nursing students 91.9%; nursing students for mentally disabled 96.8%; teaching students 93.4%. Of those who had tasted alcohol 94.7% were male and 92.4% female. The average units of alcohol consumed per week was: all 4.8; nursing students 4.1; nursing students for mentally disabled 6.8; and teaching students 5.9. |
| Greece | Evagelou et al. (2014) | High | 435 | ✓ | ✓ | | ✓ | The percentage of respondents who rarely consumed alcohol was 66.1% for females and 43.1% for males. 38.1% of female respondents were consumed alcohol moderately and 56.9% of males. The frequency per week that respondents reported to consume alcohol was: 2.8% 7 |

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| | | | | | | | | days; 1.1% 6 days; 1.8% 5 days; 5.5% 4 days; 9.2% 3 days; 11% 2 days; 22.3% once a week; and 29% rarely. |
| UK, China, USA | Undertaking Nursing Interventions Throught Europe (UNITE) Study Group (2002) | High | 130 | ✓ | ✓ | ✓ | | The mean number of units consumed per week was 9 for females and 14 for males. |
| Poland | Bukowska et al. (2015) | High | 657 nurses and midwives | ✓ | | ✓ | | The mean number of drinks consumed per week among premenopausal women by shift type was: 0.7 (SD 0.9) day shift workers and 0.6 (SD 0.8) rotating night shift workers. Among postmenopausal women was: 0.5 (SD 0.6) for day shift workers and 0.5 (SD 0.5) for rotating night shift workers. |
| Brazil | da Silva Pires et al. (2015) | Middle | 154 | ✓ | ✓ | | ✓ | 57.1% consumed alcohol. 5.8% 1-3 times/week. Of those who consumed alcohol (doses, cups or bottles), 38.6% 1-2, 35.2% 3-4, 20.5% 5-6, and 5.7% 7+. |
| | Fernandes et al. (2013) | Middle | 2,279 | ✓ | ✓ | ✓ | | 61% of females reported to consume alcohol and 72.7% of males. |
| China | An et al. (2014) | Middle | 799 | ✓ | ✓ | ✓ | | 29.3% of respondents reported to consume alcohol (25.7% of non-smokers and of 75.4% smokers). |
| Turkey | Kutlu et al. (2008) | Middle | 835 | ✓ | ✓ | | ✓ | 12.5% of respondents reported to consume alcohol. Of those who consumed alcohol, 38.5% did intermittently, 3.7% occasionally, and 57.8% drank alcohol when they socialised with friends. Of those who consumed alcohol, 31.7% had their first drink before the age of 18 and 26.9% between the age 17-18. |
| Iran | Ahmadi et al. (2004) | Middle | 400 | ✓ | ✓ | | ✓ | 5.8% of respondents reported to consume alcohol (2.6% female, 23.7% male), and 94.3% reported to have never consumed alcohol (97.4% female, 76.3% male). |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Thailand | Klainin-Yobas et al. (2015) | Middle | 335 | ✓ | ✓ | | ✓ | 1.5% reported to consume alcohol. |
| UK, Australia, New Zealand | Sheard et al. (2014) | | 44 | ✓ | ✓ | ✓ | | 90.9% of respondents reported to be current drinkers (89.7% female, 93.3% male) and 2.3% indicated that they had never drunk (3.4% female). The frequency respondents reported to drink was as follows: 9.1% never (10.3% female, 6.7% male); 18.2% 1 day per week (20.7% female, 13.3% male; 15.9% 2 (17.2% female, 13.3% male); 25.0% 3 (20.7% female, 33.3% male); 4.5% 4 (6.9% female, - male); 6.8% 5 (6.9% female, 6.7% male); 6.8% 6 (6.9% female, 6.7% male); and 4.5% every day (3.4% female, 6.7% male). The number of drinks consumed in a session were as follows: 9.1% none (10.3% female, 6.7% male); 38.6% 1 drink (41.4% female, 33.3% male); 25.0% 2 (24.1% female, 26.7% male); 13.6% 3 (6.9% female, 26.7% male); 9.1% 4 (13.8% female, - male); 2.3% 5 (3.4% female, - male); and 2.3% 6 (- female, 6.7% male). 21.9% of respondents reported to consume more than the recommended daily limit of no more than 3 for males and no more than 2 for females (24.1% female, 6.7% male). 15.9% of respondents reported to consume more than the recommended weekly limit of no more than 15 for males and no more than 10 for females (17.1% female, 13.4% male). |
| Not reported | Hensel et al. (2016) | | 123 | ✓ | | | ✓ | The mean number of weekly drinks consumed was 11.0 (SD 13.17). The mean number of alcohol drinks consumed by alcohol type was as follows: 2.3 (SD 4.75) beer, 1.8 (SD 3.85) wine, 7.3 (SD 8.92) hard liquor. |

# Appendix vii Dietary Habits Prevalence

| | | | Participant characteristics | | | | | |
|---|---|---|---|---|---|---|---|---|
| Country | Study | World Bank classification | Sample size | Female | Male | Qualified nurse | Student nurse | Dietary habits |
| Australia | Happell et al. (2014) | High | 52 | ✓ | ✓ | ✓ | | Fruit servings were 37% ≤1, 37% 2, 19% 3, 6% 4, 0 ≥5. Vegetable servings were 12% ≤1, 31% 2, 23% 3, 15% 4, 15% ≥5. |
| | Purcell et al. (2006) | High | 94 | ✓ | ✓ | | ✓ | 34.0% consumed fruit and 54.0% vegetables. |
| Denmark | Sanderson et al. (2005) | High | 4731 | ✓ | | ✓ | | Fruit consumption in 1993 of current smokers were: 32% several times a day; 24% daily; 23% a couple of times a week; 14% less often or never; and 16% no information. |
| | Friis et al. (2005) | High | 22,715 | ✓ | | ✓ | | 3.2% of nurses and 12.1% of the female population reported to consume fruit seldom or never and 71.3% of nurses and 58.7% of the female population reported to consume fruit daily or several times a day. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| England | Malik et al. (2011) | High | 551 qualified nurses and 325 student nurses | ✓ | ✓ | ✓ | ✓ | Respondents reporting to consume foods high in fat and sugar: a few times a week were 55.5% all respondents, 61.3% qualified nurses and 45.5% student nurses; once a day were 33.6% all, 30.7% qualified nurses and 38.7% student nurses; 2-3 times a day were 8.9% all respondents, 5.6% qualified nurses and 14.6% student nurses. Respondents reporting to consume five servings of fruit/vegetables a day: rarely were 13.7% all, 10.3% qualified nurses and 19.4% student nurses; sometimes 51.1% all, 47.7% qualified nurses and 56.9% student nurses; and everyday 33.9% all, 40.3% qualified nurses and 23.1% student nurses. |
| | Blake et al. (2011) | High | 325 | ✓ | ✓ | | ✓ | 46.1% of respondents reported to consume foods high in sugar and fat a few times a week, 39.2% once a week and 14.7% 2-3 times a day. The percentage of respondents reporting to consume five fruit and vegetables daily was 19.5% for rarely, 57.3% sometimes and 23.2% every day. |
| Greece | Evagelou et al. (2014) | High | 435 | ✓ | ✓ | | ✓ | The number of times respondents reported to have consume fruit per week was: 36.1% for 7 times; 1.4% 6; 5% 5; 8.5% 4; 10.8% 3; 12.7% 2; 12.3% once; and 13.2% rarely. The number of times respondents reported to have consume vegetables per week was: 39.2% for 7 times; 2.4% 6; 10.4% 5; 8.3% 4; 16.1% 3; 11.3% 2; 5.4% once; and 4.5% rarely. |
| Italy | Quattrin et al. (2010) | High | 149 | ✓ | ✓ | | ✓ | Respondents reporting to consume the recommended five portions of fruit was: 4.7% never; 28.2% 1-2 days; 25.5% 3-5 days; 41.6% 6-7 days; and 0% non-responders. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Japan | Tada et al. (2014) | High | 2758 | ✓ | ✓ | | The total mean grams of fat consumed was 66.3 (SD 11.1) for all respondents, 66.6 (SD 11.5) for day workers and 66.2 (SD 10.7) for shift workers, p = 0.360. The total mean grams of fruit consumed was 68.7 (SD 63.4) for all respondents, 73.3 (SD 63.9) for day workers and 311.2 (SD 115.5) for shift workers, p = 0.311. The total mean grams of green/yellow vegetables consumed was 67.8 (SD 38.9) for all respondents, 71.4 (SD 39.4) for day workers and 65.2 (SD 38.4) for shift workers, p < 0.001. The total mean grams of white vegetables consumed was 113.4 (SD 62.7) for all respondents, 118.0 (SD 64.1) for day workers and 109.9 (SD 61.4) for shift workers, p < 0.001. |
| Korea | Han et al. (2016) | High | 340 | | ✓ | | 59.1% of respondents reported to eat vegetables with every meal (rotating with night 56.3%, rotating without night 65.7%, fixed no night 67.9%). 57.9% of respondents reported to eat more than one serving of fruit per day (rotating with night 54.4%, rotating without night 77.1%, fixed no night 62.3%). 42.1% of respondents reported eating fatty foods at least once every 3 days (rotating with night 44.0%, rotating without night 31.4%, fixed no night 39.6%). |
| | Park et al. (2015) | High | 160 | ✓ | | ✓ | The mean amount of fat consumed per day was 65.30 (SD 20.30). |
| Spain | Irazusta et al. (2006) | High | 46 | ✓ | | ✓ | The energy ratio fat percentage reported by respondents was 40.3% for all 1st year respondents and 39.3% other students. Among 1st year students the energy fat percentage reported varied by physical activity level: 40.8% sedentary; 40.7% irregularly active; and 40.4% active. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| UK | Blake & Harrison (2013) | High | 540 | ✓ | ✓ | | ✓ | The frequency respondents reported to consume sugary foods was: 28.9% rarely; 47.4% sometimes; and 22.8% every day. The frequency respondents reported to consume foods high in fat was: 18.1% rarely; 58.5% sometimes; and 22.4% every day. The frequency respondents reported to consume five daily portions of fruit and vegetables was: 13.3% rarely; 58.5% sometimes; and 27.4% every day. |
| USA | Fair et al. (2009) | High | 1,345 | ✓ | ✓ | ✓ | | The percentage of respondents reporting to routinely use fat or oils was: butter (28.4% all, 28.3% female, 31.4% male), margarine (35.2% all, 35% female, 41.2% male), olive oil (78.2% all, 78.7% female, 66.7% male), canola oil (45.1% all, 45.7% female, 29.4% male). The number of fruit servings respondents reported to consume was: none (1.6% all, 1.5% female, 3.9% male), 1per day (19.7% all, 19.2% female, 33.3% male), 2 per day (39.9% all, 39.8% female, 41.2% male), 3 per day (24.7% all, 25.2% female, 11.8% male), 4 per day (9.1% all, 9.4% female, 2% male), ≥5 per week (4.7% all, 4.7% female, 7.9%male). The number of vegetable servings respondents reported to consume was: none (0.5% all, 0.5% female, 2% male), 1 per day (12.1% all, 11.8% female, 19.6% male), 2 per day (37.2% all, 37.1% female, 39.2% male), 3 per day (25.9% all, 26% female, 21.6% male), 4 per day (13.5% all, 13.7% female, 7.8% male), ≥5 per week (10.4% all, 10.7% female, 9.9% male). |
| | Sun et al. (2011) | High | 13,894 | ✓ | | ✓ | | The mean number of fruit and vegetable servings consumed per day was 5.1 (SD 1.9) among successful agers and 4.9 (SD 1.9) among usual agers. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Zapka et al. (2009) | High | 194 (baseline) and 287 (part two) | ✓ | ✓ | ✓ | | The mean number of fruit and vegetables consumed per day was 4.0. |
| Brazil | Fernandes et al. (2013) | Middle | 2,279 | ✓ | ✓ | ✓ | | The percentage of respondents reporting adequate consumption of fruit and vegetables was 57.7% for females and 52.5% for males. 42.3% females and 47.5% males reported low consumption. |
| China | Tse & Benzie (2006) | Middle | 274 | ✓ | ✓ | | ✓ | The number of portions of fruit and vegetables consumed daily was: 10% ≥ 5; 26% ≥ 2-5; and 64o < 2 portions. |

# Appendix viii UK Data Service end licence agreement

### 1. End User Licence (EUL) Text

This Agreement is made between you and the University of Essex (also referred to as the "registrar") and the service funders in order to provide you (the "End User") with the right to use the collections provided via the UK Data Service and the UK Data Archive, according to the terms below.

In this agreement:

"Data Team" means in relation to a particular data collection, the registrar, the relevant data service providers, and (to the extent that the Special Conditions and/or metadata specific to a particular data collection expressly provide) the service funders, data collection funders and/or original data creators or depositors.

"data service provider" means the persons or organisations that directly provide you with the data collections (on behalf of the service funder). The data service provider for a particular data collection is identified in the Special Conditions and/or metadata applicable to that data collection;

"service funder" means the persons or organisations that fund the data service provider as defined above. The service funder for a particular data collection is identified in the Special Conditions and/or metadata applicable to that data collection;

"data collection funder" means the persons or organisations that funded the collection and/or creation of the data collections. The data collection funder for a particular data collection is identified in the Special Conditions and/or metadata applicable to that data collection;

"original data creator or depositor" means the persons or organisations that originally collected, created or deposited the materials making up the data collections and/or who own the intellectual property rights in the data collections. The original data creator or depositor for a particular data collection is identified in the Special Conditions and/or metadata applicable to that data collection;

"registrar" means the person or organisation responsible for the system that registers End Users and issues them with End User Licences (being the University of Essex);

"Special Conditions" means any further conditions applicable to the use of one or more data collections by an End User, as notified to the End User in accordance with paragraph 5 of the End User Licence;

"metadata" means any additional or bibliographic information about one or more of the data collections, as notified to the End User from time to time. Metadata may be supplied by electronic means.

I (the "End User") agree to the following conditions of use in consideration of the data collections being made available to me through the various contributions of each member of the Data Team:

1. To use the data collections only in accordance with this End User Licence and to notify promptly the registrar and the data service provider of any breach of its terms in writing or of any infringements of the data collections of which I become aware.
2. To use and to make personal copies of any part of the data collections only for the purposes of not for-profit research or teaching or personal educational development. To obtain permission prior to using part or all of the data collections for commercial purposes by contacting the registrar and/or relevant data service provider, where relevant, in order to obtain an appropriate licence from the rights holder(s) in question or their permitted licensee if one is available.
3. That this Licence does not operate to transfer any interest in intellectual property from the data collection funders, service funder(s), the data service providers, the original data creators, producers, depositors, copyright or other right holders (including without limitation the ONS or the Crown ) to me. That any rights subsisting in materials derived now or in the future from the data collections which are the intellectual property of the Crown are hereby assigned (by way of assignment of present and future intellectual property) to the Crown by this Licence to the extent not already vested in the Crown. To take all steps necessary to give effect to this Clause (including by executing further written documentation).

4. That the Licence and the data collections are provided by the Data Team on an "as is" basis and without warranty or liability of any kind. Any representations or warranties given by any member of the Data Team relating to this licence, expressed or implied, are excluded to the maximum extent permitted by law.
5. To abide by any further conditions notified to me from time to time by the registrar or the relevant data service provider that may apply to the access to, or use of, specific materials within the data collections or particular data collections. Notice of further conditions under this paragraph may be given to me by electronic means, for example, by way of a pop-up window upon my ordering one or more data collections. My acceptance of the further conditions shall be required before I gain access to the data collections in question. In this Agreement such further conditions are referred to as Special Conditions.
6. To give access to the data collections, in whole or in part, or any material derived from the data collections, only to registered End Users with a registered use who have entered into an End User Licence and accepted the relevant Special Conditions, such as a Commercial Licence, necessary to access and use the data collections (with the exception of data collections or material derived from data collections supplied for the stated purpose of teaching and shared under the terms and conditions of the Access Agreement for Teaching or included in publications made for the purposes set out in paragraph 2).

7. To ensure that the means of access to the data (such as passwords) are kept secure and not disclosed to a third party except by special written permission or licence obtained from the original data service provider.
8. To preserve at all times the confidentiality of information pertaining to individuals and/or households in the data collections where the information is not in the public domain. Not to use the data to attempt to obtain or derive information relating specifically to an identifiable individual or household, nor to claim to have obtained or derived such information. In addition, to preserve the confidentiality of information about, or supplied by, organisations recorded in the data collections. This includes the use or attempt to use the data collections to compromise or otherwise infringe the confidentiality of individuals, households or organisations.
9. To acknowledge, in any publication, whether printed, electronic or broadcast, based wholly or in part on the data collections, the original data creators, depositors or copyright holders, the service funders and the data service provider(s) in the form specified on the data distribution notes or in accompanying metadata received with the dataset or notified to me and without prejudice to paragraph 5 above to comply with any restrictions on my use of the data collections referred to or referenced therein or otherwise notified to me from time to time. To cite, in any publication, whether printed, electronic or broadcast, based wholly or in part on the data collections, the data collections used in the form specified on the data distribution notes or in accompanying metadata received with the dataset or notified to me.

10. To supply the relevant data service provider with the bibliographic details of any published work based wholly or in part on the data collections.
11. That the members of the Data Team may hold and process any personal data submitted by me for validation and statistical purposes, and for the purposes of the management of the service or for any other lawful purpose notified to me and to which I have consented under this Agreement in relation to a particular data collection, and they may also pass the information on to other parties such as: (i) depositors and distributors of material contained in or accessed via the data service provider; (ii) copyright and other intellectual property rights owners whose material is held by the data service provider; as well as (iii) each member of the Data Team's organisation and (iv) my own institution or organisation, in compliance with the Data Protection Act 1998.
12. To notify the data service provider of any errors discovered in the data collections.
13. That any personal data submitted by me is accurate to the best of my knowledge, and that any changes in that personal data, including my educational or employment status, will be made known to the registrar at the earliest possible opportunity.
14. To meet any charges that may from time to time be levied by any member of the Data Team for the supply of the data collections including, where relevant, annual service fees and royalty fees.
15. At the conclusion of my research (or if earlier at any time at the request of a member of the Data Team), to offer for deposit in the data collection(s) on a suitable medium and at my own expense any new data collections which have

been derived from the materials supplied or which have been created by the combination of the data supplied with other data. The deposit of the derived data collection(s) will include sufficient explanatory documentation to enable the new data collection(s) to be accessible to others.

16. I understand that breach of any of the provisions of this Agreement will lead to immediate termination of my access to all services provided by the Data Team either permanently or temporarily, at the discretion of a member of the Data Team, and may result in legal action being taken against me. I understand that where there is no breach of this Licence, it may be terminated, or its terms altered, by a member of the Data Team either after 30 days notice; or, if a service charge has been paid in advance, at the end of the period for which payment has been made, whichever is the longer. The failure to exercise or delay in exercising a right or remedy provided by this Agreement or by law does not constitute a waiver of the right or remedy or a waiver of other rights or remedies.

**DISCLAIMERS**

To the extent that applicable law permits:

a. The members of the Data Team bear no legal responsibility for the accuracy or comprehensiveness of the data supplied.
b. The members of the Data Team accept no liability for, and I will not be entitled to claim against them in respect of, any direct, indirect, consequential or incidental damages or losses arising from use of the data collections, or from the unavailability of, or break in access to, the service, for whatever reason.

c. Whilst steps have been taken to ensure all licences, authorisation and permissions required for the granting of this Licence have been obtained, this may not have been possible in all cases, and no warranties or assurance are given in this regard. To the extent that additional licences, authorisations and permissions are required to use the data collections in accordance with this Licence, it is the End User's responsibility to obtain them.

d. I agree to indemnify and shall keep indemnified each member of the Data Team against any costs, actions, claims, demands, liabilities, expenses, damages or losses (including without limitation consequential losses and loss of profit, and all interest, penalties and legal and other professional costs and expenses) arising from or in connection with any third party claim made against any member of the Data Team relating to my use of the data collections or any other activities in relation to the data where such use is in breach of this licence.

If the whole or any part of a provision of this Agreement is void, unenforceable or illegal for any reason, that provision will be severed and the remainder of the provisions of this Agreement will continue in full force and effect as if this Agreement had been executed with the invalid provision eliminated.

This Agreement may be enforced separately in relation to each data collection provided to the End User by any member of the Data Team and the End User. No other persons may enforce this Agreement under the Contract (Rights of Third Parties) Act 1999.

This Agreement (which is the entire agreement between the parties and supersedes any previous agreement between them) may be varied in writing by agreement of the relevant service funders, the registrar, and the End User (who may give its consent to such variations by electronic means). No consent from any other party is required to vary or rescind this Agreement.

This Agreement and any documents to be entered into pursuant to it shall be governed by and construed in accordance with the laws of England and Wales and each Party irrevocably submits to the exclusive jurisdiction of the courts of England and Wales over any claim or matter arising under or in connection with this Agreement and the documents entered into pursuant to it.

## 2. End User Licence (EUL) Summary text

Sixteen points to help you understand the End User Licence (EUL). These pointers are for general guidance and you must read and understand the full EUL before agreeing to it. By accepting the EUL, you agree:

1. to use the data in accordance with the EUL and to notify the UK Data Service of any breach you are aware of
2. not to use the data for commercial purposes without obtaining permission and, where relevant, an appropriate licence if commercial use of the data is required
3. that the EUL does not transfer any interest in intellectual property to you
4. that the EUL and data collections are provided without warranty or liability of any kind

5. to abide by any further conditions notified to you
6. to give access to the data collections only to registered users with a registered use (who have accepted the terms and conditions, including any relevant further conditions). There are some exceptions regarding the use of data collections for teaching and the use of data collections for Commercial purposes set out in an additional Commercial Licence.
7. to ensure that the means of access to the data (such as passwords) are kept secure and not disclosed to anyone else
8. to preserve the confidentiality of, and not attempt to identify, individuals, households or organisations in the data
9. to use the correct methods of citation and acknowledgement in publications
10. to send the UK Data Service bibliographic details of any published work based on our data collections
11. that personal data about you may be held for validation and statistical purposes and to manage the service, and that these data may be passed on to other parties
12. to notify the UK Data Service of any errors discovered in the data collections
13. that personal data submitted by you are accurate to the best of your knowledge and kept up to date by you
14. to meet any charges that may apply
15. to offer for deposit any new data collections which have been derived from the materials supplied
16. that any breach of the EUL will lead to immediate termination of your access to the services and could result in legal action against you.

# Appendix ix Chapter 5 descriptive tables

The descriptive tables from Chapter 5 are presented below:

- Table 5.2 Current Disability by Gender and Age Nested Within Occupation.
- Table 5.3 Current Health Problem Lasting More than One Year by Gender and Age Nested Within Occupation.
- Table 5.4 Health Problem Affects Amount of Work by Gender and Age Nested Within Occupation.
- Table 5.5 Health Problem Affects Kind of Work by Gender and Age Nested Within Occupation.
- Table 5.6 Mean Satisfaction with Life by Gender and Age Nested Within Occupation.

## Table 5.2 Current Disability by Gender and Age Nested Within Occupation.

| | | | | Current disability | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Equality Act Disabled | | Not Equality Act Disabled | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupation | Nursing and Midwifery Professionals | Sex | Male | 7809 | 11.4 | 60711 | 88.6% | 68520 | 100.0% |
| | | | Female | 66249 | 11.1 | 530531 | 88.9% | 596780 | 100.0% |
| | | Age group | 17-29 | 7379 | 7.2 | 94815 | 92.8% | 102194 | 100.0% |
| | | | 30-39 | 12211 | 8.6 | 129386 | 91.4% | 141597 | 100.0% |
| | | | 40-49 | 23066 | 11.6 | 175321 | 88.4% | 198387 | 100.0% |
| | | | 50-59 | 26872 | 14.1 | 163238 | 85.9% | 190110 | 100.0% |
| | | | 60-69 | 4530 | 13.7 | 28482 | 86.3% | 33012 | 100.0% |
| | Health Professionals | Sex | Male | 11307 | 5 | 217014 | 95.0% | 228321 | 100.0% |
| | | | Female | 25165 | 8.7 | 263586 | 91.3% | 288751 | 100.0% |
| | | Age group | 17-29 | 3672 | 4.2 | 82940 | 95.8% | 86612 | 100.0% |
| | | | 30-39 | 6351 | 3.9 | 155775 | 96.1% | 162126 | 100.0% |
| | | | 40-49 | 14254 | 10.5 | 121082 | 89.5% | 135336 | 100.0% |
| | | | 50-59 | 8902 | 9.0 | 90145 | 91.0% | 99047 | 100.0% |
| | | | 60-69 | 3293 | 9.7 | 30658 | 90.3% | 33951 | 100.0% |
| | Therapy Professionals | Sex | Male | 2066 | 9.4 | 20019 | 90.6% | 22085 | 100.0% |
| | | | Female | 12488 | 11.5 | 95983 | 88.5% | 108471 | 100.0% |
| | | Age group | 17-29 | 2560 | 11 | 20758 | 89.0% | 23318 | 100.0% |
| | | | 30-39 | 2517 | 6.8 | 34764 | 93.2% | 37281 | 100.0% |
| | | | 40-49 | 3543 | 11.3 | 27747 | 88.7% | 31290 | 100.0% |
| | | | 50-59 | 3632 | 12.7 | 24889 | 87.3% | 28521 | 100.0% |
| | | | 60-69 | 2302 | 22.7 | 7844 | 77.3% | 10146 | 100.0% |
| | Caring Personal Services | Sex | Male | 33089 | 14.1 | 200882 | 85.9% | 233971 | 100.0% |
| | | | Female | 184034 | 17.4 | 871009 | 82.6% | 1055043 | 100.0% |
| | | Age group | 17-29 | 41325 | 13 | 276243 | 87.0% | 317568 | 100.0% |
| | | | 30-39 | 35274 | 13.5 | 225221 | 86.5% | 260495 | 100.0% |
| | | | 40-49 | 50481 | 16.2 | 260534 | 83.8% | 311015 | 100.0% |
| | | | 50-59 | 69232 | 23.2 | 229155 | 76.8% | 298387 | 100.0% |
| | | | 60-69 | 20811 | 20.5 | 80738 | 79.5% | 101549 | 100.0% |
| | Health and Social Services Managers and Directors | Sex | Male | 3555 | 12.9 | 24087 | 87.1% | 27642 | 100.0% |
| | | | Female | 6618 | 11.7 | 50124 | 88.3% | 56742 | 100.0% |
| | | Age group | 17-29 | | | | | 4118 | 100.0% |
| | | | 30-39 | 1230 | 0.09 | 12383 | 91.0% | 13613 | 100.0% |
| | | | 40-49 | 3307 | 0.119 | 24400 | 88.1% | 27707 | 100.0% |
| | | | 50-59 | 5562 | 0.162 | 28808 | 83.8% | 34370 | 100.0% |
| | | | 60-69 | 74 | 0.016 | 4502 | 98.4% | 4576 | 100.0% |
| | Managers and Proprietors in Health and Care Services | Sex | Male | 2536 | 0.177 | 11790 | 82.3% | 14326 | 100.0% |
| | | | Female | 10842 | 0.159 | 57548 | 84.1% | 68390 | 100.0% |
| | | Age group | 17-29 | 1716 | 0.371 | 2910 | 62.9% | 4626 | 100.0% |
| | | | 30-39 | 818 | 0.07 | 10827 | 93.0% | 11645 | 100.0% |
| | | | 40-49 | 3610 | 0.133 | 23489 | 86.7% | 27099 | 100.0% |
| | | | 50-59 | 4153 | 0.141 | 25275 | 85.9% | 29428 | 100.0% |
| | | | 60-69 | 3081 | 0.311 | 6837 | 68.9% | 9918 | 100.0% |
| | Teaching and Educational Professionals | Sex | Male | 46958 | 0.095 | 448799 | 90.5% | 495757 | 100.0% |
| | | | Female | 116791 | 0.115 | 902473 | 88.5% | 1019264 | 100.0% |
| | | Age group | 17-29 | 20792 | 0.078 | 246306 | 92.2% | 267098 | 100.0% |
| | | | 30-39 | 33388 | 0.087 | 352150 | 91.3% | 385538 | 100.0% |
| | | | 40-49 | 46474 | 0.113 | 365672 | 88.7% | 412146 | 100.0% |
| | | | 50-59 | 46571 | 0.135 | 299469 | 86.5% | 346040 | 100.0% |
| | | | 60-69 | 16524 | 0.159 | 87675 | 84.1% | 104199 | 100.0% |
| | Other Occupations | Sex | Male | 3551032 | 0.177 | 16502638 | 82.3% | 20053670 | 100.0% |
| | | | Female | 4110244 | 0.224 | 14204307 | 77.6% | 18314551 | 100.0% |
| | | Age group | 17-29 | 1255654 | 0.125 | 8827888 | 87.5% | 10083542 | 100.0% |
| | | | 30-39 | 1040352 | 0.141 | 6318727 | 85.9% | 7359079 | 100.0% |
| | | | 40-49 | 1479309 | 0.194 | 6136637 | 80.6% | 7615946 | 100.0% |
| | | | 50-59 | 1906984 | 0.258 | 5494386 | 74.2% | 7401370 | 100.0% |
| | | | 60-69 | 1978977 | 0.335 | 3929307 | 66.5% | 5908284 | 100.0% |

* Cells with a count < 10 have been removed.

## Table 5.3 Current Health Problem Lasting More than One Year by Gender and Age Nested Within Occupation.

| | | | | Any health problems lasting more than one year | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | | No | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupation | Nursing and Midwifery Professionals | Sex | Male | 1696 | 6.1% | 26314 | 93.9% | 28010 | 100.0% |
| | | | Female | 20826 | 8.8% | 215061 | 91.2% | 235887 | 100.0% |
| | | Age group | 17-29 | 1750 | 4.4% | 37969 | 95.6% | 39719 | 100.0% |
| | | | 30-39 | 4614 | 7.9% | 53946 | 92.1% | 58560 | 100.0% |
| | | | 40-49 | 7859 | 10.3% | 68469 | 89.7% | 76328 | 100.0% |
| | | | 50-59 | 6071 | 8.1% | 68545 | 91.9% | 74616 | 100.0% |
| | | | 60-69 | 2228 | 15.2% | 12446 | 84.8% | 14674 | 100.0% |
| | Health Professionals | Sex | Male | 3021 | 4.0% | 72042 | 96.0% | 75063 | 100.0% |
| | | | Female | 4056 | 3.7% | 104809 | 96.3% | 108865 | 100.0% |
| | | Age group | 17-29 | 346 | 1.1% | 30747 | 98.9% | 31093 | 100.0% |
| | | | 30-39 | 1831 | 2.9% | 60316 | 97.1% | 62147 | 100.0% |
| | | | 40-49 | 2050 | 4.7% | 41406 | 95.3% | 43456 | 100.0% |
| | | | 50-59 | 1252 | 3.7% | 32143 | 96.3% | 33395 | 100.0% |
| | | | 60-69 | 1598 | 11.5% | 12239 | 88.5% | 13837 | 100.0% |
| | Therapy Professionals | Sex | Male | 1234 | 14.0% | 7590 | 86.0% | 8824 | 100.0% |
| | | | Female | 3221 | 8.4% | 35169 | 91.6% | 38390 | 100.0% |
| | | Age group | 17-29 | 810 | 7.9% | 9476 | 92.1% | 10286 | 100.0% |
| | | | 30-39 | 1246 | 10.8% | 10321 | 89.2% | 11567 | 100.0% |
| | | | 40-49 | 961 | 7.8% | 11369 | 92.2% | 12330 | 100.0% |
| | | | 50-59 | 1030 | 12.0% | 7536 | 88.0% | 8566 | 100.0% |
| | | | 60-69 | 408 | 9.1% | 4057 | 90.9% | 4465 | 100.0% |
| | Caring Personal Services | Sex | Male | 6995 | 8.6% | 74746 | 91.4% | 81741 | 100.0% |
| | | | Female | 41760 | 9.9% | 380226 | 90.1% | 421986 | 100.0% |
| | | Age group | 17-29 | 6989 | 6.2% | 105024 | 93.8% | 112013 | 100.0% |
| | | | 30-39 | 7714 | 7.4% | 96582 | 92.6% | 104296 | 100.0% |
| | | | 40-49 | 15049 | 12.3% | 106949 | 87.7% | 121998 | 100.0% |
| | | | 50-59 | 11655 | 9.6% | 109565 | 90.4% | 121220 | 100.0% |
| | | | 60-69 | 7348 | 16.6% | 36852 | 83.4% | 44200 | 100.0% |
| | Health and Social Services Managers and Directors | Sex | Male | 867 | 12.5% | 6086 | 87.5% | 6953 | 100.0% |
| | | | Female | 2842 | 12.3% | 20287 | 87.7% | 23129 | 100.0% |
| | | Age group | 17-29 | 523 | 33.6% | 1032 | 66.4% | 1555 | 100.0% |
| | | | 30-39 | 456 | 7.4% | 5716 | 92.6% | 6172 | 100.0% |
| | | | 40-49 | 553 | 6.8% | 7534 | 93.2% | 8087 | 100.0% |
| | | | 50-59 | 2177 | 17.4% | 10327 | 82.6% | 12504 | 100.0% |
| | | | 60-69 | | | | | 1764 | 100.0% |
| | Managers and Proprietors in Health and Care Services | Sex | Male | 452 | 10.7% | 3784 | 89.3% | 4236 | 100.0% |
| | | | Female | 2859 | 11.2% | 22750 | 88.8% | 25609 | 100.0% |
| | | Age group | 17-29 | | | | | 710 | 100.0% |
| | | | 30-39 | 761 | 18.9% | 3276 | 81.1% | 4037 | 100.0% |
| | | | 40-49 | 1070 | 10.6% | 8983 | 89.4% | 10053 | 100.0% |
| | | | 50-59 | 1100 | 9.8% | 10148 | 90.2% | 11248 | 100.0% |
| | | | 60-69 | 380 | 10.0% | 3417 | 90.0% | 3797 | 100.0% |
| | Teaching and Educational Professionals | Sex | Male | 9211 | 5.6% | 156259 | 94.4% | 165470 | 100.0% |
| | | | Female | 32450 | 8.7% | 340662 | 91.3% | 373112 | 100.0% |
| | | Age group | 17-29 | 4222 | 4.6% | 87407 | 95.4% | 91629 | 100.0% |
| | | | 30-39 | 10535 | 7.3% | 134430 | 92.7% | 144965 | 100.0% |
| | | | 40-49 | 11302 | 8.3% | 125071 | 91.7% | 136373 | 100.0% |
| | | | 50-59 | 10456 | 8.7% | 109862 | 91.3% | 120318 | 100.0% |
| | | | 60-69 | 5146 | 11.4% | 40151 | 88.6% | 45297 | 100.0% |
| | Other Occupations | Sex | Male | 625376 | 9.2% | 6176124 | 90.8% | 6801500 | 100.0% |
| | | | Female | 740189 | 10.2% | 6488070 | 89.8% | 7228259 | 100.0% |
| | | Age group | 17-29 | 202757 | 7.2% | 2629531 | 92.8% | 2832288 | 100.0% |
| | | | 30-39 | 192491 | 7.3% | 2461955 | 92.7% | 2654446 | 100.0% |
| | | | 40-49 | 236205 | 8.8% | 2452411 | 91.2% | 2688616 | 100.0% |
| | | | 50-59 | 288803 | 11.0% | 2333672 | 89.0% | 2622475 | 100.0% |
| | | | 60-69 | 445309 | 13.8% | 2786625 | 86.2% | 3231934 | 100.0% |

* Cells with a count < 10 have been removal.

## Table 5.4 Health Problem Affects Amount of Work by Gender and Age Nested Within Occupation.

| | | | | Whether health problems affect amount of work | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | | No | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupation | Nursing and Midwifery Professionals | Sex | Male | 3930 | 19.1% | 16670 | 80.9% | 20600 | 100.0% |
| | | | Female | 38103 | 25.4% | 111619 | 74.6% | 149722 | 100.0% |
| | | Age group | 17-29 | 2830 | 15.8% | 15043 | 84.2% | 17873 | 100.0% |
| | | | 30-39 | 6602 | 24.8% | 19991 | 75.2% | 26593 | 100.0% |
| | | | 40-49 | 13190 | 26.3% | 37028 | 73.7% | 50218 | 100.0% |
| | | | 50-59 | 16894 | 26.3% | 47226 | 73.7% | 64120 | 100.0% |
| | | | 60-69 | 2517 | 21.9% | 9001 | 78.1% | 11518 | 100.0% |
| | Health Professionals | Sex | Male | 6620 | 13.2% | 43577 | 86.8% | 50197 | 100.0% |
| | | | Female | 15033 | 24.3% | 46749 | 75.7% | 61782 | 100.0% |
| | | Age group | 17-29 | 2210 | 15.5% | 12064 | 84.5% | 14274 | 100.0% |
| | | | 30-39 | 4782 | 20.2% | 18863 | 79.8% | 23645 | 100.0% |
| | | | 40-49 | 6741 | 19.8% | 27269 | 80.2% | 34010 | 100.0% |
| | | | 50-59 | 4984 | 16.8% | 24680 | 83.2% | 29664 | 100.0% |
| | | | 60-69 | 2936 | 28.3% | 7450 | 71.7% | 10386 | 100.0% |
| | Therapy Professionals | Sex | Male | 1146 | 20.1% | 4544 | 79.9% | 5690 | 100.0% |
| | | | Female | 6318 | 22.8% | 21368 | 77.2% | 27686 | 100.0% |
| | | Age group | 17-29 | 1447 | 26.3% | 4051 | 73.7% | 5498 | 100.0% |
| | | | 30-39 | 125 | 2.5% | 4851 | 97.5% | 4976 | 100.0% |
| | | | 40-49 | 2229 | 26.7% | 6106 | 73.3% | 8335 | 100.0% |
| | | | 50-59 | 2197 | 22.1% | 7743 | 77.9% | 9940 | 100.0% |
| | | | 60-69 | 1466 | 31.7% | 3161 | 68.3% | 4627 | 100.0% |
| | Caring Personal Services | Sex | Male | 17435 | 24.6% | 53374 | 75.4% | 70809 | 100.0% |
| | | | Female | 112290 | 33.9% | 218651 | 66.1% | 330941 | 100.0% |
| | | Age group | 17-29 | 20207 | 30.2% | 46656 | 69.8% | 66863 | 100.0% |
| | | | 30-39 | 17587 | 27.0% | 47475 | 73.0% | 65062 | 100.0% |
| | | | 40-49 | 34872 | 34.5% | 66258 | 65.5% | 101130 | 100.0% |
| | | | 50-59 | 44562 | 36.0% | 79074 | 64.0% | 123636 | 100.0% |
| | | | 60-69 | 12497 | 27.7% | 32562 | 72.3% | 45059 | 100.0% |
| | Health and Social Services Managers and Directors | Sex | Male | 748 | 8.0% | 8584 | 92.0% | 9332 | 100.0% |
| | | | Female | 2446 | 14.6% | 14262 | 85.4% | 16708 | 100.0% |
| | | Age group | 17-29 | | | | | 856 | 100.0% |
| | | | 30-39 | 118 | 5.5% | 2023 | 94.5% | 2141 | 100.0% |
| | | | 40-49 | 1834 | 25.8% | 5270 | 74.2% | 7104 | 100.0% |
| | | | 50-59 | 1242 | 8.7% | 13064 | 91.3% | 14306 | 100.0% |
| | | | 60-69 | | | | | 1633 | 100.0% |
| | Managers and Proprietors in Health and Care Services | Sex | Male | 874 | 17.6% | 4093 | 82.4% | 4967 | 100.0% |
| | | | Female | 6822 | 29.2% | 16518 | 70.8% | 23340 | 100.0% |
| | | Age group | 17-29 | 377 | 15.7% | 2019 | 84.3% | 2396 | 100.0% |
| | | | 30-39 | 753 | 31.1% | 1671 | 68.9% | 2424 | 100.0% |
| | | | 40-49 | 2242 | 28.6% | 5603 | 71.4% | 7845 | 100.0% |
| | | | 50-59 | 2289 | 20.8% | 8709 | 79.2% | 10998 | 100.0% |
| | | | 60-69 | 2035 | 43.8% | 2609 | 56.2% | 4644 | 100.0% |
| | Teaching and Educational Professionals | Sex | Male | 24787 | 20.8% | 94181 | 79.2% | 118968 | 100.0% |
| | | | Female | 62422 | 25.3% | 183900 | 74.7% | 246322 | 100.0% |
| | | Age group | 17-29 | 10976 | 24.7% | 33382 | 75.3% | 44358 | 100.0% |
| | | | 30-39 | 16947 | 24.2% | 52976 | 75.8% | 69923 | 100.0% |
| | | | 40-49 | 23978 | 24.4% | 74242 | 75.6% | 98220 | 100.0% |
| | | | 50-59 | 25186 | 22.9% | 85005 | 77.1% | 110191 | 100.0% |
| | | | 60-69 | 10122 | 23.8% | 32476 | 76.2% | 42598 | 100.0% |
| | Other Occupations | Sex | Male | 2418144 | 43.4% | 3150043 | 56.6% | 5568187 | 100.0% |
| | | | Female | 2793166 | 49.9% | 2801614 | 50.1% | 5594780 | 100.0% |
| | | Age group | 17-29 | 858892 | 43.3% | 1123311 | 56.7% | 1982203 | 100.0% |
| | | | 30-39 | 745403 | 44.8% | 918635 | 55.2% | 1664038 | 100.0% |
| | | | 40-49 | 1110993 | 47.0% | 1254063 | 53.0% | 2365056 | 100.0% |
| | | | 50-59 | 1498764 | 48.6% | 1582982 | 51.4% | 3081746 | 100.0% |
| | | | 60-69 | 997258 | 48.2% | 1072666 | 51.8% | 2069924 | 100.0% |

* Cells with a count < 10 have been removed.

## Table 5.5 Health Problem Affects Kind of Work by Gender and Age Nested Within Occupation.

| | | | | Whether health problems affect kind of work | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | | No | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupation | Nursing and Midwifery Professionals | Sex | Male | 4444 | 21.6% | 16156 | 78.4% | 20600 | 100.0% |
| | | | Female | 41518 | 27.8% | 108000 | 72.2% | 149518 | 100.0% |
| | | Age group | 17-29 | 4375 | 24.6% | 13383 | 75.4% | 17758 | 100.0% |
| | | | 30-39 | 8610 | 32.4% | 17983 | 67.6% | 26593 | 100.0% |
| | | | 40-49 | 13475 | 26.8% | 36743 | 73.2% | 50218 | 100.0% |
| | | | 50-59 | 17348 | 27.1% | 46683 | 72.9% | 64031 | 100.0% |
| | | | 60-69 | 2154 | 18.7% | 9364 | 81.3% | 11518 | 100.0% |
| | Health Professionals | Sex | Male | 7276 | 14.5% | 42921 | 85.5% | 50197 | 100.0% |
| | | | Female | 16116 | 26.0% | 45790 | 74.0% | 61906 | 100.0% |
| | | Age group | 17-29 | 3651 | 25.6% | 10623 | 74.4% | 14274 | 100.0% |
| | | | 30-39 | 4884 | 20.7% | 18761 | 79.3% | 23645 | 100.0% |
| | | | 40-49 | 7252 | 21.2% | 26934 | 78.8% | 34186 | 100.0% |
| | | | 50-59 | 4577 | 15.5% | 25035 | 84.5% | 29612 | 100.0% |
| | | | 60-69 | 3028 | 29.2% | 7358 | 70.8% | 10386 | 100.0% |
| | Therapy Professionals | Sex | Male | 1252 | 22.0% | 4438 | 78.0% | 5690 | 100.0% |
| | | | Female | 7826 | 28.4% | 19775 | 71.6% | 27601 | 100.0% |
| | | Age group | 17-29 | 1593 | 29.0% | 3905 | 71.0% | 5498 | 100.0% |
| | | | 30-39 | 605 | 12.2% | 4371 | 87.8% | 4976 | 100.0% |
| | | | 40-49 | 2594 | 31.1% | 5741 | 68.9% | 8335 | 100.0% |
| | | | 50-59 | 3489 | 35.4% | 6366 | 64.6% | 9855 | 100.0% |
| | | | 60-69 | 797 | 17.2% | 3830 | 82.8% | 4627 | 100.0% |
| | Caring Personal Services | Sex | Male | 25652 | 36.2% | 45219 | 63.8% | 70871 | 100.0% |
| | | | Female | 118823 | 35.8% | 212794 | 64.2% | 331617 | 100.0% |
| | | Age group | 17-29 | 22594 | 33.6% | 44713 | 66.4% | 67307 | 100.0% |
| | | | 30-39 | 22475 | 34.5% | 42587 | 65.5% | 65062 | 100.0% |
| | | | 40-49 | 39292 | 38.9% | 61838 | 61.1% | 101130 | 100.0% |
| | | | 50-59 | 46475 | 37.5% | 77393 | 62.5% | 123868 | 100.0% |
| | | | 60-69 | 13639 | 30.2% | 31482 | 69.8% | 45121 | 100.0% |
| | Health and Social Services Managers and Directors | Sex | Male | 1512 | 16.2% | 7820 | 83.8% | 9332 | 100.0% |
| | | | Female | 4554 | 27.3% | 12154 | 72.7% | 16708 | 100.0% |
| | | Age group | 17-29 | | | | | 856 | 100.0% |
| | | | 30-39 | 118 | 5.5% | 2023 | 94.5% | 2141 | 100.0% |
| | | | 40-49 | 2795 | 39.3% | 4309 | 60.7% | 7104 | 100.0% |
| | | | 50-59 | 2810 | 19.6% | 11496 | 80.4% | 14306 | 100.0% |
| | | | 60-69 | 343 | 21.0% | 1290 | 79.0% | 1633 | 100.0% |
| | Managers and Proprietors in Health and Care Services | Sex | Male | 874 | 17.6% | 4093 | 82.4% | 4967 | 100.0% |
| | | | Female | 6494 | 27.7% | 16947 | 72.3% | 23441 | 100.0% |
| | | Age group | 17-29 | 377 | 15.7% | 2019 | 84.3% | 2396 | 100.0% |
| | | | 30-39 | 818 | 33.7% | 1606 | 66.3% | 2424 | 100.0% |
| | | | 40-49 | 2294 | 29.2% | 5551 | 70.8% | 7845 | 100.0% |
| | | | 50-59 | 2239 | 20.2% | 8860 | 79.8% | 11099 | 100.0% |
| | | | 60-69 | 1640 | 35.3% | 3004 | 64.7% | 4644 | 100.0% |
| | Teaching and Educational Professionals | Sex | Male | 33905 | 28.5% | 84999 | 71.5% | 118904 | 100.0% |
| | | | Female | 70429 | 28.6% | 175753 | 71.4% | 246182 | 100.0% |
| | | Age group | 17-29 | 11920 | 26.9% | 32438 | 73.1% | 44358 | 100.0% |
| | | | 30-39 | 21901 | 31.2% | 48195 | 68.8% | 70096 | 100.0% |
| | | | 40-49 | 28666 | 29.3% | 69323 | 70.7% | 97989 | 100.0% |
| | | | 50-59 | 31052 | 28.2% | 79107 | 71.8% | 110159 | 100.0% |
| | | | 60-69 | 10795 | 25.4% | 31689 | 74.6% | 42484 | 100.0% |
| | Other Occupations | Sex | Male | 2779089 | 49.8% | 2800692 | 50.2% | 5579781 | 100.0% |
| | | | Female | 2983105 | 53.2% | 2622117 | 46.8% | 5605222 | 100.0% |
| | | Age group | 17-29 | 999178 | 50.2% | 990180 | 49.8% | 1989358 | 100.0% |
| | | | 30-39 | 837092 | 50.2% | 829299 | 49.8% | 1666391 | 100.0% |
| | | | 40-49 | 1232816 | 52.1% | 1135205 | 47.9% | 2368021 | 100.0% |
| | | | 50-59 | 1634352 | 52.9% | 1455106 | 47.1% | 3089458 | 100.0% |
| | | | 60-69 | 1058756 | 51.1% | 1013019 | 48.9% | 2071775 | 100.0% |

* Cells with a count < 10 have been removed.

## Table 5.6 Mean Satisfaction with Life by Gender and Age Nested Within Occupation.

| | | Occupation | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Nursing and Midwifery Professionals | | | | Health Professionals | | | | Therapy Professionals | | | | Caring Personal Services | | | |
| | | Min | Max | Mean | SD | Min | Max | Mean | SD | Min | Max | Mean | SD | Min | Max | Mean | SD |
| Sex | Male | 2 | 10 | 7.80 | 1.45 | 0 | 10 | 7.96 | 1.33 | 6 | 10 | 7.86 | 1.02 | 0 | 10 | 7.48 | 1.81 |
| | Female | 0 | 10 | 7.89 | 1.45 | 0 | 10 | 7.91 | 1.38 | 3 | 10 | 8.06 | 1.25 | 0 | 10 | 7.54 | 1.75 |
| Age group | 17-29 | 3 | 10 | 8.18 | 1.39 | 5 | 10 | 8.14 | 1.09 | 4 | 10 | 8.22 | 1.34 | 0 | 10 | 7.64 | 1.68 |
| | 30-39 | 4 | 10 | 8.01 | 1.23 | 0 | 10 | 7.96 | 1.31 | 3 | 10 | 8.14 | 1.10 | 0 | 10 | 7.56 | 1.65 |
| | 40-49 | 1 | 10 | 7.85 | 1.42 | 0 | 10 | 7.76 | 1.54 | 3 | 10 | 7.89 | 1.28 | 0 | 10 | 7.39 | 1.75 |
| | 50-59 | 0 | 10 | 7.71 | 1.61 | 2 | 10 | 7.92 | 1.43 | 5 | 10 | 7.87 | 1.23 | 0 | 10 | 7.47 | 1.90 |
| | 60-69 | 0 | 10 | 7.80 | 1.57 | 4 | 10 | 7.96 | 1.10 | 6 | 10 | 8.09 | 1.01 | 0 | 10 | 7.79 | 1.73 |
| | Total | 0 | 10 | 7.88 | 1.45 | 0 | 10 | 7.93 | 1.36 | 3 | 10 | 8.03 | 1.22 | 0 | 10 | 7.53 | 1.76 |

| | | Occupation | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Health and Social Services Managers and Directors | | | | Managers and Proprietors in Health and Care Services | | | | Teaching and Educational Professionals | | | | Other Occupations | | | |
| | | Min | Max | Mean | SD | Min | Max | Mean | SD | Min | Max | Mean | SD | Min | Max | Mean | SD |
| Sex | Male | 5 | 10 | 7.71 | 1.09 | 3 | 10 | 7.67 | 1.84 | 2 | 10 | 7.78 | 1.31 | 0 | 10 | 7.55 | 1.74 |
| | Female | 4 | 10 | 7.87 | 1.43 | 0 | 10 | 7.81 | 1.65 | 0 | 10 | 7.91 | 1.37 | 0 | 10 | 7.60 | 1.82 |
| Age group | 17-29 | 7 | 10 | 8.60 | 1.26 | 7 | 10 | 8.06 | 1.03 | 3 | 10 | 8.13 | 1.16 | 0 | 10 | 7.69 | 1.60 |
| | 30-39 | 5 | 10 | 8.00 | 1.03 | 4 | 10 | 7.90 | 1.58 | 1 | 10 | 7.94 | 1.29 | 0 | 10 | 7.61 | 1.66 |
| | 40-49 | 4 | 10 | 7.64 | 1.42 | 3 | 10 | 7.75 | 1.66 | 1 | 10 | 7.75 | 1.37 | 0 | 10 | 7.42 | 1.80 |
| | 50-59 | 4 | 10 | 7.72 | 1.32 | 0 | 10 | 7.79 | 1.91 | 2 | 10 | 7.72 | 1.47 | 0 | 10 | 7.37 | 1.94 |
| | 60-69 | 6 | 10 | 8.60 | 1.28 | 5 | 10 | 7.69 | 1.25 | 0 | 10 | 8.07 | 1.37 | 0 | 10 | 7.79 | 1.80 |
| | Total | 4 | 10 | 7.83 | 1.34 | 0 | 10 | 7.79 | 1.68 | 0 | 10 | 7.87 | 1.35 | 0 | 10 | 7.57 | 1.78 |

# Appendix x Chapter 6 descriptive tables

The descriptive tables from Chapter 6 are presented below:

- Table 6.2 Back or Neck Problems by Gender and Age Group Nested Within Occupation.
- Table 6.3 Heart, Blood Pressure or Circulation Problems by Gender and Age Group Nested Within Occupation.
- Table 6.4 Diabetes by Gender and Age Nested Within Occupation.
- Table 6.5 Depression, Bad Nerves or Anxiety Problems by Gender and Age Group Nested Within Occupation.
- Table 6.6 Progressive Illness by Gender and Age Group Nested Within Occupation.
- Table 6.7 Number of Health Problems by Gender and Age Group Nested Within Occupation.

## Table 6.2 Back or Neck Problems by Gender and Age Group Nested Within Occupation.

| | | | | Back or neck Problem | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | No Problem | | Problem | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupation | Nursing and midwifery professionals | Gender | Male | 65269 | 94.6% | 3757 | 5.4% | 69026 | 100.0% |
| | | | Female | 602050 | 94.8% | 32905 | 5.2% | 634955 | 100.0% |
| | | Age | 17-29 | 114537 | 98.4% | 1828 | 1.6% | 116365 | 100.0% |
| | | | 30-39 | 142326 | 96.6% | 4979 | 3.4% | 147305 | 100.0% |
| | | | 40-49 | 186247 | 94.6% | 10582 | 5.4% | 196829 | 100.0% |
| | | | 50-59 | 190195 | 91.9% | 16656 | 8.1% | 206851 | 100.0% |
| | | | 60-69 | 34014 | 92.9% | 2617 | 7.1% | 36631 | 100.0% |
| | Health professionals | Gender | Male | 250987 | 98.9% | 2853 | 1.1% | 253840 | 100.0% |
| | | | Female | 268223 | 95.5% | 12655 | 4.5% | 280878 | 100.0% |
| | | Age | 17-29 | 91037 | 99.2% | 748 | 0.8% | 91785 | 100.0% |
| | | | 30-39 | 162318 | 97.8% | 3612 | 2.2% | 165930 | 100.0% |
| | | | 40-49 | 144815 | 96.1% | 5916 | 3.9% | 150731 | 100.0% |
| | | | 50-59 | 88195 | 97.2% | 2530 | 2.8% | 90725 | 100.0% |
| | | | 60-69 | 32845 | 92.4% | 2702 | 7.6% | 35547 | 100.0% |
| | Therapy professionals | Gender | Male | 22963 | 92.3% | 1926 | 7.7% | 24889 | 100.0% |
| | | | Female | 87777 | 92.9% | 6727 | 7.1% | 94504 | 100.0% |
| | | Age | 17-29 | | | | | | 100.0% |
| | | | 30-39 | 37126 | 97.9% | 814 | 2.1% | 37940 | 100.0% |
| | | | 40-49 | 27173 | 90.7% | 2794 | 9.3% | 29967 | 100.0% |
| | | | 50-59 | 17379 | 83.5% | 3443 | 16.5% | 20822 | 100.0% |
| | | | 60-69 | 6858 | 81.1% | 1602 | 18.9% | 8460 | 100.0% |
| | Caring personal services | Gender | Male | 235499 | 96.4% | 8860 | 3.6% | 244359 | 100.0% |
| | | | Female | 970048 | 92.9% | 73577 | 7.1% | 1043625 | 100.0% |
| | | Age | 17-29 | 298316 | 97.6% | 7426 | 2.4% | 305742 | 100.0% |
| | | | 30-39 | 261111 | 96.9% | 8410 | 3.1% | 269521 | 100.0% |
| | | | 40-49 | 269978 | 92.2% | 22978 | 7.8% | 292956 | 100.0% |
| | | | 50-59 | 274743 | 90.2% | 30012 | 9.8% | 304755 | 100.0% |
| | | | 60-69 | 101399 | 88.2% | 13611 | 11.8% | 115010 | 100.0% |
| | Health and social service managers and directors | Gender | Male | 24242 | 91.9% | 2126 | 8.1% | 26368 | 100.0% |
| | | | Female | 52703 | 92.9% | 4021 | 7.1% | 56724 | 100.0% |
| | | Age | 17-29 | | | | | 1887 | 100.0% |
| | | | 30-39 | | | | | 14013 | 100.0% |
| | | | 40-49 | 20060 | 87.4% | 2892 | 12.6% | 22952 | 100.0% |
| | | | 50-59 | 36591 | 93.3% | 2645 | 6.7% | 39236 | 100.0% |
| | | | 60-69 | 4394 | 87.8% | 610 | 12.2% | 5004 | 100.0% |
| | Managers and proprietors in health and care services | Gender | Male | 9418 | 92.9% | 716 | 7.1% | 10134 | 100.0% |
| | | | Female | 65153 | 92.8% | 5085 | 7.2% | 70238 | 100.0% |
| | | Age | 17-29 | 836 | 53.0% | 742 | 47.0% | 1578 | 100.0% |
| | | | 30-39 | | | | | 14540 | 100.0% |
| | | | 40-49 | 24480 | 95.1% | 1259 | 4.9% | 25739 | 100.0% |
| | | | 50-59 | 23938 | 89.6% | 2781 | 10.4% | 26719 | 100.0% |
| | | | 60-69 | 10777 | 91.4% | 1019 | 8.6% | 11796 | 100.0% |
| | Teaching and educational professionals | Gender | Male | 487673 | 97.1% | 14428 | 2.9% | 502101 | 100.0% |
| | | | Female | 1045233 | 95.9% | 44838 | 4.1% | 1090071 | 100.0% |
| | | Age | 17-29 | 256287 | 99.7% | 788 | .3% | 257075 | 100.0% |
| | | | 30-39 | 395835 | 97.9% | 8477 | 2.1% | 404312 | 100.0% |
| | | | 40-49 | 410632 | 94.5% | 23971 | 5.5% | 434603 | 100.0% |
| | | | 50-59 | 355661 | 95.5% | 16900 | 4.5% | 372561 | 100.0% |
| | | | 60-69 | 114491 | 92.6% | 9130 | 7.4% | 123621 | 100.0% |
| | Other occupations | Gender | Male | 19180726 | 93.2% | 1409872 | 6.8% | 20590598 | 100.0% |
| | | | Female | 16972299 | 90.0% | 1881033 | 10.0% | 18853332 | 100.0% |
| | | Age | 17-29 | 9895412 | 97.4% | 268900 | 2.6% | 10164312 | 100.0% |
| | | | 30-39 | 7067268 | 95.3% | 346371 | 4.7% | 7413639 | 100.0% |
| | | | 40-49 | 6981705 | 91.8% | 622685 | 8.2% | 7604390 | 100.0% |
| | | | 50-59 | 6544651 | 87.2% | 960616 | 12.8% | 7505267 | 100.0% |
| | | | 60-69 | 5663989 | 83.8% | 1092333 | 16.2% | 6756322 | 100.0% |

* Cells with count < 5 were removed.

## Table 6.3 Heart, Blood Pressure or Circulation Problems by Gender and Age Group Nested Within Occupation.

| | | | | Heart, blood pressure or circulation problems | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | No Problem | | Problem | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupation | Nursing and midwifery professionals | Gender | Male | 62385 | 90.4% | 6641 | 9.6% | 69026 | 100.0% |
| | | | Female | 593798 | 93.5% | 41157 | 6.5% | 634955 | 100.0% |
| | | Age | 17-29 | 112898 | 97.0% | 3467 | 3.0% | 116365 | 100.0% |
| | | | 30-39 | 142481 | 96.7% | 4824 | 3.3% | 147305 | 100.0% |
| | | | 40-49 | 184885 | 93.9% | 11944 | 6.1% | 196829 | 100.0% |
| | | | 50-59 | 185642 | 89.7% | 21209 | 10.3% | 206851 | 100.0% |
| | | | 60-69 | 30277 | 82.7% | 6354 | 17.3% | 36631 | 100.0% |
| | Health professionals | Gender | Male | 239817 | 94.5% | 14023 | 5.5% | 253840 | 100.0% |
| | | | Female | 270365 | 96.3% | 10513 | 3.7% | 280878 | 100.0% |
| | | Age | 17-29 | 89539 | 97.6% | 2246 | 2.4% | 91785 | 100.0% |
| | | | 30-39 | 163728 | 98.7% | 2202 | 1.3% | 165930 | 100.0% |
| | | | 40-49 | 142632 | 94.6% | 8099 | 5.4% | 150731 | 100.0% |
| | | | 50-59 | 82877 | 91.3% | 7848 | 8.7% | 90725 | 100.0% |
| | | | 60-69 | 31406 | 88.4% | 4141 | 11.6% | 35547 | 100.0% |
| | Therapy professionals | Gender | Male | 23836 | 95.8% | 1053 | 4.2% | 24889 | 100.0% |
| | | | Female | 90838 | 96.1% | 3666 | 3.9% | 94504 | 100.0% |
| | | Age | 17-29 | | | | | 22204 | 100.0% |
| | | | 30-39 | | | | | 37940 | 100.0% |
| | | | 40-49 | 28575 | 95.4% | 1392 | 4.6% | 29967 | 100.0% |
| | | | 50-59 | 19063 | 91.6% | 1759 | 8.4% | 20822 | 100.0% |
| | | | 60-69 | 6892 | 81.5% | 1568 | 18.5% | 8460 | 100.0% |
| | Caring personal services | Gender | Male | 221783 | 90.8% | 22576 | 9.2% | 244359 | 100.0% |
| | | | Female | 975495 | 93.5% | 68130 | 6.5% | 1043625 | 100.0% |
| | | Age | 17-29 | 302098 | 98.8% | 3644 | 1.2% | 305742 | 100.0% |
| | | | 30-39 | 262376 | 97.3% | 7145 | 2.7% | 269521 | 100.0% |
| | | | 40-49 | 270096 | 92.2% | 22860 | 7.8% | 292956 | 100.0% |
| | | | 50-59 | 267727 | 87.8% | 37028 | 12.2% | 304755 | 100.0% |
| | | | 60-69 | 94981 | 82.6% | 20029 | 17.4% | 115010 | 100.0% |
| | Health and social service managers and directors | Gender | Male | 23911 | 90.7% | 2457 | 9.3% | 26368 | 100.0% |
| | | | Female | 51916 | 91.5% | 4808 | 8.5% | 56724 | 100.0% |
| | | Age | 17-29 | | | | | 1887 | 100.0% |
| | | | 30-39 | | | | | 14013 | 100.0% |
| | | | 40-49 | 22306 | 97.2% | 646 | 2.8% | 22952 | 100.0% |
| | | | 50-59 | 33781 | 86.1% | 5455 | 13.9% | 39236 | 100.0% |
| | | | 60-69 | 3840 | 76.7% | 1164 | 23.3% | 5004 | 100.0% |
| | Managers and proprietors in health and care services | Gender | Male | 9664 | 95.4% | 470 | 4.6% | 10134 | 100.0% |
| | | | Female | 64979 | 92.5% | 5259 | 7.5% | 70238 | 100.0% |
| | | Age | 17-29 | | | | | 1578 | 100.0% |
| | | | 30-39 | | | | | 14540 | 100.0% |
| | | | 40-49 | 22908 | 89.0% | 2831 | 11.0% | 25739 | 100.0% |
| | | | 50-59 | 24830 | 92.9% | 1889 | 7.1% | 26719 | 100.0% |
| | | | 60-69 | 10787 | 91.4% | 1009 | 8.6% | 11796 | 100.0% |
| | Teaching and educational professionals | Gender | Male | 471374 | 93.9% | 30727 | 6.1% | 502101 | 100.0% |
| | | | Female | 1045410 | 95.9% | 44661 | 4.1% | 1090071 | 100.0% |
| | | Age | 17-29 | 255500 | 99.4% | 1575 | .6% | 257075 | 100.0% |
| | | | 30-39 | 398308 | 98.5% | 6004 | 1.5% | 404312 | 100.0% |
| | | | 40-49 | 419043 | 96.4% | 15560 | 3.6% | 434603 | 100.0% |
| | | | 50-59 | 333549 | 89.5% | 39012 | 10.5% | 372561 | 100.0% |
| | | | 60-69 | 110384 | 89.3% | 13237 | 10.7% | 123621 | 100.0% |
| | Other occupations | Gender | Male | 18636898 | 90.5% | 1953700 | 9.5% | 20590598 | 100.0% |
| | | | Female | 17281808 | 91.7% | 1571524 | 8.3% | 18853332 | 100.0% |
| | | Age | 17-29 | 10023492 | 98.6% | 140820 | 1.4% | 10164312 | 100.0% |
| | | | 30-39 | 7227528 | 97.5% | 186111 | 2.5% | 7413639 | 100.0% |
| | | | 40-49 | 7130365 | 93.8% | 474025 | 6.2% | 7604390 | 100.0% |
| | | | 50-59 | 6455525 | 86.0% | 1049742 | 14.0% | 7505267 | 100.0% |
| | | | 60-69 | 5081796 | 75.2% | 1674526 | 24.8% | 6756322 | 100.0% |

* Cells with count < 5 were removed.

## Table 6.4 Diabetes by Gender and Age Nested Within Occupation.

| | | | | Diabetes | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | No Problem | | Problem | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupation | Nursing and midwifery professionals | Gender | Male | 67152 | 97.3% | 1874 | 2.7% | 69026 | 100.0% |
| | | | Female | 614938 | 96.8% | 20017 | 3.2% | 634955 | 100.0% |
| | | Age | 17-29 | 113687 | 97.7% | 2678 | 2.3% | 116365 | 100.0% |
| | | | 30-39 | 144690 | 98.2% | 2615 | 1.8% | 147305 | 100.0% |
| | | | 40-49 | 192796 | 98.0% | 4033 | 2.0% | 196829 | 100.0% |
| | | | 50-59 | 197252 | 95.4% | 9599 | 4.6% | 206851 | 100.0% |
| | | | 60-69 | 33665 | 91.9% | 2966 | 8.1% | 36631 | 100.0% |
| | Health professionals | Gender | Male | 245951 | 96.9% | 7889 | 3.1% | 253840 | 100.0% |
| | | | Female | 280257 | 99.8% | 621 | 0.2% | 280878 | 100.0% |
| | | Age | 17-29 | 90882 | 99.0% | 903 | 1.0% | 91785 | 100.0% |
| | | | 30-39 | 165334 | 99.6% | 596 | 0.4% | 165930 | 100.0% |
| | | | 40-49 | 147925 | 98.1% | 2806 | 1.9% | 150731 | 100.0% |
| | | | 50-59 | 87845 | 96.8% | 2880 | 3.2% | 90725 | 100.0% |
| | | | 60-69 | 34222 | 96.3% | 1325 | 3.7% | 35547 | 100.0% |
| | Caring personal services | Gender | Male | 231684 | 94.8% | 12675 | 5.2% | 244359 | 100.0% |
| | | | Female | 1009845 | 96.8% | 33780 | 3.2% | 1043625 | 100.0% |
| | | Age | 17-29 | 303049 | 99.1% | 2693 | .9% | 305742 | 100.0% |
| | | | 30-39 | 265353 | 98.5% | 4168 | 1.5% | 269521 | 100.0% |
| | | | 40-49 | 283550 | 96.8% | 9406 | 3.2% | 292956 | 100.0% |
| | | | 50-59 | 283897 | 93.2% | 20858 | 6.8% | 304755 | 100.0% |
| | | | 60-69 | 105680 | 91.9% | 9330 | 8.1% | 115010 | 100.0% |
| | Teaching and educational professionals | Gender | Male | 482020 | 96.0% | 20081 | 4.0% | 502101 | 100.0% |
| | | | Female | 1077810 | 98.9% | 12261 | 1.1% | 1090071 | 100.0% |
| | | Age | 17-29 | 253424 | 98.6% | 3651 | 1.4% | 257075 | 100.0% |
| | | | 30-39 | 402516 | 99.6% | 1796 | 0.4% | 404312 | 100.0% |
| | | | 40-49 | 427289 | 98.3% | 7314 | 1.7% | 434603 | 100.0% |
| | | | 50-59 | 358826 | 96.3% | 13735 | 3.7% | 372561 | 100.0% |
| | | | 60-69 | 117775 | 95.3% | 5846 | 4.7% | 123621 | 100.0% |
| | Other occupations | Gender | Male | 19704667 | 95.7% | 885931 | 4.3% | 20590598 | 100.0% |
| | | | Female | 18261309 | 96.9% | 592023 | 3.1% | 18853332 | 100.0% |
| | | Age | 17-29 | 10112043 | 99.5% | 52269 | 0.5% | 10164312 | 100.0% |
| | | | 30-39 | 7334726 | 98.9% | 78913 | 1.1% | 7413639 | 100.0% |
| | | | 40-49 | 7376381 | 97.0% | 228009 | 3.0% | 7604390 | 100.0% |
| | | | 50-59 | 7028574 | 93.6% | 476693 | 6.4% | 7505267 | 100.0% |
| | | | 60-69 | 6114252 | 90.5% | 642070 | 9.5% | 6756322 | 100.0% |

## Table 6.5 Depression, Bad Nerves or Anxiety Problems by Gender and Age Group Nested Within Occupation.

| | | | | Depression, bad nerves or anxiety | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | No Problem | | Problem | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupation | Health professionals | Gender | Male | 251727 | 99.2% | 2113 | .8% | 253840 | 100.0% |
| | | | Female | 275694 | 98.2% | 5184 | 1.8% | 280878 | 100.0% |
| | | Age | 17-29 | | | | | 91785 | 100.0% |
| | | | 30-39 | 165294 | 99.6% | 636 | 0.4% | 165930 | 100.0% |
| | | | 40-49 | 147338 | 97.7% | 3393 | 2.3% | 150731 | 100.0% |
| | | | 50-59 | 88126 | 97.1% | 2599 | 2.9% | 90725 | 100.0% |
| | | | 60-69 | 34878 | 98.1% | 669 | 1.9% | 35547 | 100.0% |
| | Therapy professionals | Gender | Male | | | | | 24889 | 100.0% |
| | | | Female | 92163 | 97.5% | 2341 | 2.5% | 94504 | 100.0% |
| | | Age | 17-29 | | | | | 22204 | 100.0% |
| | | | 30-39 | | | | | 37940 | 100.0% |
| | | | 40-49 | 28141 | 93.9% | 1826 | 6.1% | 29967 | 100.0% |
| | | | 50-59 | | | | | 20822 | 100.0% |
| | | | 60-69 | 7945 | 93.9% | 515 | 6.1% | 8460 | 100.0% |
| | Nursing and midwifery professionals | Gender | Male | 67128 | 97.3% | 1898 | 2.7% | 69026 | 100.0% |
| | | | Female | 610691 | 96.2% | 24264 | 3.8% | 634955 | 100.0% |
| | | Age | 17-29 | 112452 | 96.6% | 3913 | 3.4% | 116365 | 100.0% |
| | | | 30-39 | 142622 | 96.8% | 4683 | 3.2% | 147305 | 100.0% |
| | | | 40-49 | 186638 | 94.8% | 10191 | 5.2% | 196829 | 100.0% |
| | | | 50-59 | 199894 | 96.6% | 6957 | 3.4% | 206851 | 100.0% |
| | | | 60-69 | 36213 | 98.9% | 418 | 1.1% | 36631 | 100.0% |
| | Caring personal services | Gender | Male | 232821 | 95.3% | 11538 | 4.7% | 244359 | 100.0% |
| | | | Female | 963401 | 92.3% | 80224 | 7.7% | 1043625 | 100.0% |
| | | Age | 17-29 | 280848 | 91.9% | 24894 | 8.1% | 305742 | 100.0% |
| | | | 30-39 | 249442 | 92.6% | 20079 | 7.4% | 269521 | 100.0% |
| | | | 40-49 | 267175 | 91.2% | 25781 | 8.8% | 292956 | 100.0% |
| | | | 50-59 | 286047 | 93.9% | 18708 | 6.1% | 304755 | 100.0% |
| | | | 60-69 | 112710 | 98.0% | 2300 | 2.0% | 115010 | 100.0% |
| | Health and social service managers and directors | Gender | Male | 24841 | 94.2% | 1527 | 5.8% | 26368 | 100.0% |
| | | | Female | 54410 | 95.9% | 2314 | 4.1% | 56724 | 100.0% |
| | | Age | 17-29 | | | | | 1887 | 100.0% |
| | | | 30-39 | | | | | 14013 | 100.0% |
| | | | 40-49 | 21837 | 95.1% | 1115 | 4.9% | 22952 | 100.0% |
| | | | 50-59 | 36510 | 93.1% | 2726 | 6.9% | 39236 | 100.0% |
| | | | 60-69 | | | | | 5004 | 100.0% |
| | Managers and proprietors in health and care services | Gender | Male | 8926 | 88.1% | 1208 | 11.9% | 10134 | 100.0% |
| | | | Female | 68269 | 97.2% | 1969 | 2.8% | 70238 | 100.0% |
| | | Age | 17-29 | | | | | 1578 | 100.0% |
| | | | 30-39 | 13328 | 91.7% | 1212 | 8.3% | 14540 | 100.0% |
| | | | 40-49 | 24928 | 96.8% | 811 | 3.2% | 25739 | 100.0% |
| | | | 50-59 | 26152 | 97.9% | 567 | 2.1% | 26719 | 100.0% |
| | | | 60-69 | 11209 | 95.0% | 587 | 5.0% | 11796 | 100.0% |
| | Teaching and educational professionals | Gender | Male | 488163 | 97.2% | 13938 | 2.8% | 502101 | 100.0% |
| | | | Female | 1040219 | 95.4% | 49852 | 4.6% | 1090071 | 100.0% |
| | | Age | 17-29 | 247243 | 96.2% | 9832 | 3.8% | 257075 | 100.0% |
| | | | 30-39 | 384764 | 95.2% | 19548 | 4.8% | 404312 | 100.0% |
| | | | 40-49 | 415323 | 95.6% | 19280 | 4.4% | 434603 | 100.0% |
| | | | 50-59 | 359087 | 96.4% | 13474 | 3.6% | 372561 | 100.0% |
| | | | 60-69 | 121965 | 98.7% | 1656 | 1.3% | 123621 | 100.0% |
| | Other occupations | Gender | Male | 19464897 | 94.5% | 1125701 | 5.5% | 20590598 | 100.0% |
| | | | Female | 17129975 | 90.9% | 1723357 | 9.1% | 18853332 | 100.0% |
| | | Age | 17-29 | 9586373 | 94.3% | 577939 | 5.7% | 10164312 | 100.0% |
| | | | 30-39 | 6953636 | 93.8% | 460003 | 6.2% | 7413639 | 100.0% |
| | | | 40-49 | 6998157 | 92.0% | 606233 | 8.0% | 7604390 | 100.0% |
| | | | 50-59 | 6794570 | 90.5% | 710697 | 9.5% | 7505267 | 100.0% |
| | | | 60-69 | 6262136 | 92.7% | 494186 | 7.3% | 6756322 | 100.0% |

## Table 6.6 Progressive Illness by Gender and Age Group Nested Within Occupation.

| | | | | Progressive illness | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | No Problem | | Problem | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupation | Health professionals | Gender | Male | 252203 | 99.4% | 1637 | .6% | 253840 | 100.0% |
| | | | Female | 278443 | 99.1% | 2435 | 0.9% | 280878 | 100.0% |
| | | Age | 17-29 | | | | | 91785 | 100.0% |
| | | | 30-39 | 165324 | 99.6% | 606 | 0.4% | 165930 | 100.0% |
| | | | 40-49 | 148535 | 98.5% | 2196 | 1.5% | 150731 | 100.0% |
| | | | 50-59 | 89455 | 98.6% | 1270 | 1.4% | 90725 | 100.0% |
| | | | 60-69 | | | | | 35547 | 100.0% |
| | Nursing and midwifery professionals | Gender | Male | | | | | 69026 | 100.0% |
| | | | Female | 628249 | 98.9% | 6706 | 1.1% | 634955 | 100.0% |
| | | Age | 17-29 | 115248 | 99.0% | 1117 | 1.0% | 116365 | 100.0% |
| | | | 30-39 | | | | | 147305 | 100.0% |
| | | | 40-49 | 195636 | 99.4% | 1193 | 0.6% | 196829 | 100.0% |
| | | | 50-59 | 203125 | 98.2% | 3726 | 1.8% | 206851 | 100.0% |
| | | | 60-69 | 35961 | 98.2% | 670 | 1.8% | 36631 | 100.0% |
| | Caring personal services | Gender | Male | 243001 | 99.4% | 1358 | 0.6% | 244359 | 100.0% |
| | | | Female | 1030075 | 98.7% | 13550 | 1.3% | 1043625 | 100.0% |
| | | Age | 17-29 | 304896 | 99.7% | 846 | .3% | 305742 | 100.0% |
| | | | 30-39 | 269003 | 99.8% | 518 | 0.2% | 269521 | 100.0% |
| | | | 40-49 | 290840 | 99.3% | 2116 | 0.7% | 292956 | 100.0% |
| | | | 50-59 | 296768 | 97.4% | 7987 | 2.6% | 304755 | 100.0% |
| | | | 60-69 | 111569 | 97.0% | 3441 | 3.0% | 115010 | 100.0% |
| | Teaching and educational professionals | Gender | Male | 496227 | 98.8% | 5874 | 1.2% | 502101 | 100.0% |
| | | | Female | 1073098 | 98.4% | 16973 | 1.6% | 1090071 | 100.0% |
| | | Age | 17-29 | 255699 | 99.5% | 1376 | .5% | 257075 | 100.0% |
| | | | 30-39 | 401263 | 99.2% | 3049 | 0.8% | 404312 | 100.0% |
| | | | 40-49 | 426616 | 98.2% | 7987 | 1.8% | 434603 | 100.0% |
| | | | 50-59 | 365455 | 98.1% | 7106 | 1.9% | 372561 | 100.0% |
| | | | 60-69 | 120292 | 97.3% | 3329 | 2.7% | 123621 | 100.0% |
| | Other occupations | Gender | Male | 20243285 | 98.3% | 347313 | 1.7% | 20590598 | 100.0% |
| | | | Female | 18414675 | 97.7% | 438657 | 2.3% | 18853332 | 100.0% |
| | | Age | 17-29 | 10099355 | 99.4% | 64957 | 0.6% | 10164312 | 100.0% |
| | | | 30-39 | 7343277 | 99.1% | 70362 | 0.9% | 7413639 | 100.0% |
| | | | 40-49 | 7470333 | 98.2% | 134057 | 1.8% | 7604390 | 100.0% |
| | | | 50-59 | 7290543 | 97.1% | 214724 | 2.9% | 7505267 | 100.0% |
| | | | 60-69 | 6454452 | 95.5% | 301870 | 4.5% | 6756322 | 100.0% |

## Table 6.7 Number of Health Problems by Gender and Age Group Nested Within Occupation.

| | | | | Other health problems or disabilities | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | One problem | | Two or more problems | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupation | Health professionals | Gender | Male | 25823 | 95.0% | 1346 | 5.0% | 27169 | 100.0% |
| | | | Female | 21856 | 82.1% | 4776 | 17.9% | 26632 | 100.0% |
| | | Age | 17-29 | | | | | 3897 | 100.0% |
| | | | 30-39 | 6440 | 91.4% | 606 | 8.6% | 7046 | 100.0% |
| | | | 40-49 | 19644 | 93.4% | 1383 | 6.6% | 21027 | 100.0% |
| | | | 50-59 | 11971 | 82.3% | 2578 | 17.7% | 14549 | 100.0% |
| | | | 60-69 | 5727 | 78.6% | 1555 | 21.4% | 7282 | 100.0% |
| | Nursing and midwifery professionals | Gender | Male | 7230 | 74.3% | 2505 | 25.7% | 9735 | 100.0% |
| | | | Female | 81175 | 80.1% | 20142 | 19.9% | 101317 | 100.0% |
| | | Age | 17-29 | 5983 | 71.4% | 2393 | 28.6% | 8376 | 100.0% |
| | | | 30-39 | 14403 | 91.4% | 1349 | 8.6% | 15752 | 100.0% |
| | | | 40-49 | 22284 | 75.7% | 7145 | 24.3% | 29429 | 100.0% |
| | | | 50-59 | 40582 | 83.8% | 7824 | 16.2% | 48406 | 100.0% |
| | | | 60-69 | 5153 | 56.7% | 3936 | 43.3% | 9089 | 100.0% |
| | Caring personal services | Gender | Male | 36979 | 80.4% | 9013 | 19.6% | 45992 | 100.0% |
| | | | Female | 153538 | 74.0% | 53898 | 26.0% | 207436 | 100.0% |
| | | Age | 17-29 | 30795 | 87.6% | 4354 | 12.4% | 35149 | 100.0% |
| | | | 30-39 | 28154 | 82.9% | 5822 | 17.1% | 33976 | 100.0% |
| | | | 40-49 | 38210 | 64.5% | 20987 | 35.5% | 59197 | 100.0% |
| | | | 50-59 | 66160 | 75.2% | 21858 | 24.8% | 88018 | 100.0% |
| | | | 60-69 | 27198 | 73.3% | 9890 | 26.7% | 37088 | 100.0% |
| | Teaching and educational professionals | Gender | Male | 55836 | 79.7% | 14255 | 20.3% | 70091 | 100.0% |
| | | | Female | 109179 | 79.9% | 27551 | 20.1% | 136730 | 100.0% |
| | | Age | 17-29 | | | | | 17222 | 100.0% |
| | | | 30-39 | 27523 | 83.7% | 5351 | 16.3% | 32874 | 100.0% |
| | | | 40-49 | 44977 | 77.2% | 13289 | 22.8% | 58266 | 100.0% |
| | | | 50-59 | 55284 | 76.3% | 17166 | 23.7% | 72450 | 100.0% |
| | | | 60-69 | 20009 | 76.9% | 6000 | 23.1% | 26009 | 100.0% |
| | Other occupations | Gender | Male | 2813089 | 69.3% | 1245594 | 30.7% | 4058683 | 100.0% |
| | | | Female | 2844922 | 66.8% | 1413525 | 33.2% | 4258447 | 100.0% |
| | | Age | 17-29 | 774072 | 83.8% | 149241 | 16.2% | 923313 | 100.0% |
| | | | 30-39 | 710406 | 78.9% | 190374 | 21.1% | 900780 | 100.0% |
| | | | 40-49 | 1038104 | 70.3% | 438250 | 29.7% | 1476354 | 100.0% |
| | | | 50-59 | 1424854 | 63.2% | 828491 | 36.8% | 2253345 | 100.0% |
| | | | 60-69 | 1710575 | 61.9% | 1052763 | 38.1% | 2763338 | 100.0% |

# Appendix xi Chapter 7 descriptive tables

The descriptive tables from Chapter 7 are presented below:

- Table 7.2 Self-Assessed Health by Gender and Age Group Nested Within Occupation.
- Table 7.3 Long-Term Illness by Gender and Age Group Nested Within Occupation.
- Table 7.4 Limiting Long-Term Illness by Gender and Age Group Nested Within Occupation.
- Table 7.5 Tobacco Smoking by Gender and Age Group Nested Within Occupation.
- Table 7.6 Physical Activity by Gender and Age Group Nested Within Occupation.
- Table 7.7 Sedentary Time by Gender and Age Group Nested Within Occupation.
- Table 7.8 Alcohol Consumption by Gender and Age Group Nested Within Occupation.
- Table 7.9 Sugar Consumption by Gender and Age Group Nested Within Occupation.

## Table 7.2 Self-Assessed Health by Gender and Age Group Nested Within Occupation.

| | | | | Self-assessed health | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Good | | Poor | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupational groups | Nurses | Sex | Male | | | | | 19 | 100.0% |
| | | | Female | 223 | 82.6% | 47 | 17.4% | 270 | 100.0% |
| | | Age_grouped | <29 | | | | | 20 | 100.0% |
| | | | 30-39 | | | | | 54 | 100.0% |
| | | | 40-49 | 85 | 83.5% | 17 | 16.5% | 102 | 100.0% |
| | | | 50-59 | 57 | 77.2% | 17 | 22.8% | 74 | 100.0% |
| | | | 60-69 | 27 | 69.6% | 12 | 30.4% | 38 | 100.0% |
| | Other health professionals | Sex | Male | 56 | 85.1% | 10 | 14.9% | 66 | 100.0% |
| | | | Female | | | | | 143 | 100.0% |
| | | Age_grouped | <29 | | | | | 35 | 100.0% |
| | | | 30-39 | | | | | 65 | 100.0% |
| | | | 40-49 | | | | | 48 | 100.0% |
| | | | 50-59 | | | | | 35 | 100.0% |
| | | | 60-69 | | | | | 26 | 100.0% |
| | Care workers | Sex | Male | 66 | 67.2% | 32 | 32.8% | 98 | 100.0% |
| | | | Female | 357 | 74.7% | 121 | 25.3% | 478 | 100.0% |
| | | Age_grouped | <29 | 97 | 85.5% | 16 | 14.5% | 114 | 100.0% |
| | | | 30-39 | 70 | 79.7% | 18 | 20.3% | 88 | 100.0% |
| | | | 40-49 | 85 | 67.7% | 41 | 32.3% | 126 | 100.0% |
| | | | 50-59 | 91 | 66.5% | 46 | 33.5% | 137 | 100.0% |
| | | | 60-69 | 78 | 71.0% | 32 | 29.0% | 110 | 100.0% |
| | Teachers | Sex | Male | | | | | 117 | 100.0% |
| | | | Female | 244 | 90.5% | 26 | 9.5% | 270 | 100.0% |
| | | Age_grouped | <29 | | | | | 45 | 100.0% |
| | | | 30-39 | | | | | 82 | 100.0% |
| | | | 40-49 | | | | | 82 | 100.0% |
| | | | 50-59 | | | | | 84 | 100.0% |
| | | | 60-69 | 81 | 85.6% | 14 | 14.4% | 95 | 100.0% |
| | Other occupations | Sex | Male | 4172 | 77.5% | 1212 | 22.5% | 5384 | 100.0% |
| | | | Female | 3617 | 75.7% | 1162 | 24.3% | 4779 | 100.0% |
| | | Age_grouped | <29 | 2009 | 87.6% | 285 | 12.4% | 2293 | 100.0% |
| | | | 30-39 | 1523 | 83.2% | 308 | 16.8% | 1830 | 100.0% |
| | | | 40-49 | 1668 | 77.3% | 490 | 22.7% | 2158 | 100.0% |
| | | | 50-59 | 1455 | 69.3% | 646 | 30.7% | 2101 | 100.0% |
| | | | 60-69 | 1135 | 63.7% | 646 | 36.3% | 1781 | 100.0% |

* Cells with a count < 10 have been suppressed or where cells <10 can be calculated.

## Table 7.3 Long-Term Illness by Gender and Age Group Nested Within Occupation.

| | | | | Long term illness | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | No condition | | Has condition | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupational groups | Nurses | Sex | Male | | | | | 19 | 100.0% |
| | | | Female | 160 | 59.5% | 109 | 40.5% | 270 | 100.0% |
| | | Age_grouped | <29 | | | | | 20 | 100.0% |
| | | | 30-39 | 39 | 72.4% | 15 | 27.6% | 54 | 100.0% |
| | | | 40-49 | 67 | 65.3% | 35 | 34.7% | 102 | 100.0% |
| | | | 50-59 | 35 | 47.5% | 39 | 52.5% | 74 | 100.0% |
| | | | 60-69 | 15 | 38.3% | 24 | 61.7% | 38 | 100.0% |
| | Other health professionals | Sex | Male | 52 | 79.1% | 14 | 20.9% | 66 | 100.0% |
| | | | Female | 99 | 69.4% | 44 | 30.6% | 143 | 100.0% |
| | | Age_grouped | <29 | | | | | 35 | 100.0% |
| | | | 30-39 | 54 | 82.9% | 11 | 17.1% | 65 | 100.0% |
| | | | 40-49 | 38 | 79.0% | 10 | 21.0% | 48 | 100.0% |
| | | | 50-59 | 19 | 54.6% | 16 | 45.4% | 35 | 100.0% |
| | | | 60-69 | 10 | 38.0% | 16 | 62.0% | 26 | 100.0% |
| | Care workers | Sex | Male | 54 | 54.9% | 44 | 45.1% | 98 | 100.0% |
| | | | Female | 248 | 52.0% | 229 | 48.0% | 478 | 100.0% |
| | | Age_grouped | <29 | 77 | 67.6% | 37 | 32.4% | 114 | 100.0% |
| | | | 30-39 | 56 | 63.6% | 32 | 36.4% | 88 | 100.0% |
| | | | 40-49 | 65 | 51.7% | 61 | 48.3% | 126 | 100.0% |
| | | | 50-59 | 59 | 43.2% | 78 | 56.8% | 137 | 100.0% |
| | | | 60-69 | 45 | 40.5% | 66 | 59.5% | 110 | 100.0% |
| | Teachers | Sex | Male | 71 | 60.4% | 46 | 39.6% | 117 | 100.0% |
| | | | Female | 154 | 57.0% | 116 | 43.0% | 270 | 100.0% |
| | | Age_grouped | <29 | 24 | 53.6% | 21 | 46.4% | 45 | 100.0% |
| | | | 30-39 | 59 | 72.4% | 23 | 27.6% | 82 | 100.0% |
| | | | 40-49 | 54 | 65.9% | 28 | 34.1% | 82 | 100.0% |
| | | | 50-59 | 55 | 65.7% | 29 | 34.3% | 84 | 100.0% |
| | | | 60-69 | 32 | 34.1% | 62 | 65.9% | 95 | 100.0% |
| | Other occupations | Sex | Male | 3257 | 60.5% | 2125 | 39.5% | 5382 | 100.0% |
| | | | Female | 2753 | 57.6% | 2023 | 42.4% | 4776 | 100.0% |
| | | Age_grouped | <29 | 1762 | 76.8% | 532 | 23.2% | 2293 | 100.0% |
| | | | 30-39 | 1272 | 69.5% | 557 | 30.5% | 1829 | 100.0% |
| | | | 40-49 | 1340 | 62.1% | 817 | 37.9% | 2157 | 100.0% |
| | | | 50-59 | 1020 | 48.6% | 1078 | 51.4% | 2098 | 100.0% |
| | | | 60-69 | 616 | 34.6% | 1165 | 65.4% | 1781 | 100.0% |

* Cells with a count < 10 have been suppressed or where cells <10 can be calculated.

## Table 7.4 Limiting Long-Term Illness by Gender and Age Group Nested Within Occupation.

| | | | | Limiting longstanding illness | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Limiting Longterm Illness | | Non limiting longterm illness | | No longterm illness | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupational groups | Nurses | Sex | Male | | | | | 12 | 62.5% | 19 | 100.0% |
| | | | Female | 74 | 27.3% | 36 | 13.2% | 160 | 59.5% | 270 | 100.0% |
| | | Age_grouped | <29 | | | | | 17 | 81.6% | 20 | 100.0% |
| | | | 30-39 | | | | | 39 | 72.4% | 54 | 100.0% |
| | | | 40-49 | 24 | 23.6% | 11 | 11.0% | 67 | 65.3% | 102 | 100.0% |
| | | | 50-59 | 26 | 35.3% | 13 | 17.2% | 35 | 47.5% | 74 | 100.0% |
| | | | 60-69 | 19 | 48.7% | | | | | 38 | 100.0% |
| | Other health professionals | Sex | Male | | | | | 52 | 79.1% | 66 | 100.0% |
| | | | Female | 17 | 11.8% | 27 | 18.8% | 99 | 69.4% | 143 | 100.0% |
| | | Age_grouped | <29 | | | | | 31 | 88.1% | 35 | 100.0% |
| | | | 30-39 | | | | | 54 | 82.9% | 65 | 100.0% |
| | | | 40-49 | | | | | 38 | 79.0% | 48 | 100.0% |
| | | | 50-59 | | | | | 19 | 54.6% | 35 | 100.0% |
| | | | 60-69 | | | | | 10 | 38.0% | 26 | 100.0% |
| | Care workers | Sex | Male | 33 | 34.2% | 11 | 10.9% | 54 | 54.9% | 98 | 100.0% |
| | | | Female | 160 | 33.5% | 69 | 14.5% | 248 | 52.0% | 478 | 100.0% |
| | | Age_grouped | <29 | 24 | 21.1% | 13 | 11.3% | 77 | 67.6% | 114 | 100.0% |
| | | | 30-39 | | | | | 56 | 63.6% | 88 | 100.0% |
| | | | 40-49 | 42 | 33.6% | 19 | 14.7% | 65 | 51.7% | 126 | 100.0% |
| | | | 50-59 | 53 | 38.9% | 25 | 17.9% | 59 | 43.2% | 137 | 100.0% |
| | | | 60-69 | 46 | 42.0% | 19 | 17.6% | 45 | 40.5% | 110 | 100.0% |
| | Teachers | Sex | Male | 18 | 15.7% | 28 | 23.9% | 71 | 60.4% | 117 | 100.0% |
| | | | Female | 65 | 24.2% | 51 | 18.8% | 154 | 57.0% | 270 | 100.0% |
| | | Age_grouped | <29 | | | | | 24 | 53.6% | 45 | 100.0% |
| | | | 30-39 | 13 | 15.8% | 10 | 11.8% | 59 | 72.4% | 82 | 100.0% |
| | | | 40-49 | 10 | 12.1% | 18 | 22.0% | 54 | 65.9% | 82 | 100.0% |
| | | | 50-59 | 16 | 19.7% | 12 | 14.6% | 55 | 65.7% | 84 | 100.0% |
| | | | 60-69 | 38 | 40.2% | 24 | 25.7% | 32 | 34.1% | 95 | 100.0% |
| | Other occupations | Sex | Male | 1365 | 25.4% | 760 | 14.1% | 3257 | 60.5% | 5382 | 100.0% |
| | | | Female | 1379 | 28.9% | 644 | 13.5% | 2753 | 57.6% | 4776 | 100.0% |
| | | Age_grouped | <29 | 311 | 13.6% | 220 | 9.6% | 1762 | 76.8% | 2293 | 100.0% |
| | | | 30-39 | 348 | 19.0% | 209 | 11.4% | 1272 | 69.5% | 1829 | 100.0% |
| | | | 40-49 | 545 | 25.2% | 272 | 12.6% | 1340 | 62.1% | 2157 | 100.0% |
| | | | 50-59 | 733 | 35.0% | 344 | 16.4% | 1020 | 48.6% | 2098 | 100.0% |
| | | | 60-69 | 807 | 45.3% | 358 | 20.1% | 616 | 34.6% | 1781 | 100.0% |

* Cells with a count < 10 have been suppressed or where cells <10 can be calculated.

## Table 7.5 Tobacco Smoking by Gender and Age Group Nested Within Occupation.

| | | | | Smoke cigarettes nowadays | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Yes | | No | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupational groups | Nurses | Sex | Male | | | | | 10 | 100.0% |
| | | | Female | 33 | 22.5% | 115 | 77.5% | 148 | 100.0% |
| | | Age_grouped | <29 | | | | | 7 | 100.0% |
| | | | 30-39 | | | | | 28 | 100.0% |
| | | | 40-49 | 15 | 24.5% | 46 | 75.5% | 61 | 100.0% |
| | | | 50-59 | | | | | 40 | 100.0% |
| | | | 60-69 | | | | | 24 | 100.0% |
| | Other health professionals | Sex | Male | | | | | 33 | 100.0% |
| | | | Female | | | | | 47 | 100.0% |
| | | Age_grouped | <29 | | | | | 10 | 100.0% |
| | | | 30-39 | | | | | 27 | 100.0% |
| | | | 40-49 | | | | | 13 | 100.0% |
| | | | 50-59 | | | | | 16 | 100.0% |
| | | | 60-69 | | | | | 14 | 100.0% |
| | Care workers | Sex | Male | 29 | 47.0% | 32 | 53.0% | 61 | 100.0% |
| | | | Female | 151 | 47.8% | 165 | 52.2% | 315 | 100.0% |
| | | Age_grouped | <29 | 28 | 40.2% | 41 | 59.8% | 69 | 100.0% |
| | | | 30-39 | 39 | 61.1% | 25 | 38.9% | 64 | 100.0% |
| | | | 40-49 | 44 | 49.8% | 45 | 50.2% | 89 | 100.0% |
| | | | 50-59 | 41 | 49.3% | 42 | 50.7% | 84 | 100.0% |
| | | | 60-69 | 27 | 38.1% | 43 | 61.9% | 70 | 100.0% |
| | Teachers | Sex | Male | | | | | 45 | 100.0% |
| | | | Female | 20 | 18.3% | 89 | 81.7% | 109 | 100.0% |
| | | Age_grouped | <29 | | | | | 16 | 100.0% |
| | | | 30-39 | | | | | 36 | 100.0% |
| | | | 40-49 | | | | | 33 | 100.0% |
| | | | 50-59 | | | | | 29 | 100.0% |
| | | | 60-69 | 10 | 24.4% | 31 | 75.6% | 40 | 100.0% |
| | Other occupations | Sex | Male | 1423 | 42.9% | 1891 | 57.1% | 3314 | 100.0% |
| | | | Female | 1149 | 42.8% | 1533 | 57.2% | 2682 | 100.0% |
| | | Age_grouped | <29 | 621 | 51.4% | 588 | 48.6% | 1209 | 100.0% |
| | | | 30-39 | 463 | 43.1% | 611 | 56.9% | 1075 | 100.0% |
| | | | 40-49 | 587 | 46.2% | 685 | 53.8% | 1272 | 100.0% |
| | | | 50-59 | 532 | 42.3% | 727 | 57.7% | 1259 | 100.0% |
| | | | 60-69 | 368 | 31.2% | 813 | 68.8% | 1181 | 100.0% |

* Cells with a count < 10 have been suppressed or where cells <10 can be calculated.

# Table 7.6 Physical Activity by Gender and Age Group Nested Within Occupation.

| | | | | Physical activity level | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | None | | < twice a week | | 3-4 times a week | | ≥5 times a week | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupational groups | Nurses | Sex | Male | | | | | | | | | 19 | 100.0% |
| | | | Female | 25 | 9.2% | 84 | 31.1% | 23 | 8.4% | 138 | 51.3% | 270 | 100.0% |
| | | Age_grouped | <29 | | | | | | | 13 | 65.2% | 20 | 100.0% |
| | | | 30-39 | | | | | | | 37 | 67.4% | 54 | 100.0% |
| | | | 40-49 | | | 34 | 33.1% | | | 52 | 51.2% | 102 | 100.0% |
| | | | 50-59 | | | 33 | 45.1% | | | 24 | 32.0% | 74 | 100.0% |
| | | | 60-69 | | | 13 | 32.7% | | | 17 | 44.7% | 38 | 100.0% |
| | Other health professionals | Sex | Male | | | 23 | 36.4% | | | 24 | 37.5% | 65 | 100.0% |
| | | | Female | 10 | 7.1% | 49 | 34.2% | 18 | 12.7% | 66 | 46.0% | 143 | 100.0% |
| | | Age_grouped | <29 | | | 11 | 31.2% | | | 16 | 46.5% | 35 | 100.0% |
| | | | 30-39 | | | 21 | 31.6% | | | 24 | 36.5% | 65 | 100.0% |
| | | | 40-49 | | | 16 | 34.4% | | | 25 | 53.8% | 46 | 100.0% |
| | | | 50-59 | | | 14 | 39.9% | | | 17 | 47.1% | 35 | 100.0% |
| | | | 60-69 | | | 11 | 42.1% | | | | | 26 | 100.0% |
| | Care workers | Sex | Male | 11 | 11.6% | 28 | 28.4% | | | 53 | 54.1% | 98 | 100.0% |
| | | | Female | 70 | 14.6% | 132 | 27.7% | 59 | 12.4% | 216 | 45.2% | 478 | 100.0% |
| | | Age_grouped | <29 | | | 22 | 19.3% | | | 64 | 56.7% | 114 | 100.0% |
| | | | 30-39 | | | 17 | 19.4% | | | 54 | 60.8% | 88 | 100.0% |
| | | | 40-49 | | | 48 | 38.2% | | | 53 | 42.1% | 126 | 100.0% |
| | | | 50-59 | 24 | 17.3% | 34 | 24.6% | 12 | 8.4% | 68 | 49.7% | 137 | 100.0% |
| | | | 60-69 | 25 | 22.6% | 39 | 35.6% | 16 | 14.8% | 30 | 27.0% | 110 | 100.0% |
| | Teachers | Sex | Male | | | 38 | 32.5% | | | 61 | 52.3% | 117 | 100.0% |
| | | | Female | 32 | 12.0% | 106 | 39.4% | 39 | 14.3% | 92 | 34.2% | 270 | 100.0% |
| | | Age_grouped | <29 | | | 21 | 45.9% | | | 19 | 42.5% | 45 | 100.0% |
| | | | 30-39 | | | 32 | 38.9% | | | 32 | 39.3% | 82 | 100.0% |
| | | | 40-49 | | | 25 | 30.7% | | | 36 | 43.7% | 82 | 100.0% |
| | | | 50-59 | | | 32 | 38.7% | | | 33 | 39.0% | 84 | 100.0% |
| | | | 60-69 | | | 34 | 36.4% | | | 34 | 35.9% | 95 | 100.0% |
| | Other occupations | Sex | Male | 749 | 13.9% | 1410 | 26.2% | 596 | 11.1% | 2626 | 48.8% | 5381 | 100.0% |
| | | | Female | 751 | 15.7% | 1565 | 32.8% | 611 | 12.8% | 1851 | 38.7% | 4778 | 100.0% |
| | | Age_grouped | <29 | 148 | 6.5% | 562 | 24.5% | 272 | 11.9% | 1310 | 57.2% | 2293 | 100.0% |
| | | | 30-39 | 153 | 8.4% | 541 | 29.5% | 224 | 12.3% | 912 | 49.8% | 1830 | 100.0% |
| | | | 40-49 | 279 | 12.9% | 600 | 27.8% | 289 | 13.4% | 989 | 45.9% | 2157 | 100.0% |
| | | | 50-59 | 413 | 19.7% | 628 | 29.9% | 242 | 11.5% | 815 | 38.9% | 2097 | 100.0% |
| | | | 60-69 | 507 | 28.5% | 644 | 36.1% | 180 | 10.1% | 451 | 25.3% | 1782 | 100.0% |

* Cells with a count < 10 have been suppressed or where cells <10 can be calculated.

# Table 7.7 Sedentary Time by Gender and Age Group Nested Within Occupation.

| | | | | Sedentary time | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0-270.00 | | 275.00-360.00 | | 370.00-480.00 | | 485.00-720.00 | | 740.00-2460.00 | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupational groups | Nurses | Sex | Male | | | | | | | | | | | 19 | 100.0% |
| | | | Female | 75 | 27.7% | 76 | 28.0% | 69 | 25.7% | 36 | 13.3% | 14 | 5.3% | 270 | 100.0% |
| | | Age_grouped | <29 | | | | | | | | | | | 20 | 100.0% |
| | | | 30-39 | 14 | 25.0% | 21 | 37.8% | | | 14 | 25.0% | | | 54 | 100.0% |
| | | | 40-49 | 40 | 39.0% | 24 | 23.5% | 28 | 27.6% | | | | | 102 | 100.0% |
| | | | 50-59 | 20 | 26.5% | 19 | 25.6% | 18 | 24.2% | | | | | 74 | 100.0% |
| | | | 60-69 | | | | | 15 | 39.5% | | | | | 38 | 100.0% |
| | Other health professionals | Sex | Male | 29 | 44.2% | 11 | 15.8% | 14 | 21.5% | | | | | 66 | 100.0% |
| | | | Female | 51 | 35.7% | 40 | 27.7% | 32 | 22.3% | | | | | 143 | 100.0% |
| | | Age_grouped | <29 | 13 | 38.3% | 14 | 39.9% | | | | | | | 35 | 100.0% |
| | | | 30-39 | 28 | 42.9% | 18 | 27.1% | 10 | 16.1% | | | | | 65 | 100.0% |
| | | | 40-49 | 26 | 54.2% | | | 10 | 21.8% | | | | | 48 | 100.0% |
| | | | 50-59 | | | | | 12 | 33.6% | | | | | 35 | 100.0% |
| | | | 60-69 | | | | | 10 | 39.5% | | | | | 26 | 100.0% |
| | Care workers | Sex | Male | 14 | 14.2% | 23 | 24.0% | 24 | 24.4% | 26 | 27.0% | 10 | 10.4% | 98 | 100.0% |
| | | | Female | 138 | 29.0% | 111 | 23.3% | 120 | 25.2% | 71 | 14.9% | 36 | 7.6% | 476 | 100.0% |
| | | Age_grouped | <29 | 33 | 28.8% | 30 | 26.3% | 29 | 25.8% | | | | | 114 | 100.0% |
| | | | 30-39 | 28 | 32.5% | 20 | 23.2% | 21 | 23.8% | | | | | 87 | 100.0% |
| | | | 40-49 | 40 | 31.9% | 29 | 23.3% | | | 24 | 18.8% | | | 126 | 100.0% |
| | | | 50-59 | 40 | 29.4% | 28 | 20.4% | 38 | 27.8% | 21 | 15.3% | 10 | 7.2% | 137 | 100.0% |
| | | | 60-69 | 10 | 9.4% | 27 | 24.6% | 32 | 29.4% | 26 | 23.4% | 14 | 13.1% | 110 | 100.0% |
| | Teachers | Sex | Male | | | 40 | 34.6% | 25 | 21.1% | 25 | 21.6% | | | 117 | 100.0% |
| | | | Female | 56 | 20.8% | 70 | 25.9% | 83 | 30.7% | 48 | 17.7% | 13 | 5.0% | 270 | 100.0% |
| | | Age_grouped | <29 | | | 15 | 33.4% | 16 | 34.5% | | | | | 45 | 100.0% |
| | | | 30-39 | 22 | 27.1% | 25 | 30.2% | 18 | 21.8% | | | | | 82 | 100.0% |
| | | | 40-49 | 21 | 25.9% | 29 | 35.5% | 20 | 24.9% | | | | | 82 | 100.0% |
| | | | 50-59 | 14 | 17.1% | 27 | 32.6% | 31 | 37.5% | | | | | 84 | 100.0% |
| | | | 60-69 | | | 14 | 15.2% | 22 | 23.6% | 41 | 43.7% | | | 95 | 100.0% |
| | Other occupations | Sex | Male | 1282 | 23.8% | 1432 | 26.6% | 1160 | 21.6% | 1037 | 19.3% | 463 | 8.6% | 5374 | 100.0% |
| | | | Female | 1073 | 22.5% | 1219 | 25.6% | 1119 | 23.5% | 982 | 20.6% | 371 | 7.8% | 4763 | 100.0% |
| | | Age_grouped | <29 | 532 | 23.3% | 546 | 23.9% | 521 | 22.8% | 491 | 21.5% | 192 | 8.4% | 2284 | 100.0% |
| | | | 30-39 | 537 | 29.4% | 535 | 29.2% | 403 | 22.0% | 250 | 13.7% | 105 | 5.7% | 1829 | 100.0% |
| | | | 40-49 | 682 | 31.7% | 605 | 28.1% | 456 | 21.2% | 300 | 13.9% | 109 | 5.1% | 2152 | 100.0% |
| | | | 50-59 | 442 | 21.1% | 594 | 28.4% | 462 | 22.1% | 420 | 20.1% | 176 | 8.4% | 2094 | 100.0% |
| | | | 60-69 | 162 | 9.1% | 372 | 20.9% | 436 | 24.5% | 558 | 31.4% | 251 | 14.1% | 1779 | 100.0% |

* Cells with a count < 10 have been suppressed or where cells <10 can be calculated.

## Table 7.8 Alcohol Consumption by Gender and Age Group Nested Within Occupation.

| | | | | Weekly drinking category | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Non-drinker | | Moderate (≤ 21 men / ≤ 14 women) | | Hazardous / harmful (> 21 men / >14 women) | | Total | |
| | | | | Count | Row N % | Count | Row N % | Count | Row N % | Count | Row N % |
| Occupational groups | Nurses | Sex | Male | | | 13 | 68.7% | | | 19 | 100.0% |
| | | | Female | 38 | 14.1% | 191 | 70.9% | 40 | 15.0% | 270 | 100.0% |
| | | Age_grouped | <29 | | | 15 | 74.3% | | | 20 | 100.0% |
| | | | 30-39 | | | 41 | 76.3% | | | 54 | 100.0% |
| | | | 40-49 | | | 78 | 76.1% | | | 102 | 100.0% |
| | | | 50-59 | 13 | 17.7% | 46 | 61.9% | 15 | 20.3% | 74 | 100.0% |
| | | | 60-69 | | | 24 | 63.7% | | | 38 | 100.0% |
| | Other health professionals | Sex | Male | | | 45 | 69.2% | | | 65 | 100.0% |
| | | | Female | | | 97 | 68.9% | | | 141 | 100.0% |
| | | Age_grouped | <29 | | | 25 | 73.7% | | | 34 | 100.0% |
| | | | 30-39 | | | 52 | 80.1% | | | 65 | 100.0% |
| | | | 40-49 | | | 30 | 67.0% | | | 45 | 100.0% |
| | | | 50-59 | | | 21 | 60.3% | | | 35 | 100.0% |
| | | | 60-69 | | | 13 | 50.3% | | | 26 | 100.0% |
| | Care workers | Sex | Male | | | 65 | 66.3% | | | 98 | 100.0% |
| | | | Female | 69 | 14.5% | 336 | 70.9% | 69 | 14.5% | 473 | 100.0% |
| | | Age_grouped | <29 | | | 79 | 71.9% | | | 110 | 100.0% |
| | | | 30-39 | | | 63 | 71.3% | | | 88 | 100.0% |
| | | | 40-49 | 17 | 13.7% | 88 | 70.8% | 19 | 15.5% | 125 | 100.0% |
| | | | 50-59 | 18 | 12.8% | 96 | 70.0% | 24 | 17.2% | 137 | 100.0% |
| | | | 60-69 | 20 | 18.3% | 74 | 66.9% | 16 | 14.8% | 110 | 100.0% |
| | Teachers | Sex | Male | | | 88 | 75.2% | | | 117 | 100.0% |
| | | | Female | 29 | 10.8% | 177 | 65.4% | 64 | 23.8% | 270 | 100.0% |
| | | Age_grouped | <29 | | | 36 | 78.7% | | | 45 | 100.0% |
| | | | 30-39 | 11 | 13.0% | 57 | 69.3% | 14 | 17.7% | 82 | 100.0% |
| | | | 40-49 | | | 52 | 64.1% | | | 82 | 100.0% |
| | | | 50-59 | 10 | 11.5% | 60 | 71.9% | 14 | 16.6% | 84 | 100.0% |
| | | | 60-69 | 10 | 10.9% | 60 | 63.2% | 24 | 25.9% | 95 | 100.0% |
| | Other occupations | Sex | Male | 569 | 10.7% | 3412 | 64.4% | 1319 | 24.9% | 5300 | 100.0% |
| | | | Female | 671 | 14.2% | 3153 | 66.8% | 899 | 19.0% | 4723 | 100.0% |
| | | Age_grouped | <29 | 240 | 11.0% | 1483 | 67.8% | 464 | 21.2% | 2187 | 100.0% |
| | | | 30-39 | 198 | 10.9% | 1248 | 68.8% | 368 | 20.3% | 1814 | 100.0% |
| | | | 40-49 | 258 | 12.0% | 1386 | 64.4% | 510 | 23.7% | 2153 | 100.0% |
| | | | 50-59 | 258 | 12.3% | 1347 | 64.4% | 487 | 23.3% | 2092 | 100.0% |
| | | | 60-69 | 287 | 16.1% | 1101 | 61.9% | 390 | 21.9% | 1777 | 100.0% |

* Cells with a count < 10 have been suppressed or where cells <10 can be calculated.

**Table 7.9 Sugar Consumption by Gender and Age Group Nested Within Occupation.**

| | Nurses | | | | Other health professionals | | | | Care workers | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min. | Max. | Mean | SD | Min. | Max. | Mean | SD | Min. | Max. | Mean | SD |
| Sex | | | | | | | | | | | | |
| Male | .13 | 1.96 | .67 | .84 | .06 | 1.96 | .85 | .62 | .05 | 1.97 | .84 | .64 |
| Female | .05 | 2.25 | .92 | .60 | .00 | 1.96 | .64 | .49 | .05 | 2.25 | .85 | .59 |
| Total | .05 | 2.25 | .91 | .61 | .00 | 1.96 | .74 | .56 | .05 | 2.25 | .85 | .59 |
| Age | | | | | | | | | | | | |
| <29 | .16 | 1.11 | .49 | .37 | .05 | .63 | .42 | .19 | .14 | 1.55 | .52 | .37 |
| 30-39 | .17 | 1.96 | .87 | .60 | .06 | 1.57 | .60 | .56 | .05 | 2.25 | .76 | .54 |
| 40-49 | .05 | 2.25 | 1.04 | .67 | .21 | 1.47 | .69 | .52 | .05 | 2.13 | 1.03 | .69 |
| 50-59 | .09 | 1.96 | .97 | .62 | .00 | 1.96 | 1.09 | .63 | .06 | 1.96 | 1.13 | .63 |
| 60-69 | .25 | 1.00 | .54 | .25 | .25 | 1.96 | .91 | .61 | .14 | 1.76 | .85 | .49 |
| Total | .05 | 2.25 | .91 | .61 | .00 | 1.96 | .74 | .56 | .05 | 2.25 | .85 | .59 |

| | Teachers | | | | Other occupations | | | |
|---|---|---|---|---|---|---|---|---|
| | Min. | Max. | Mean | SD | Min. | Max. | Mean | SD |
| Sex | | | | | | | | |
| Male | .02 | 2.25 | 1.11 | .72 | .00 | 2.36 | .85 | .57 |
| Female | .00 | 1.96 | .72 | .53 | .00 | 2.42 | .82 | .58 |
| Total | .00 | 2.25 | .84 | .62 | .00 | 2.42 | .83 | .58 |
| Age | | | | | | | | |
| <29 | .00 | 1.38 | .55 | .37 | .00 | 2.30 | .81 | .56 |
| 30-39 | .02 | 1.96 | .44 | .52 | .01 | 2.25 | .83 | .50 |
| 40-49 | .08 | 2.25 | 1.00 | .64 | .00 | 2.42 | .88 | .62 |
| 50-59 | .06 | 1.96 | 1.14 | .75 | .00 | 2.36 | .87 | .62 |
| 60-69 | .57 | 1.96 | 1.05 | .47 | .00 | 2.30 | .78 | .57 |
| Total | .00 | 2.25 | .84 | .62 | .00 | 2.42 | .83 | .58 |