

Tiny Housing Development: A Vaccine for Unaffordable Housing Delivery in Africa

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Abstract. The menace of unaffordable housing delivery has spread like a virus across the countries within the African continent. The virus has infested numerous activities and is responsible for the slum development and other social vices on the continent. Towards combating the virus this study makes a case for developing tiny houses as a vaccine for unaffordable housing delivery. The prospect and challenges of developing tiny houses were examined in this study. A random sampling technique was used in collecting data from construction and housing stakeholders within the study area. The data were collected with the aid of a questionnaire and analysed using statistical tools such as mean score, Kruskal Wallis test, and factor analysis. The study discovered that there is a high prospect for tiny houses in overcoming the menace of housing unaffordability. Findings from the factor analysis revealed that the development of tiny houses is hindered by occupant's acceptance, government permit/approval, and security. The study's findings revealed that stakeholders in the construction sector are willing to develop tiny houses. The study recommended that the government should create and support policies that encourage the development of tiny houses. The study provides the roadmap for creating an innovative method of ensuring housing affordability in Africa.

Keywords: Affordable Housing · Sustainability · Tiny houses · Zoning laws

1 Introduction

The Government of most nations has strengthened its program and effort on housing delivery to meet its commitment to ensuring affordable and quality housing for the ever-growing population [1, 2]. Unfortunately, Daniel and Owotemu [3] affirmed that the Government's commitment to affordable housing delivery over the years has proven difficult both in developed and developing nations owing to the rapid population growth. Ajayi, Ajayi, Akinsiku and Osunsanmi [4] believed that the difficulty is more enormous in developing countries owing to the uncontrolled population growth. Aside from the rapid population growth. Mills [5] indicated that the problem of housing delivery in developing nations, especially in Africa, is compounded by an increase in housing prices that is resistant to numerous housing policies and strategies. Pillay and Naudé [6] and Osunsanmi, Aigbavboa, Oke and Ohiomah [7] asserted that the population of developing countries is increasing at a pace beyond the capacity of the existing housing delivery strategies.

To enhance housing delivery in Africa, numerous housing delivery strategies have been created by countries within the African continent [4, 8]. For instance, the South African Government created a housing delivery strategy focused on creating subsidies for low-income households. The housing delivery scheme was called the reconstruction and development program (RDP), and it operates by building a basic house with the installation of sanitary and water services [9]. Booyens and Rogerson [10] affirmed that the RDP plans were laudable but failed to solve the housing backlog problems in South Africa. A similar housing delivery strategy was adopted in Nigeria to ensure affordable housing in Africa. According to Ajayi, Ajayi, Akinsiku and Osunsanmi [4] the Nigerian Government launched the new national housing and urban development policy (NHUDP) in 2002 targeted at ensuring that all Nigerians own decent housing. Ibem [1] postulated that ever since, different housing policies and strategies have been enacted by the Nigerian Government. Unfortunately, all the housing strategies and policies have failed to meet the housing demands within the country [8]. Aigbavboa and Thwala [11] opined that aside from Nigeria and South Africa the Government of other African countries has also failed to adequately cater to the housing needs of its citizens.

African countries' failure to provide housing for their citizens has led to the partnership with private companies in ensuring housing provision [2, 12]. Dunga and Grobler [13] describe this arrangement as unaffordable because private developers are only interested in making profits, making housing unattainable for low-income earners. Thus, low-income earners in Africa are left to provide housing for themselves. Landman and Napier [14] opined that low-income earners meet their housing needs by developing houses excluded from a sustainable neighbourhood thereby preventing its contribution to urban economic and social life. Ademiluyi [8] attributed the activities performed by low-income earners and the failure of the Government in providing suitable policies to the creation of slums in most African countries. The menace of unaffordable housing delivery has spread like a virus across the countries within the African continent.

Unaffordable housing originated from the high cost of land, including the bureaucratic and corrupt practices of Government in providing affordable housing [4, 15]. The virus has infested numerous activities of the country and is responsible for the slum development and other social vices in the continent. Towards combating the virus this study makes a case for developing tiny houses as a vaccine for unaffordable housing delivery. This study describes a tiny house as a building that is less than and equal to 37 square metres in floor area excluding lofts and follows the health and safety regulations for ceiling height, stairways and emergency escape and rescue. The prospect and challenges for developing tiny houses were examined in this study.

2 Housing affordability strategies in Africa

The concept of housing affordability became popular in the early 1980s intending to provide accommodation for low-income earners [4]. Ever since the term has achieved international stature despite the absence of a precise and consistent definition. Likewise Landman and Napier [14] and Daniel and Owotemu [3] discovered that housing

affordability has different meanings and opinions from the literature. However, most of the definitions describe housing affordability as encompassing social housing, low-income housing, and financially assisted housing for middle-income households. Aigbavboa [9] believed that affordability is not a characteristic of housing rather it is a relationship between housing and people. This is because for some people all housing is affordable regardless of the price whereas for others no housing is affordable.

Ajayi, Ajayi, Akinsiku and Osunsanmi [4] asserted that affordable housing in most African nations functions as a tool in catering to the welfare of their citizens. It works as a tool by enacting policies that support the delivery of housing below the market price. In comparison to other African countries, South Africa has a strong and effective policy and strategies in ensuring affordable housing for its citizens. Booyens and Rogerson [10] revealed that in the delivery of affordable housing South African Government combines numerous policies and strategies. Miraftab [16] opined that the policies were established to provide accommodation for the less privileged post-apartheid period. The policies were targeted to ensure affordable, sustainable housing for low-income families at a reduced cost [17]. One of the notable policies is the reconstruction and development program (RDP) housing policies [18]. The RDP was developed to curb housing inequality during the apartheid regime. Osunsanmi, Aigbavboa, Oke and Ohiomah [7] and Dugard [19] submitted that the RDP policy was effective but was confronted with Government bureaucracy, corruption, and other shenanigans. Thus, it can be deduced that the Government policy failed in ensuring affordable housing.

Self-aided housing delivery strategy was another strategy adopted by the African Government in ensuring affordable housing [11]. The concept of self-aided housing is based on the notion that Government may assist individuals in developing their houses [20]. Osunsanmi, Aigbavboa, Oke and Ohiomah [7] affirmed that the self-aided housing delivery scheme was practiced in South Africa prior to the apartheid period. After the apartheid regime, it was changed to the people housing process (PHP). Under this scheme, the Government is charged with the responsibility of supporting low-income earners through land provision, urban services, and options for the piecemeal development of houses [14]. Bradlow, Bolnick and Shearing [15] opined that the strategy and concept of PHP were laudable as they assisted in the effective delivery of affordable housing. Although, critics such as Fish [12], Osunsanmi, Aigbavboa, Oke and Ohiomah [7], and Booyens and Rogerson [10] perceived that self-aided housing scheme as the potential of creating slums if not properly managed. Booyens and Rogerson [10] attributed the slum development in major cities in South Africa to the PHP housing delivery strategies.

The shortcoming of PHP housing delivery strategy leads to establishing another housing delivery strategy called the enabling markets. Aigbavboa [9] describes enabling the market as an indirect approach to ensuring affordable housing. The strategy works through the subsidy provided by the Government and directed at the construction industry. The subsidy functions through reducing the tax on building materials, training construction tradesmen and provision of building loans [18]. Aigbavboa [9] submitted that the strategy assisted in effective housing delivery.

Unfortunately, the strategy failed to target the low-income earners that need affordable housing. Ajayi, Ajayi, Akinsiku and Osunsanmi [21] discovered that enabling the market is not a sustainable strategy for affordable housing delivery. This is because the low-income earners usually do not meet the criteria for accepting building loans. The absence of an effective affordable housing delivery strategy in Africa leads to the proposition of tiny houses.

2.1 Tiny house development

The idea behind tiny house was brought to live after recognising the short coming in the obesity trend in residential architecture [22, 23]. Shearer and Burton [24] and Evans [25] affirmed that the concept of tiny housing became popular from the scholarly work of two architects and designers in the United States around 1990. In the early 1990s most tiny houses were on wheels to achieve home ownership without the cost of land and freedom to change location [26]. Ever since, the movement has continued growing has tiny houses were developed as a response to natural disasters [27]. For example, during the Hurricane Katrina a tiny cottage with 28.6 Square metre was developed for the survivors of the hurricane. Shearer and Burton [24] opined that in Australia, the interest in the development and construction of tiny houses has increased significantly to achieve housing affordability. Anson [28] opined that the tiny house concept drew on previous small/micro house typologies. The past typologies of smaller housing are prefabricated post war housing, cottage-style houses.

Unfortunately, no formal or legal definition exist for tiny house in Africa including some developed countries like Australia and the United Kingdom. Although Shearer and Burton [24] affirmed that the international residential code in the United States defines a tiny house as a building with 37 square metres in floor area excluding lofts, ceiling, emergency escape, and rescue. This study adopted a similar definition and describes tiny houses as a building with less than or equal to 37 square metres and functions as a tool for affordable housing. Tiny houses are often confused as meaning the same as Caravans [27, 29, 30]. However, the major differentiating factor originates from the tiny house's functionality and regulatory features. Ford and Gomez-Lanier [30] indicated that tiny houses are sometimes detachable and have the functionality of a permanent house as opposed to a caravan. Tiny houses have economic sustainability and design parameters that reflect the architectural pioneers of the movement [25]. Shearer, Bares, Pieters, Winkle and Meathrel [31] discovered that they are three major types of tiny houses. They are tiny houses on wheels, potentially moveable tiny houses like containers or relocatable/prefab houses and tiny permanent houses.

Regardless of the tiny house types Petersen and Parsell [32] opined that they are enormous benefits emanating from the ownership of tiny houses. Owing to the absence of land purchase. Ford and Gomez-Lanier [30] believed that tiny houses are affordable in comparison to regular buildings. The unique characteristics of tiny house makes it a suitable tool for ensuring housing affordability in African countries where there is a high cost of land. Another crucial benefit of tiny houses is energy management. Most of them are off grid and therefore use significantly less electrical power and water for day-to-day activities [25].

Furthermore, Byram [33] submitted that tiny house assists in saving energy due to the numerous alternative and renewable systems incorporated in most tiny houses. Shearer [27] examines the benefits of the tiny house from other perspectives. The scholar revealed that tiny houses provide social benefits as it provides accommodation for those in lower socio-economic class or status. Anson [28] discovered that in Australia, interest in tiny houses is higher for older women and singles, that are also the fastest-growing demographic for homeless individuals in Australia. Thus, it can be deduced that tiny house has the potential in ensuring housing affordability. Table 1 also presents some other potential benefits, drivers and challenges to tiny housing development.

Table 1. Drivers and challenges to tiny house development

Authors	Drivers and benefits of tiny house movements	Challenges to tiny house development
Shearer, Bares, Pieters, Winkle and Meathrel [31]	A tiny house is an emerging housing design and strategy that originated in the United States of America. Tiny house has the potential to be a catalyst for infill development. The tiny house allows both homeowners and tenants to situate well designed buildings on sub urban plots	High cost of construction, complex legislation and building permit cost.
Shearer and Burton [24]	The motivating factors for tiny house movement are secure tenure and sustainable community. Tiny houses represent a small specialised housing niche with the potential of functioning as a panacea for housing unaffordability.	Legislation, maintenance and absence in obtaining mortgage
Penfold, Waitt and McGuirk [29]	The major supporters of tiny house movement tap into the narratives that less is more, debt free living, off the grid living and affordability.	No pets, lack of information on tiny houses and building materials
Byram [33]	The tiny house movement has moved from a fringe phenomenon to an object of building occupants' desires and fantasies. The significant drivers are affordability and sustainability.	Absence of co-operation from building occupants, legislation and security
Carlin [23]	Tiny house provide a fantastic alternative for homeowners seeking for alternative in reducing carbon footprint. It contributes to reducing carbon footprint by reducing indoor heating and cooling throughout the year.	Bland design, absence of mortgage funding, large family, legacy and ostentatious life style
Evans [25]	The interest in tiny houses grew owing to the issues of addressing housing unaffordability and as a means of pursuing counterculture lifestyles.	Land use barrier and integration into the urban land space

Source: authors review of literature

3 Research Methodology

Housing unaffordability is a major challenge to the South African Government [10]. The recent and frequent violent and the establishment of slums in major cities in South Africa has been attributed to the housing unaffordability in the country [34]. This study

proposes the utilisation or the development of tiny house as a vaccine for unaffordable housing delivery in Africa. The study aimed to discover the factors that hinder the adoption of tiny houses and the prospects for developing tiny houses in South Africa. The study utilised quantitative method in sourcing and gathering information from respondents (stakeholders in the South African housing sector). The quantitative research method was adopted because of its ability to adequately study the relationship between facts and relate them in accordance with findings or theories from existing or past studies [35].

A random sampling technique was used to obtain data from the South African housing sector stakeholders. The random sampling was used because of its ability to give equal opportunity to the selection of stakeholders within the study area. Gauteng province in South Africa was selected as the study area for this study for numerous reasons. One of them is attributed to high housing prices within the country. Pillay and Naudé [6] and Fomum [36] discovered that Gauteng is the epic center of unaffordable housing. The instrument for gathering the data is a close-ended questionnaire that was structured into three sections. The first section examines the characteristics of the respondents such as; academic qualifications, working experience and respondent's affiliation. The second section appraises the prospect for the development of tiny houses in South Africa. The last section examines the challenges confronting the development of tiny houses in South Africa. The variables supporting the development of the questionnaire were sourced from reviewing relevant literature, as shown in Table 1.

A total of 170 questionnaires were used for analysis out of the 200 distributed to the respondents. The questionnaire was analysed using the statistical package for social science (SPSS) version 24 and adopting statistical tools like frequency distribution, mean item score and factor analysis. The questionnaire was validated using a Cronbach Alpha and yielded a value of 0.857. [37] indicated that a Cronbach alpha above 0.6 is deemed valid. The frequency distribution and mean item score was used to analyse the first portion of the questionnaire that focused on the personal characteristics of the respondents. The findings from the respondents' personal information revealed that all the respondents are educated and will therefore provide a valuable response to this study. More than half (56%) of the respondents possess a Bsc or Btech students, while the remaining proportion are qualified with either masters and PhD degree as their highest level of publication. The survey on working experience revealed that all the respondents have an ample working experience regarding the provision of affordable or unaffordable housing in South Africa. Regarding the affiliation, the findings from the survey revealed that all the respondents are affiliated with the appropriate bodies responsible for housing delivery. The relevant bodies are the national association of social housing organisations (NASHO), the Engineering Council of South Africa (ECSA) and other reputable professional bodies.

4 Discussion of Findings

The discussion of findings emanating from this study was presented in this section. The discussion was centered around the two major objectives that made up this study. The objectives were assessing the prospect of developing tiny house and the challenges emanating from its development.

4.1 Prospect of developing tiny house

Tiny houses are presently in the grey zones and are not recognised or accepted by most local or state planning legislation bodies [30]. The prospect was defined as the possibilities for developing tiny houses. Based on this, this study accessed the possibilities or prospects for developing tiny houses in South Africa. The prospect was sought by using a five-point Likert scale from strongly agree to disagree strongly. The respondents presented the Likert scale with the findings presented in Table 2. The table revealed that more than half (52.9%) of the stakeholders agreed that there is a prospect of developing tiny house as a vaccine for housing unaffordability. The findings of this study coincide with the work done by Shearer [27] and Shearer, Bares, Pieters, Winkle and Meathrel [31] who discovered that there is a high prospect for developing a tiny house in Australia. Likewise, Evans [25] found that there is a huge prospect for the development of tiny houses in the urban landscape.

Table 2. Prospect in developing tiny houses

	Frequency	Percentage	MIS	X ²	Sig
Moderate	36	21.2			
Agree	90	52.9	4.10	4.24	0.003*
Strongly agree	44	25.9			
Total	170	100			

4.1 Factors hindering the development of tiny house

This study adopted principal component analysis, also called factor analysis, to determine the factors that hinder the development of tiny houses in South Africa. Prior to conducting the factor analysis, the KMNO and Bartlett's test of sphericity were analysed to examine the validity of the data for a principal component analysis. The findings from the analysis were presented in Table 3, and it shows that the KMNO gave a value of 0.625 which is above the recommended threshold of 0.4. According to [38] a KMNO value greater than 0.4 is deemed adequate. Further investigation revealed that the chi-square was significant, with a value of 325.439 at a 120 degree of freedom. Thus, it can be deduced that the data collected for determining the factors hindering the development of tiny houses supports principal component analysis.

Table 3. KMNO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.625
Bartlett's Test of Sphericity:	
Approx. Chi-square	325.439
Degree of freedom	120

The study adopted varimax rotation method, which shows the sixteen (16) factors loaded differently on 3 components which hinder the development of tiny houses in South Africa. The findings from the analysis are presented in Table 4.

Table 4. Rotated component matrix

	Component			Variance explained
	1	2	3	
Accepting tiny house designs	.940			37.1
Acceptance of living in a tiny house	.870			
Sense of community	.810			
Large family	.758			
Bland design	.648			
Building permit approval		.894		12.2
Government approval		.760		
Legislative policies		.710		
Maintenance		.650		
Lack of information on tiny house		.550		
Security of tenure			.850	6.5
Occupants security			.800	
Difficulty in accessing mortgage			.756	
Integration into urban land space			.690	
High cost of construction			.628	
Building materials			.547	

Table 4 presents the rotated component matrix and it revealed that the factors hindering the development of tiny houses in South Africa are divided into three components. The components are usually named based on the factors with the highest loadings. Thus, the first component were called "occupants acceptance" owing to the two top variables in this components. The findings from this study coincides with similar studies in Australia [27, 31]. According to Shearer and Burton [24], one of the major impediments to the adoption of tiny houses as a tool for affordability is the acceptance and willingness of individuals to change their lifestyles. The findings from the component analysis revealed that "occupant acceptance "accounts for 37.1% of the factors hindering the development of tiny house as a tool for affordable

The second component was called "government permit/approval" due to the variables under the components. The topmost variables in this component are building permit approval, government approval and legislative policies. Petersen and Parsell [32] discovered that government policies or permits can serve as a tool to either hinder or drive the development of tiny houses as a tool for affordable housing. Shearer, Bares, Pieters, Winkle and Meathrel [31] discovered that government policy and obtaining building approvals are the major impediments to planning tiny houses. The third component from Table 4 comprises of six variables with the topmost being security of tenure, occupant's security, difficulty in accessing mortgage, and integration into urban land space. Due to the variables within this component, it was called the occupant's security. Dunga and Grobler [13] discovered that occupants' security had been a significant challenge in curbing unaffordable houses. Mills [5] opined that affordable housing occupant's security occurs in the form of physical security and financial security. This study discovered that both physical and financial security hinders the development of tiny houses as a tool for unaffordable housing.

5 Conclusion and Recommendation

The menace of unaffordable housing has plagued most African nations' development and advancement, especially in South Africa. The unaffordable housing within the country is responsible for in-security, slum development and other shenanigans within the country. Towards curbing the menace of unaffordable housing in South Africa the Government has implement numerous strategies and policies. One of the notable policies is the reconstruction and development program (RDP) housing policy. The policy was laudable but failed to curb the problems associated with housing unaffordability. Other housing delivery policies and strategies adopted by the Government were unsuccessful.

This created the need for establishing a strategic approach for developing quality and affordable houses. This study proposes the development of tiny house as a vaccine for unaffordable housing delivery in Africa. The literature review revealed that tiny house development is an emerging field of study with little scholarly research and few legislative guidelines. Tiny houses assist in densifying the missing middle with low rise, medium density housing and ease affordability issues, especially for older women, singles and students. If adequately implemented, tiny houses could serve as a tool or vaccine for curbing housing unaffordability. However, the development of tiny houses is hindered by three significant factors: occupant's acceptance, Government permit/approval, and security.

The security occurs in two dimensions which is the physical and financial security. The financial security is attributed to the failure of obtaining mortgage from financial institutions. Whereas, the physical is a function of theft and damage to tiny houses. Despite the factors hindering the development of tiny houses this study discovered that stakeholders in the construction sector are willing to develop tiny houses. The study recommended that the Government should create and support policies that encourage the development of tiny houses. Also, awareness should be created of the proposed benefit attributed to constructing a tiny building as a vaccine for housing unaffordability. The study provides the roadmap for creating an innovative method of ensuring housing affordability in Africa.

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