**Review Article**

**Analyzing Innovative Approaches to Address the Affordable Housing Crisis in Ghanaian Urban Areas**

**Abstract**

Ghana is confronted with an acute housing shortage of over 1.8 million units currently, which grows by approximately 70,000 units annually. Urbanization, rural-urban migration, and infrastructure shortfall all combine to aggravate the crisis. Traditional responses to housing fail to deal with low- and middle-income demand, resulting in intensified dependence on informal settlements with limited services. The paper analyzed innovative approaches to Ghana's affordable urban housing deficit in Ghanaian urban areas through a systematic review. Based on an extensive body of peer-reviewed research articles, organizational reports, and empirical case studies published between 2001 and 2025, the paper presents the most salient solutions, including modular and prefabricated housing, eco-friendly building materials, and community-based initiatives. The paper acknowledges the potential of modular construction to reduce construction time and housing costs, with the use of green materials enhancing environmental sustainability. Community-led housing schemes and digital data analysis then emerge as the most critical elements for shaping inclusive, resilient, and affordable urban growth. While these strategies have attractive benefits, policy deficits, infrastructure constraints, and capacity shortages compromise their successful implementation. The paper calls for a multi-stakeholder approach, combining technology, policy reform, and local capacity development with the vision of efficiently closing Ghana's housing gap and promoting sustainable urban growth.

**KEYWORDS:** Innovative Approach, Affordable, Housing Crisis, Ghanaian Urban Cities

**1. Introduction**

The world's urban population is growing at a record rate, increasing pressure on housing systems to accommodate a large and expanding population. By 2050, nearly 70% of the world's population is expected to live in urban areas, up from 56.2% in 2020 (UN-Habitat, 2022). This rapid urbanization has doubled the demand for affordable, safe, and decent housing, especially in low- and middle-income countries where urban growth often outpaces infrastructure development. As a result, there is uncontrolled growth of slums, overcrowded housing, and informal settlements, which heighten inequalities and diminish the quality of city life (Walley & Vidal, 2021).

In Sub-Saharan Africa, the problem is especially severe. It has the fastest urbanization rate in the world, at 3.8% per year, and more than 50% of its urban dwellers reside in slums (United Nations, 2022). The affordability crisis is not only the result of increased construction costs and poor access to housing finance but also of inefficient land tenure systems, inadequate urban planning, and ineffective policy institutions. The outcome is a shortage of housing that disproportionately affects poor segments of society, forcing many into informal settlements with no basic services (Fox, 2014 & Amegah, 2021).

Ghana mirrors this continental reality, where its urban population is expected to rise from 57% in 2021 to more than 65% by 2035 (Ghana Statistical Service [GSS], 2021). This upsurge in urbanization has worsened the housing shortage in the country, which exceeds 1.8 million units and increases by some 100,000 units every year (Centre for Affordable Housing Finance in Africa, 2024). In urban areas such as Accra, Kumasi, and Tamale, shortages in housing have resulted in overpopulation, increased rents, land conflicts, and the spread of slums. Although the government has tried, policies such as the National Housing Policy (2015), low-cost housing programs, and partnerships with the private sector, progress is sluggish due to financing constraints, administrative inefficiencies, and supply-demand mismatches concerning the effective affordability levels of the low-income group (Acheampong & Anokye, 2015 and Agyemang & Morrison, 2020).

Accordingly, there is an increasing demand for context-specific and innovative approaches beyond traditional housing supply. They encompass the adoption of incremental housing types, sustainable and affordable construction materials, community-driven development, microfinance for housing, and public-private partnerships (Akinsulire et al., 2024 & Boamah, 2023). Ghana's way forward needs to incorporate such innovations in its urban planning policy if it is to create inclusive, resilient, and sustainable solutions to the housing crisis. This paper examined innovative strategies to address the affordable housing crisis in Ghanaian urban cities. It aims to distill pragmatic, replicable, and context-specific solutions that will close the housing gap and facilitate inclusive urban growth.

**2. Literature Review**

**2.1 Overview of the Affordable Housing Crisis**

The affordable housing crisis in Ghana is a product of colonial legacy and socio-political dynamics. The colonial housing policy privileged elites through the neglect of domestic needs and the formation of urban imbalance upon independence (Appeaning-Addo & Mba, 2022; Konadu-Agyemang, 2001). During the post-colonial era, Ghana's housing policies, like state-driven programs and rent control, were not sustainable due to budgetary limitations, political instability, and ineffective implementation (Boamah, 2014 & Konadu-Agyemang, 2001). Access to housing was further worsened in the 1980s and 1990s by structural adjustment programs by minimized state intervention and promoted market-driven initiatives (Boamah, 2010 & Arku, 2009). Policy reforms in the 1990s brought in private-sector involvement and deregulation, failing to respond to the housing needs of low- and middle-income groups. It exacerbated inequalities (Boamah, 2011; Danso-Wiredu & Loopmans, 2013). The 2015 National Housing Policy was embraced, but its implementation is patchy due to historical path dependencies (Appeaning-Addo & Mba, 2022; Danso-Wiredu & Poku, 2020).

Ghana has a housing deficit of over 1.7 million units, which is mostly centered in urban towns like Accra, Kumasi, and Tamale (Boamah, 2011; Addo, 2014). The causes are rapid urbanization, costly land, poor policy implementation, limited access to housing finance, and elevated building costs (Wuni et al., 2018, and Adabre & Chan, 2020). Formal housing markets are inaccessible to the majority because the mortgage markets cater to a minority due to high rates of interest and strict collateral conditions (Boamah, 2010 & Adade et al., 2021). Slums and informal settlements are on the rise, representing most of the housing in the urban localities. Over 58% of residents in Accra and Kumasi live in substandard living conditions (Amoako & Cobbinah, 2011; Mensah, 2014). Politicization of the housing projects makes them unaffordable to low-income beneficiaries (Ayumu et al., 2025). There are innovative but underfunded approaches like collective self-help, microfinance, and community-led housing (Gillespie, 2018; Ibrahim et al., 2002).

Current studies point to frugal innovations, green construction, and appropriate technologies as viable sustainable alternatives, yet they remain mostly untested (Dok-Yen et al., 2023 & Tekpe et al., 2022). The lack of affordable housing dramatically impacts urban growth in Ghana, leading to slums and informal settlements that strain infrastructure and resources (Danso-Wiredu & Poku, 2020; Amoako & Cobbinah, 2011). This creates inefficient land use, traffic congestion, poor sanitation, and declining living standards, which are disincentives to sustainable urban growth (Addo, 2014, and Boateng & Klopp, 2024). Lack of inclusive housing policy deepens socio-economic exclusion, forcing the urban poor into vulnerable areas (Boamah, 2011 & Owusu-Ansah et al., 2019). Elite control of housing policy fosters inequality, and weak urban governance limits housing in planning, deterring spatial justice and resilience (Boateng & Klopp, 2024 and Adabre & Chan, 2021). Ghana's affordable housing crisis has been caused by historical policy shortfalls, governance gaps, and socio-economic disruptions. It demands a multi-faceted response through policy innovation, creative finance, sustainable architecture, and inclusive planning.

**2.2 Government Policies and Initiatives**

**2.2.1 National Housing Policy**

Ghana's National Housing Policy (NHP) of 2015 aimed to resolve the housing shortage by enhancing access to affordable and secure shelter. However, studies indicate that it has fallen short by a significant margin based on its poor implementation and political interference (Appeaning-Addo & Mba, 2022 & Boamah, 2014). The NHP promoted PPPs, better land management, and housing finance access, yet it has had limited effect. A key limitation is that it is driven by the market, thus locking out low-income groups. Boamah (2011) and Danso-Wiredu and Loopmans (2013) note that government-subsidized housing programs have most frequently benefited high-income groups to the detriment of equity. Lack of serious monitoring, funding commitment, and policy stability has weakened the effectiveness of the policy (Sunday & Osafo, 2020; Konadu-Agyemang, 2001). Recent studies stress the importance of long-term housing policy change. Adabre and Chan (2020) suggest that housing policy needs to have environmental, social, and economic indicators for long-term affordability and resilience. Boamah (2014) and Danso-Wiredu & Poku (2020) suggest reframing the role of the state from a developer to a facilitator and regulator to provide an enabling environment for inclusive housing.

**2.2.2 Local Government Strategies**

The role of Ghana's local governments in the provision of housing is minor but growing. They are statutorily mandated to facilitate planning and infrastructure, but limited capacity, political centralization, and a lack of fiscal powers restrict their contribution to housing development (Agyemang & Morrison, 2018; Boateng & Klopp, 2024). Metropolitan Municipal Assemblies lack the resources to carry out good housing projects and are typically reliant on the central government (Amoako & Cobbinah, 2011). Accra and Kumasi, for instance, have tried to include housing in urban development programs, like slum improvement and building standards enforcement. Such interventions are symptomatic, as opposed to causal, and are frequently donor-driven, politically motivated, or short-term (Afrane et al., 2023). Land use planning, a key tool for municipal governments, breaks down due to a lack of enforcement, prevalence of customary tenure, and poor integration into housing policy (Agyemang & Morrison, 2018). Land availability and zoning are the most significant barriers to developing more affordable housing in the region.

**2.2.3 Public-Private Partnerships**

Public-Private Partnerships (PPPs) are essential in Ghana's housing sector, especially with the National Housing Policy. The PPP policy aims at leveraging private capital and efficiency to promote affordable housing programs (Damoah et al., 2020). Its implementation, however, faces a myriad of challenges in Ghana. Most PPP housing projects largely benefit middle- and high-income groups at the cost of low-income groups since they are still out of affordability (Boamah, 2010). PPPs are also faced with bureaucratic delays, land acquisition, as well as transparency in partner selection and execution (Kwofie et al., 2016). Notwithstanding this, PPPs are believed to be effective if properly regulated. The critical success factors are clear legal frameworks, risk-sharing, land access, and incentives for affordable housing (Damoah et al., 2020 & Kwofie et al., 2024). PPPs are seen as innovative housing products, and developments in green building, modular housing, and micro-mortgages (Achumie et al., 2024 & Adabre et al., 2021). National and local government, as well as PPP interventions, offer a way forward to tackling Ghana's affordable housing situation, yet gaps remain. Constraints, including ineffective policy coordination, exclusion of the urban poor, and a lack of institutional support, need to be tackled to provide inclusive urban housing solutions.

**2.3 Innovative Housing Solutions**

The persistent failure of conventional housing policies and market-based models to address affordability challenges in Ghanaian cities has prompted the exploration of innovative housing solutions. These approaches integrate technological, material, and social innovations to enhance affordability, sustainability, and inclusivity in housing provision. Figure 1 indicates the innovative housing approaches adopted.

***Modular and Prefabricated Housing:*** Prefabrication and modular housing are now being considered a convenient solution for filling the gap of housing in an economic as well as time-saving way (Adeyemi et al., 2024). These systems encompass off-site assembly of pieces of housing, which are fitted together on the site of construction, conserving a lot of time as well as wastage of materials. In Ghana, modular construction has been identified as a likely game changer for the urban poor, particularly because of its flexibility and the large-scale production potential (Dok-Yen et al., 2023; & Moghayedi et al., 2021). Modular technology also has the standardization, energy efficiency, and quality control potential that is not typically found in traditional self-constructed homes. Although modular solutions are yet to be broadly applied in Ghana, comparative international case studies and simulation design have validated that prefabricated buildings can lower construction costs by as much as 30% and decrease project lengths by more than 40% (Moghayedi et al., 2021). For their application in Ghana, however, investment in domestic manufacturing capacity and policy assistance will be needed in order to entice private sector operators.

***Sustainable Building Materials:*** The utilization of locally available and renewable materials has become a significant measure to encourage affordable housing. Researchers and experts in Ghana have provided more voice for green building materials such as compressed earth blocks, laterite bricks, recycled waste materials, and bamboo as cost-effective substitutes for imported steel and cement (Tekpe et al., 2022 & Saini et al., 2023). These products not only lower the construction cost but also minimize the carbon footprint of buildings. Darko et al. (2018) found that some of the most important green technologies for sustainable housing in Accra include natural ventilation, energy-efficient lighting, and optimizing building orientation. All these technologies greatly help lower energy consumption as well as indoor comfort. Nonetheless, widespread use of green technology and environmental materials is limited by a lack of awareness, policy, and experienced human capacity (Adabre et al., 2021). Notwithstanding the limitations, strategic use of green materials in building standards and housing policy can enhance housing affordability while supporting Ghana's climate resilience agenda (Darko et al., 2018). Enekwachi-Akpa (2024) recommends training schemes, demonstration initiatives, and incentives to developers using green technologies.

***Community-Led Housing Initiatives:*** Community-based housing projects introduce a grassroots system that enables local people to be actively involved in the design, planning, and building of their dwellings (Global Environment Facility Scientific and Technical Advisory Panel, 2024). The system relies on high levels of collective self-help, incremental construction, and participatory decision-making, in most cases facilitated by NGOs or state subsidies. In Ghana, the projects are increasingly perceived as crucial to addressing affordability issues, particularly in informal settlements where traditional institutional mechanisms of housing finance do not exist (Gillespie, 2018 & Biitir, 2009). Self-help housing as a collective unit not only avoids the labor costs but also sustains social ownership and harmony among dwellers. Gillespie (2018) opines that combinations of collective systems with financial inclusion mechanisms like housing microfinance would ensure more scalability as well as efficacy. The models have been most effective when incorporated with community savings groups and adaptive payment schemes. In addition, participatory planning and design ensure the housing solution is specifically oriented to address the needs of the residents' space and culture (Boateng & Klopp, 2024). Despite this, these initiatives do not get official recognition, and their significance is diminished through poor provision of basic infrastructure, lack of adequate institutional support, and insecure tenure (Addo, 2014). Shattering these barriers by creating inclusive policy structures can unlock the transformative power of community-led housing.

**Figure 1: Innovative Housing Solutions**

Source: Authors’ Construct

**2.4 Role of Technology in Housing Solutions**

The integration of technology into the housing sector has emerged as a transformative force in addressing affordability, accessibility, and efficiency in urban housing delivery (FasterCapital, 2024). In the context of Ghana and other developing economies, technological interventions offer innovative ways to bridge housing gaps by improving construction methods, streamlining access, and enhancing evidence-based planning (Tekpe, 2014). Figure 2 presents the role plays by technology in housing solutions.

***Smart Housing Technologies:*** Smart housing technology is a concept that involves the integration of digital and automated systems in the housing arrangement to support sustainability, energy efficiency, and the health of the inhabitants (Homz, 2025). Although a new phenomenon in Ghana, smart housing is fast becoming a subject of interest in urban housing discussions. The use of green technology, including solar panel systems, low-energy HVAC systems, and automatic lighting, has been proposed as a means of lowering the long-term cost of housing along with backing environmental agendas (Darko et al., 2018 & Adabre et al., 2021). Additionally, there is a call for research for the use of building information modeling (BIM), 3D printing, and other digital construction technologies to realize maximum design efficiency, minimize waste, and speed up the delivery of housing (Bhanye et al., 2024 & Moghayedi et al., 2021). These technologies are even more vital in affordable housing developments, where time savings in construction and material usage can effectively decrease the cost of housing units. But the widespread application of smart technologies in Ghana is confronted with constraints, including high capital investment, scarcity of skilled labor, and inadequate institutional frameworks for creating smart cities.

***Digital Platforms for Housing Access:*** Online portals are now a necessity in housing ecosystems of the modern day, rendering property listings, rentals, financing information, and service providers accessible to users (Noanyi, 2020). In Ghana, the evolution of internet real estate portals has begun transforming how developers and individuals engage with the housing market. Adu et al. (2023) web-scraped real estate websites in Accra online and identified substantial price differentials working against low-income families, with a demand for more inclusive digital solutions. State-supported digital registries and housing databases can work to reduce information asymmetries, transaction costs, and improve transparency in housing markets. There are some scholars who support the development of centralized digital platforms that integrate land ownership data, housing finance products, and building permit systems to allow coordination among the stakeholders (Gibb et al., 2013 & Afrane et al., 2023). Further, mobile-based systems and SMS-based systems can cater to low-income and digitally marginalized sections by providing them easy access to rental housing and government programs. These instruments can be key to enhancing the provision of housing in peri-urban and low-supply urban areas (Wangari, 2017).

***Data Analytics in Urban Planning:*** Data analysis is a critical tool for housing problem diagnosis and responsive urban planning. By using the techniques of geospatial analysis, predictive modeling, and statistical projection, planners can detect patterns in housing demand, the expansion of informal settlements, and infrastructural deficiencies (Fisher & Singh, 2023). In Ghana, greater access to open-source urban data as well as GIS technological advancements provides the versatility of promoting enhancements in the integration of housing data into spatial planning exercises (Adabre & Chan, 2021 & Fosu, 2021). Current research emphasizes the value of using big data in informing evidence-based decision-making in urban housing policy. For example, real-time data on housing transactions, population mobility, and results of service delivery can help policymakers inform maximization of land use, establish where to locate housing interventions, and assess the effects of policies (Wuni et al., 2018 & Moghayedi et al., 2021). But fragmentation of data, inter-agency coordination deficits, and limited analytical capacity within local governments impede the efficient application of data-driven planning. Integrating data analytics with participatory mapping and stakeholder participation can maximize inclusiveness and responsiveness in housing policy, particularly among low-income households and informal settlements (World Bank, 2023).

**Figure 2:** **Role of Technology in Housing Solutions**

Source: Authors’ Construct

**3. Methodology**

This study employed a systematic review approach to analyze the innovative approaches to address the affordable housing crisis in Ghanaian urban areas. The systematic review approach was employed due to its strength in accumulating existing knowledge from various sources based on an explicit and reproducible protocol. The review aimed to determine key innovative approaches to the affordable housing crisis and how these contribute to urban sustainability and resilience.

In an attempt to obtain pertinent literature, an extensive search was carried out on major academic databases, such as Scopus, Web of Science, ScienceDirect, PubMed, and Google Scholar, as indicated in Figure 3. The research strategy utilized the application of the following keywords: "innovative approaches," "affordable," "housing crisis," and "Ghanaian urban areas. The application of Boolean operators was utilized to enhance the search parameters' specificity. Only English-language articles were included, and the search was limited to publications from 2001 to 2025 to encompass both older and newer perspectives.

The selection criteria for the studies targeted research that had analyzed the innovative approaches to address the affordable housing crisis in Ghanaian urban areas, with a priority on Sub-Saharan Africa's urban areas or other comparable developing world cities. The review incorporated peer-reviewed articles, scholarly books, organizational reports, and empirical case studies. Nonetheless, opinion articles, non-academic literature, research that did not meet the general themes, and duplicate articles were not included in the review.

Following the identification of qualifying studies, data were extracted with the assistance of a structured coding scheme. This included the recording of details about each study's author(s), publication year, research objectives, methodology, key findings, and its applicability to the Ghanaian or African urban experience. This was followed by a thematic synthesis of the data that was extracted. The findings were always classified under two broad dimensions: first, the housing innovative solutions, including modular and prefabricated housing, sustainable building materials, and community-led housing initiatives; and second, the role of technology in housing solutions, including smart housing technologies, digital platforms for housing access, and data analytics in urban planning.

Although the systematic review approach guarantees some degree of academicity and comprehensiveness, some limitations were realized. Most notably, there was the risk of publication bias as a result of the restriction of grey literature and non-English sources. Secondly, even though there is increased interest in housing affordability in Ghana, empirical studies specific to Ghana remain scarce. This gap highlights the necessity for more localized studies analyzing the innovative approaches to address the affordable housing crisis in Ghanaian urban areas. Yet the methodological approach taken in this research offers a solid foundation for syntheses of current knowledge and formulating insights that are relevant to both scholars and policymakers. It also enables the identification of key themes and evidence gaps that can guide future research and urban planning initiatives.

**Figure 1: Systematic review flow diagram**

**Source: Authors’ construct**

**3.1 Contextual Context of Ghana**

Ghana, similar to most fast-urbanizing nations in Sub-Saharan Africa, is faced with an acute deficit of affordable housing. Powered by swelling population growth, rural-urban migration, and the growth of informal settlements, urban demand for housing persists to surpass supply. The Ghana Statistical Service (2021) finds that more than 56% of the population is now living in urban places, with Accra, Kumasi, and Tamale under extreme population pressures. The outcome has been a housing deficit presently projected at more than 1.8 million units, and it is still increasing by approximately 70,000 units every year (Ministry of Works and Housing, 2022).

In most of the Ghanaian cities such as Accra, Kumasi, and Tamale, as shown in Figure 4, the formal housing market is led by private sector players who focus on middle- to high-income groups, thereby locking out most of the urban poor and low-income groups (Marigold, 2025). The result is that vast portions of the population engage in self-construction in informal settlements with poorer access to basic infrastructure and services. As Asante & Ehwi (2020) posit, the failure of housing policy to forcefully tackle affordability, access to land, and the provision of infrastructure has increased urban poverty and inequality.

Government interventions over the past decades, like the National Housing Policy (2015) and the establishment of the Rent Control Department, have met with limited success due to institutional inefficiencies, absent enforcement mechanisms, and fiscal constraints (Owusu-Ansah & O'Connor, 2010). Although public-private partnerships (PPPs) have been promoted to increase the supply of housing, their output remains marginal due to cost inflation, administrative bottlenecks, and unaffordability for the intended population (Akomea-Frimpong et al., 2023).

As a reaction to these, greater focus is given to new solutions like the application of prefabricated and modular housing systems, housing micro-financing, and housing cooperatives that are community-based. For example, recent Accra and Ashaiman developments have revealed that incremental housing schemes and participatory planning can present affordable and context-specific solutions (UN-Habitat, 2021). Likewise, local NGOs and startups are testing green building materials and digital platforms to scale up housing delivery to the poor and other marginalized communities (Tekpe, 2024). These trends highlight the pressing need for a multi-stakeholder, comprehensive response to affordable housing in Ghana's cities, leveraging the potential of technological innovation, inclusive urban planning, and policy reform.



**Figure 4: Map of Study Area**

Source: Sarpong et al., 2025

**4. Analysis and Discussion**

**4.1 Innovative Housing Solutions**

Tables 1, 2 and 3 summarize the themes of modular and prefabricated housing, sustainable building materials and community-led housing initiatives, with relevant articles organized under each theme. Each entry is summarized to provide key insights relevant to innovative housing solutions to housing affordability crisis.

**Table 1: Modular and Prefabricated Housing**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author(s)** | **Year of Publication** | **Objectives** | **Methodology** | **Key Findings** | **Relevance** |
| Adeyemi, A. B., Ohakawa, T. C., & Okwan, A. C. | 2024 | To explore benefits and design considerations for modular housing in affordable housing delivery. | Literature review and architectural design analysis | Prefabricated housing reduces cost and time of construction. | Demonstrates economic and time-saving benefits relevant to Ghana's housing deficit. |
| Dok-Yen, D. M., Duah, D. Y. A., & Addy, M. N. | 2023 | To assess the potential of frugal innovation for sustainable housing. | Bibliometric and systematic review | Modular housing offers flexibility, large-scale production, and energy efficiency. | Highlights frugal innovation's relevance for urban poor in Ghana. |
| Moghayedi et al. | 2021 | To identify success factors for innovative housing. | Systematic review | Prefabricated housing can reduce costs by 30% and project duration by 40%. | Provides empirical evidence supporting prefabrication’s viability. |

Source: Authors’ Construct

**Table 2: Sustainable Building Materials**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author(s)** | **Year of Publication** | **Objectives** | **Methodology** | **Key Findings** | **Relevance** |
| Adabre et al. | 2021 | Analyze barriers to green housing implementation. | Modelling barriers | Awareness, policy, and skilled labor shortages hinder green tech adoption. | Identifies constraints to applying green solutions. |
| Darko, A., Chan, A. P. C., & Owusu, E. K. | 2018 | Identify green technologies for housing in Ghana. | Empirical study | Natural ventilation and energy-efficient lighting are impactful green tech. | Provides Ghana-specific green housing insights. |
| Enekwachi-Akpa, L. C. | 2024 | Explore sustainable housing solutions. | Empirical and theoretical analysis | Training and incentives can promote green material use. | Offers practical pathways for green tech mainstreaming. |
| Saini et al. | 2023 | Review affordable housing strategies for slum rehabilitation. | Literature review | Emphasizes use of recycled and local materials like bamboo. | Supports cost-effective materials as substitutes for cement and steel. |
| Tekpe, E., Ansah, S. K., & Akomah, B. | 2022 | Promote sustainable materials for affordable housing. | Case-based research | Locally sourced materials reduce cost and environmental impact. | Promotes use of appropriate tech for Ghanaian conditions. |

Source: Authors’ Construct

**Table 3: Community-Led Housing Initiatives**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author(s)** | **Year of Publication** | **Objectives** | **Methodology** | **Key Findings** | **Relevance** |
| Addo, I. A. | 2014 | Study housing delivery mechanisms. | Empirical | Community models face infrastructure and tenure insecurity. | Reveals system-level barriers needing policy fixes. |
| Biitir, S. B. | 2009 | Examine self-help housing in Tamale. | Field study (Master's thesis) | Collective housing reduces costs and fosters ownership. | Local evidence for bottom-up housing strategies. |
| Boateng, F. G., & Klopp, J. M. | 2024 | Analyze exclusion and housing injustice. | Qualitative policy review | Lack of official recognition weakens community efforts. | Shows institutional reforms needed to scale community housing. |
| GEF STAP | 2024 | Explore community-based approaches to housing. | Policy paper | Participatory design and incremental construction improve housing affordability. | Supports community-led design in informal settlements. |
| Gillespie, T. | 2018 | Investigate self-help housing and financial inclusion in Accra. | Empirical analysis | Community savings and microfinance can enhance scalability. | Demonstrates grassroots housing finance success. |

Source: Authors’ Construct

**4.2 Role of Technology in Housing Solutions**

Tables 4, 5 and 6 summarize the themes of smart housing technologies, digital platforms for housing access, and data analytics in urban planning, with relevant articles organized under each theme. Each entry is summarized to provide key insights relevant to role of technology in housing solutions.

**Table 4: Smart Housing Technologies**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author(s)** | **Year of Publication** | **Objectives** | **Methodology** | **Key Findings** | **Relevance** |
| Adabre et al. | 2021 | Analyze barriers to green housing. | Modelling barriers | High capital and lack of skilled labor hinder implementation. | Shows the financial and technical limits to smart adoption. |
| Bhanye et al. | 2024 | Review sustainable housing strategies. | Rapid review | BIM and 3D printing improve design and reduce cost. | Highlights digital tools for efficient housing delivery. |
| Darko et al. | 2018 | Identify green technologies in Ghana. | Empirical | Solar panels, efficient HVAC, and lighting save energy. | Aligns smart tech with Ghana’s green building goals. |
| Homz Global | 2025 | Promote smart tech in sustainable housing. | Tech industry insight | Smart systems improve energy and cost efficiency. | Raises awareness of modern housing technologies. |
| Moghayedi et al. | 2021 | Identify critical success factors for innovation. | Systematic review | Smart tech essential for cost and time efficiency. | Empirical support for innovative practices. |

Source: Authors’ Construct

**Table 5: Digital Platforms for Housing Access**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author(s)** | **Year of Publication** | **Objectives** | **Methodology** | **Key Findings** | **Relevance** |
| Adu et al. | 2023 | Analyze pricing and access via web scraping. | Data analytics | Price disparities hurt low-income access. | Calls for inclusive digital access. |
| Afrane et al. | 2023 | Examine stakeholder views on housing barriers. | Survey | Need for coordination in digital registry systems. | Supports institutional digital reform. |
| Gibb et al. | 2013 | Explore housing finance innovation. | Comparative analysis | Centralized platforms reduce info asymmetry. | Promotes integrated housing systems. |
| Noanyi | 2020 | Describe digital housing platforms in Ghana. | Online market analysis | Portals improving market access. | Shows digital shift in housing search. |
| Wangari, J. N. | 2017 | Develop mobile rent systems. | System design (Master’s thesis) | Mobile/SMS systems improve low-income access. | Useful in digitally excluded urban areas. |

Source: Authors’ Construct

**Table 6: Data Analytics in Urban Planning**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author(s)** | **Year of Publication** | **Objectives** | **Methodology** | **Key Findings** | **Relevance** |
| Adabre & Chan | 2021 | Model sustainability challenges. | Survey and statistical modelling | Data helps optimize housing interventions. | Supports data-driven policy frameworks. |
| Fisher & Singh | 2023 | Use geospatial tools for housing data. | GIS analysis | Detects informal growth and infrastructure gaps. | Data-backed planning for informal settlements. |
| Fosu, A. | 2021 | Study land conflicts and planning. | Field analysis | GIS can aid sustainable urban land use. | Relevance to peri-urban housing planning. |
| Moghayedi et al. | 2021 | Identify innovation enablers. | Systematic review | Real-time data improves delivery and monitoring. | Applies to efficient urban housing strategy. |
| World Bank | 2023 | Present municipal data infrastructure. | Technical assistance report | Institutional data systems improve planning. | Strategic guidance for urban governance. |
| Wuni et al. | 2018 | Review housing deficit drivers. | Scoping review | Data identifies systemic causes of housing shortages. | Evidence-based approach to policy reform. |

Source: Authors’ Construct

**Innovative Housing Solutions**

***Modular and Prefabricated Housing:*** There is consensus among scholars that prefabricated and modular building has tremendous potential for affordable housing in Ghana. Adeyemi et al. (2024) attest to the time and cost efficiency advantages of modular homes, arguing that off-site production drastically minimizes construction duration and material wastage. This aligns with Moghayedi et al. (2021), in which the advantages, cost savings by up to 30% and construction time by 40% are quantified in favor of the argument using global benchmarks. Nevertheless, whereas these research studies affirm the advantages, Dok-Yen et al. (2023) provides a Ghana-focused approach, with a focus on modular housing as a frugal innovation for the urban poor. However, a point of divergence emerges: whereas global data informs implementation, Ghana has contextual limitations, including absence of local manufacturing and policy support, large-scale adoption. Therefore, whereas the literature converges on the effectiveness of modular housing, its adoption in Ghana needs policy incentives, capacity development, and private sector involvement to surmount existing barriers.

***Sustainable Building Materials:*** Utilization of local and green materials is another globally accepted approach. Tekpe et al. (2022) and Saini et al. (2023) are both in agreement on the cost-effectiveness and environmental benefits of more sustainable materials such as compressed earth blocks, laterite, and bamboo over imported cement and steel. Darko et al. (2018) build on this by discussing particular green technologies like natural ventilation and energy-efficient lighting, and demonstrating their practical relevance to the Ghanaian context. They present empirical evidence that these technologies and materials improve indoor comfort and energy efficiency, and provide cost savings in the long term. But Adabre et al. (2021) and Enekwachi-Akpa (2024) warn that large-scale use of sustainable materials is confronted by constraints such as shortage of highly skilled manpower, low public awareness, and policy lethargy. This is in contrast to the enthusiastic sales pitch of previous research, which indicates that cost benefits are contingent on systemic support. Collectively, the sources confirm the potential of sustainable materials but posit that to ramp them up, there must be an integrated approach, such as training, regulation, and incentives for developers.

***Community-Led Housing Initiatives:*** The literature on community-based housing observes agreement on its social inclusivity and affordability advantages. GEF STAP (2024) and Gillespie (2018) contend that self-help and collective building trigger ownership, lower costs, and address local cultural demands. Biitir (2009) offers localized facts in the context of Tamale, illustrating how self-help housing enhances affordability where there is no formal finance system. Nevertheless, such low-level options are confronted with institutional and infrastructural abandonment. Boateng & Klopp (2024) and Addo (2014) posit that while they are valuable, these initiatives are not visible to formal policy structures and hence culminate in tenure insecurity and absence of basic services. This is a sad irony—successful on a community level, such models are at the margin of formal urban development planning. Therefore, although the model is practicable, it has to be complemented by inclusive policies, infrastructural provision, and official sanction in order to be totally transformative.

**Role of Technology in Housing Solutions**

***Smart Housing Technologies:*** The incorporation of innovative smart technologies in home building, including solar panels, BIM, 3D printing, and automation systems, is presented as a state-of-the-art affordability and sustainability solution. Homz Global (2025) and Darko et al. (2018) affirm the efficacy of these tools in optimizing energy efficiency and minimizing operational expenses, especially amidst climate change. Bhanye et al. (2024) and Moghayedi et al. (2021) also contend that they accelerate construction and enhance design precision, the prerequisites for mass affordable housing. Adabre et al. (2021), however, offers a critical dissent, quoting capital expense, scarcity of skilled manpower, and missing governance structures as hindrances. This juxtaposition highlights a basic lacuna: despite impending smart technologies, their equal uptake in Ghana involves capacity development, subsidization, and institutional harmonization, without which the gains will continue to elude the poor.

***Digital Platforms for Housing Access:*** There is widespread agreement that online platforms are reshaping housing markets. Noanyi (2020) and Adu et al. (2023) invoke the convenience with which online platforms offer access to listings and time-series market information. But Adu et al. (2023) warn that existing platforms are biased by prices against poor consumers and threatening digital inequality. Gibb et al. (2013) and Afrane et al. (2023) suggest integrated, centralized systems connecting finance, land, and permits to enhance transparency and coordination. Wangari (2017) also suggests mobile-based solutions to prevent exclusion for digitally marginalized people. The comparison shows agreement on digital potential but a strong case in favor of inclusive design. Equity will only be realized if there are accessible platforms, multi-lingual and capable of meeting the demands of low-income and peri-urban dwellers.

***Data Analytics in Urban Planning:*** The use of data analytics is confirmed as a critical tool for evidence-based planning. Fisher & Singh (2023) and Adabre & Chan (2021) point out how geospatial analysis uncovers hidden informal settlement patterns and informs resource allocation. Fosu (2021) and Wuni et al. (2018) also mention that big data is used to diagnose housing shortages and policy gaps. Yet, as World Bank (2023) and Moghayedi et al. (2021) maintain, the capacity of Ghana to aggregate data is hampered by inadequate inter-agency coordination and inadequate training of analysts. Therefore, as much as there is potential in data analysis, it must be supplemented by capacity development, data harmonization, and engagement to improve inclusiveness and responsiveness of housing policy.

**5. Conclusion and Recommendation**

The low- and middle-income housing crisis in Ghana is an emergent issue that has been compounded by rapid urbanization, economic hardship, and policy lapses in implementation. The paper affirmatively states that conventional housing alternatives have not met the demands of the low- and middle-income households, resulting in increased dependency on slums and poor living conditions. In meeting these exigent demands, priority should be given to the adoption and implementation of innovative housing alternatives. Modular and prefabricated building techniques can result in substantial construction saving both cost and time. Domestic manufacturing capabilities and policy investments would be essential to enable large-scale use of these technologies in the future. In addition, encouraging local use of low environmental footprint green materials will reduce construction costs while keeping ecological footprint low. Training builders and offering incentives to developers to utilize green technology can be the special focus.

Enabling community-driven housing projects is another critical part of the solution. Institutional endorsement and approval can empower neighborhood communities to engage with planning and development. This will not only promote social cohesion but also make housing solutions culturally sensitive and address the situation-specific needs of communities. Public-private partnerships (PPPs) can be an essential mechanism to deal with the housing crisis. Enhancing the contribution of such partnerships involves establishing clear regulatory frameworks and encouraging the involvement of low-income populations in housing projects. Such a move can lure private investment while meeting the needs of the most vulnerable sections of society.

Use of digital platforms and intelligent housing technologies in the housing industry can further expand access to processes and data on housing. Such technologies allow for improved planning and utilization of resources, and opening up housing markets to everyone and become transparent. Data-driven city planning is also equally vital. Utilization of data analysis can be made to influence urban planning through providing insights in trends, estimation of housing demands, and enhancing policy responsiveness. Increased access to urban data will allow stakeholders to make well-informed decisions that serve the interests of housing provision. Lastly, it is essential to advocate for radical housing policy changes that ensure affordability, inclusivity, and sustainability. These should address the long-standing disparities in housing provision and ensure equitable access to housing for all citizens. Implementation of these recommendations will allow Ghana to build foundations for more inclusive, sustainable, and resilient urban growth. This is a long-term strategy that will ultimately fill the housing gap and enhance the life of its city dwellers, moving towards an equitable society for everyone.

**Conflict Of Interest Statement**

The authors do not know of any conflicts of interest associated with this publication.

**Disclaimer (Artificial intelligence)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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