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Determinants of Building Performance in Residential Estates: A Review of Climatic, Design, and Socio-Economic Influences in Developing Urban Settings

Shoremi Gaddiel A.; Daramola Samuel A.; Adegbile Micheal B. O.; & Ajayi Oluwatoyin O.

Department of Architecture, College of Environmental Science and Management, Caleb University, Imota, Ikorodu, Lagos, Nigeria

Corresponding Author: toyin.ajayi@calebuniversity.edu.ng

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Abstract

This study investigates the determinants of building performance in residential estates within developing urban settings, with a focus on climatic, design, and socio-economic influences. Building performance is a critical factor in ensuring livable, durable, and sustainable housing, especially in rapidly urbanizing environments. While numerous studies have examined these variables individually, there is limited integrative research that considers how these determinants interact to affect overall building functionality and user satisfaction. This research adopts a systematic literature review (SLR) approach, analyzing findings from selected peer-reviewed studies to evaluate how climate conditions, architectural design, and socio-economic factors influence residential building outcomes in urban areas. By synthesizing the literature, the study highlights the gaps in policy implementation, user engagement, and design standards that hinder optimal building performance. The insights gained are intended to inform urban planners, architects, and housing policymakers on strategies to enhance residential building quality and resilience in developing cities.

Keywords: Building performance, Residential estates, Urban housing, Socio-economic factors, Climate-responsive design, Systematic Literature Review, Developing countries

Introduction

Housing is a fundamental component of human well-being, serving not only as a shelter but also as a critical determinant of quality of life and subjective life satisfaction. It provides individuals and families with physical security, social identity, and access to vital amenities, which collectively influence their overall happiness and life satisfaction. Research has consistently shown that satisfaction with one's housing environment plays a pivotal role in shaping broader evaluations of life quality, linking housing conditions closely to both physical and psychological well-being (Ezennia & Hoskara, 2021). Thus, housing is more than just the physical structure it encompasses a complex interplay of environmental, social, economic, and cultural factors that collectively impact residents' experiences. In developing urban contexts, the challenges of providing adequate housing are compounded by rapid urbanization, limited infrastructure, and socio-economic inequalities, which often result in disparities in housing quality and access to basic services. The physical characteristics of housing, such as size, building materials, and spatial layout, significantly affect residents' comfort and satisfaction. Additionally, external factors like the location of housing estates, access to social infrastructure (including schools, healthcare, and recreational facilities), and availability of utilities such as water and electricity contribute markedly to the livability of residential areas. In many cases, residents report higher satisfaction with internal housing features like dwelling size and privacy, while expressing dissatisfaction with neighbourhood amenities and public service provision (Ezennia & Hoskara, 2021).

Socio-economic attributes of residents such as income, education, employment, household size, and tenure status also influence perceptions of housing adequacy and quality. Middle-income, educated, and married household heads tend to have higher expectations and greater engagement in the maintenance and management of their homes, which in turn supports better housing outcomes (Ezennia & Hoskara, 2021). However, uneven access to resources and socio-economic disparities continue to challenge equitable housing delivery, underscoring the need for inclusive policies that address the diverse needs of urban populations. Furthermore, housing delivery mechanisms, including turnkey projects, core housing, public-private partnerships, and self-help housing, impact the affordability, quality, and sustainability of housing stock. Effective participation of private sector actors alongside government initiatives can enhance housing provision, promote home ownership, and improve residents' satisfaction and well-being. Such collaborative approaches are crucial for tackling the housing deficits faced in many developing cities. Subjective life satisfaction related to housing is not solely dependent on the physical structure but also reflects residents' overall experiences and social conditions, reinforcing the idea that

housing should be understood as a holistic phenomenon encompassing both objective conditions and subjective perceptions (Ezennia & Hoskara, 2021). Despite the importance of these factors, research often neglects broader life domains such as health, culture, family, and leisure that also influence satisfaction with life, indicating gaps in the comprehensive assessment of housing impacts.

In essence, housing is a multifaceted social good that is central to individual and community development. Understanding its determinants from environmental design and socio-economic factors to governance and delivery strategies is essential for improving the sustainability and livability of residential environments, particularly in rapidly growing urban areas of developing countries. Such knowledge can guide policy makers, planners, and practitioners in creating housing solutions that not only meet basic shelter needs but also enhance residents' overall well-being and life satisfaction. The aim of this study is to examine the key factors influencing building performance in residential estates within developing urban environments, focusing on the interplay of climatic conditions, architectural design elements, and socio-economic variables, to enhance the understanding of how these determinants impact residents' satisfaction and overall building functionality (Ezennia & Hoskara, 2021).

The objectives are to:

i. analyze the effects of climatic factors on the performance and durability of residential buildings in developing urban areas, considering how environmental conditions influence occupant comfort and building longevity;
ii. evaluate the role of design characteristics including spatial layout, construction materials, and housing delivery strategies in shaping the quality and sustainability of residential estates; and
iii. investigate the socio-economic influences such as income levels, homeownership status, and access to utilities on residents' satisfaction and the overall effectiveness of residential building performance in public housing contexts.

The significance of this study lies in understanding the determinants of building performance in residential estates is crucial for improving the quality of housing in developing urban settings, where rapid urbanization and socio-economic challenges often compromise residential comfort and durability. This study provides valuable insights into how climatic conditions, architectural design, and socio-economic factors collectively influence the functionality and occupant satisfaction of residential buildings (Ezennia & Hoskara, 2021). By highlighting these interrelationships, the research informs housing policymakers, architects, and developers on key areas that require attention to enhance building sustainability and livability. Specifically, recognizing the role of environmental factors helps in designing climate-responsive housing that can withstand local weather stresses and improve thermal comfort. Furthermore, evaluating design aspects such as spatial configuration, construction quality, and housing delivery methods can guide more effective housing strategies that align with residents' needs and socio-economic realities. Additionally, this study underscores the importance of socio-economic variables including income levels, homeownership, and access to utilities in shaping residents' satisfaction and the overall performance of housing estates. This knowledge is vital for creating equitable housing policies and targeted interventions that improve the living conditions of diverse urban populations in developing regions (Ezennia & Hoskara, 2021). Ultimately, the findings contribute to bridging gaps in housing research within developing countries and support efforts to promote sustainable, functional, and socially responsive residential environments.

The findings from this study are expected to provide valuable insights for policymakers, school administrators, architects, and other relevant stakeholders by highlighting how climatic conditions, design features, and socio-economic factors collectively influence building performance in residential estates within developing urban areas. Understanding these interrelated determinants will enable policymakers to develop more effective housing policies and infrastructure plans that address residents' needs and environmental challenges. For school administrators and educational planners, the research offers guidance on incorporating sustainable building practices and resilience into institutional planning within residential communities. Architects and designers will benefit from evidence-based recommendations that promote building designs responsive to local climate and socio-economic realities, ultimately enhancing occupant satisfaction and maintenance outcomes. By integrating these insights, stakeholders can collaboratively foster sustainable, functional, and socially inclusive residential environments in rapidly urbanizing settings (Ezennia & Hoskara, 2021).

LITERATURE REVIEW

The performance of residential buildings in developing urban areas is influenced by a multifaceted interaction of climatic conditions, design principles, and socio-economic factors. Rapid urbanization in many developing countries has intensified the demand for housing that not only meets basic shelter needs but also ensures durability, occupant comfort, and environmental sustainability (Maina et al., 2021; Mbazor et al., 2024). Studies have underscored the importance of adapting building designs to local climate to enhance thermal comfort and reduce energy consumption (Ige 2017; Kaushik, 2025; Ukpong et al., 2023). Moreover, the socio-economic status of residents, including income levels and educational backgrounds, significantly impacts both housing quality and residents' satisfaction (Ezennia & Hoskara, 2021; Emami et al., 2021). The integration of sound design approaches with socio-economic realities is crucial to promoting long-lasting and functional residential estates (Mohammed, 2021; Nkpite & Okoye, 2020). This literature review critically examines these dimensions to illuminate how climatic, design, and socio-economic determinants collectively shape building performance in urban residential settings within developing countries (Errante et al., 2022; Babalola, 2020; Habila et al., 2023). Understanding these dynamics provides a basis for enhancing housing policies and architectural practices tailored to the unique challenges faced in these environments (Martin-Goni et al., 2024; Olayiwola et al., 2020).

Table 1: shows various housing types and their classification

Type of Housing Classification	Characteristics
By housing type	Room in the apartment Apartment in a multi-apartment residential building or non-residential Building multi-apartment residential building Family house Other
By housing size	One-room, One-room apartment, Two-room apartment, Three-room apartment, and more, Family house, Other
By housing amenities	Housing with all the amenities, Housing with part of amenities, Housing without amenities
By housing location	Housing in a city, Housing in a rural territory
By group of population living in the housing	Any resident, Persons with low-income or other social group at risk
By type of housing ownership rights	State-owned housing, Municipality-owned housing, Natural person's owned building, Legal person's owned housing, Other
By the construction period of the housing	Housing built before World War II, Housing built from 1945 to 1990, Housing built from 1990 until now.
By energy efficiency indicators of housing	Minimum regulatory energy performance level allowed for new Buildings, Minimum regulatory energy performance level allowed for, reconstructed or renovated buildings, Almost zero energy consumption housing, Other
By construction materials used in the exterior wall of the housing	Brick wall, Wood, Brick/panel, Reinforced concrete/ Lightweight concrete, Wood/masonry, Other.

Source: Mbazor, Aigbavboa & Thwala (2024)

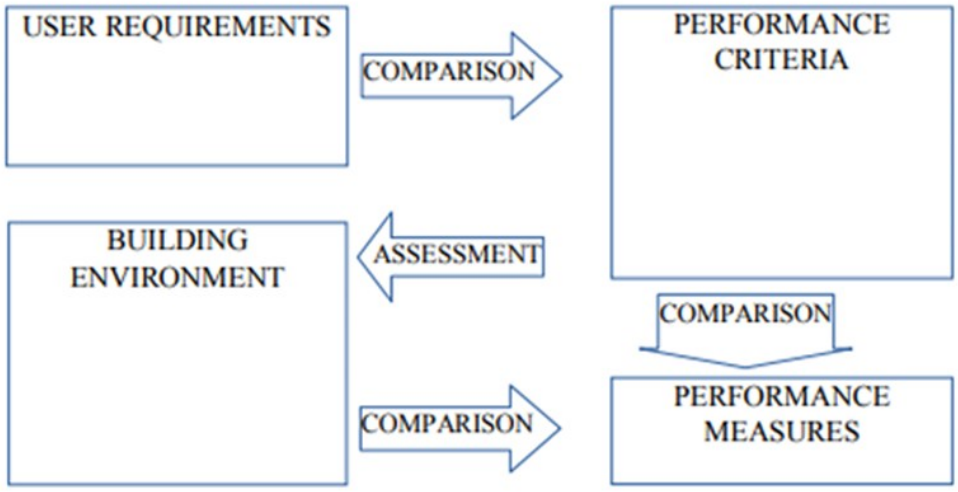


Figure 1: Performance Concept in Building.
Source: Mohammed (2021)

Climatic Determinants of Building Performance

Climatic factors significantly influence the physical performance, energy efficiency, and habitability of residential buildings, particularly in developing urban areas. In regions characterized by tropical climates, such as sub-Saharan Africa, buildings are often exposed to extreme heat, high humidity, intense solar radiation, and heavy rainfall—all of which require climate-sensitive design interventions (Ige 2017; Kaushik, 2025; Errante et al., 2022). When buildings are designed without responding to these climatic conditions, indoor comfort becomes compromised, leading to higher energy use for artificial cooling and ventilation. For example, poorly oriented structures, inadequate shading, and non-reflective roofing materials have been identified as major contributors to thermal discomfort in Nigerian and Indian housing estates (Nkpite & Okoye, 2020; Ige 2017; Kaushik, 2025).

Maina et al. (2021) emphasize that many residential developments in developing countries fail to adopt passive cooling strategies, such as cross-ventilation and sun-shading devices, which are essential for enhancing building performance in hot climates. Similarly, Errante et al. (2022) argue that building performance in tropical urban areas should prioritize context-responsive architecture to reduce overdependence on mechanical systems. The absence of thermal performance analysis during design stages often leads to suboptimal layouts that retain heat and increase discomfort (Kaushik et al., 2025; Ige, 2017). The reality of climate change introduces new challenges that require urgent attention in building design. Olayiwola et al. (2020) highlight that flooding, rising temperatures, and increased rainfall intensity increasingly affect the durability and energy performance of housing units in Nigerian urban centers. Consequently, a deeper integration of climatic data into the planning, design, and retrofitting of residential estates is necessary for ensuring sustainable housing development in the face of evolving environmental conditions (Maina et al., 2021; Babalola, 2020).

Design-Related Determinants of Residential Building Performance

The design of residential estates is a pivotal determinant of building performance, affecting not only structural stability and spatial functionality but also the psychological well-being of occupants. Design components such as building orientation, form, layout, materials, fenestration, and service integration contribute directly to thermal comfort, airflow, and maintenance efficiency (Mbazor et al., 2024; Ukpong et al., 2023). In developing urban areas, however, rapid urbanization often leads to the adoption of standardized and generic building templates that fail to respond to site-specific needs and environmental conditions (Martin-Goni et al., 2024). Olayiwola et al. (2020) and Babalola (2020) note that such generic housing solutions typically result in poor spatial arrangements, limited cross-ventilation, and congestion, thereby affecting both comfort and safety. Research by Maina et al. (2021) indicates that most post-occupancy dissatisfaction in urban estates is tied to inadequate consideration of user needs and contextual realities during the design phase. For instance, in their study of Lagos State housing estates, they found that many buildings lacked functional drainage systems, appropriate window placements, and natural lighting features.

The use of low-quality materials and poor construction detailing has been identified as a key design-related weakness. Mohammed (2021) and Nkpite & Okoye (2020) emphasize that inadequate attention to maintenance-friendly design—such as accessibility to plumbing, electrical conduits, and roof elements—results in faster deterioration and higher repair costs. The lack of inclusive design, particularly for the elderly and differently-abled, also reflects a significant gap in the performance expectations of many residential projects (Habila et al., 2023; Ezennia and

Hoskara, 2021). Incorporating sustainable design approaches such as green roofs, energy-efficient lighting, rainwater harvesting, and modular systems can significantly enhance long-term building performance. However, adoption remains low due to limited professional training, poor regulatory enforcement, and cost-related constraints in most developing countries (Mbazor et al., 2024; Maina et al., 2021).

Socio-Economic Factors Influencing Building Performance

Socio-economic variables play a fundamental role in shaping the performance, durability, and usability of residential buildings in developing urban settings. Elements such as household income, education level, employment status, and housing tenure directly influence a resident's ability to maintain, adapt, or improve their home environment (Emami et al., 2021; Habila et al., 2023). Households with limited financial capacity often face significant constraints in affording quality construction materials, hiring skilled professionals, or conducting timely repairs leading to gradual deterioration of buildings (Babalola, 2020; Mohammed, 2021). Public housing schemes especially reveal the stark impacts of socio-economic disparities, with lower-income occupants often residing in overcrowded and poorly serviced units. These living conditions not only compromise structural integrity but also contribute to sanitation and health concerns (Ukpong et al., 2023).

Social stratification further affects access to maintenance and quality amenities. For instance, Martin-Goni et al. (2024) observed that higher-income groups typically benefit from better-designed housing with consistent professional upkeep, while lower-income tenants experience neglect and degradation. Socio-economic background also shapes behavior, as occupants with higher educational attainment tend to practice more responsible maintenance habits, energy-saving techniques, and environmentally conscious behavior (Ezennia and Hoskara, 2021). Conversely, a lack of awareness and resources may result in improper use of facilities, deferred repairs, or neglect of shared maintenance duties (Habila et al., 2023). Additionally, informal housing developments and rapid urbanization have overwhelmed existing regulatory frameworks, leading to the proliferation of substandard residential environments. As highlighted by Mbazor et al. (2024), weak housing policy enforcement and fragmented governance among stakeholders have exacerbated these challenges. Hence, assessing building performance requires a comprehensive understanding of socio-economic dynamics such as affordability, social integration, and institutional support (Maina et al., 2021; Nkpite & Okoye, 2020).

Theories of Determinants of Building Performance in Residential Estates

The study of building performance in residential estates within developing urban settings necessitates a multifaceted theoretical lens that incorporates environmental, design, and socio-economic dimensions. This research is anchored in three key frameworks: Sustainable Building Theory, Environmental Behavior Theory, and Systems Theory. Sustainable Building Theory posits that high-performing buildings must be responsive to their environmental context through climate-sensitive design, energy efficiency, and durable materials. These principles are especially relevant in tropical urban settings, where passive cooling, ventilation, and localized material choices play significant roles in building durability and comfort (Kaushik et al., 2025; Errante et al., 2022). For instance, Ige et al. (2017) and Mohammed (2021) emphasize that inadequate design orientation and thermal inefficiency are major contributors to poor building performance in low-income estates. Meanwhile, Environmental Behavior Theory explains how residents' socio-economic characteristics and awareness levels affect housing outcomes. According to Ezennia and Hoskara

(2021) and Habila et al. (2023), building maintenance, cleanliness, and adaptive use are heavily influenced by occupants' education, income, and habits factors that are often unevenly distributed in developing cities. Babalola (2020) and Ukpong et al. (2023) further note that such disparities lead to differing levels of deterioration and user satisfaction within similar estate types.

Systems Theory adds another critical layer by framing building performance as a function of interrelated urban, institutional, and socio-economic subsystems. Maina et al. (2021) and Nkpite and Okoye (2020) argue that weak governance structures, inconsistent enforcement of building regulations, and fragmented stakeholder engagement contribute to the inefficiencies observed in public housing developments. Mbazor et al. (2024) and Olayiwola et al. (2020) highlight that the absence of coordinated housing policy results in infrastructural degradation and inequitable service delivery, particularly for marginalized populations. In this context, Martin-Goni et al. (2024) emphasize how socio-economic class directly affects access to well-maintained homes, reinforcing housing inequality. Additionally, Iyegere et al. (2023) show how historical urban planning and local political dynamics influence the physical condition and usability of residential estates. Empirical insights from Emami et al. (2021), 2011) support a holistic view, linking post-occupancy evaluations, affordability, and environmental sustainability as interdependent determinants of residential building performance. Together, these theories establish a comprehensive framework for analyzing how climatic, design, and socio-economic factors interact to shape the performance of housing estates in rapidly urbanizing and resource-constrained environments.

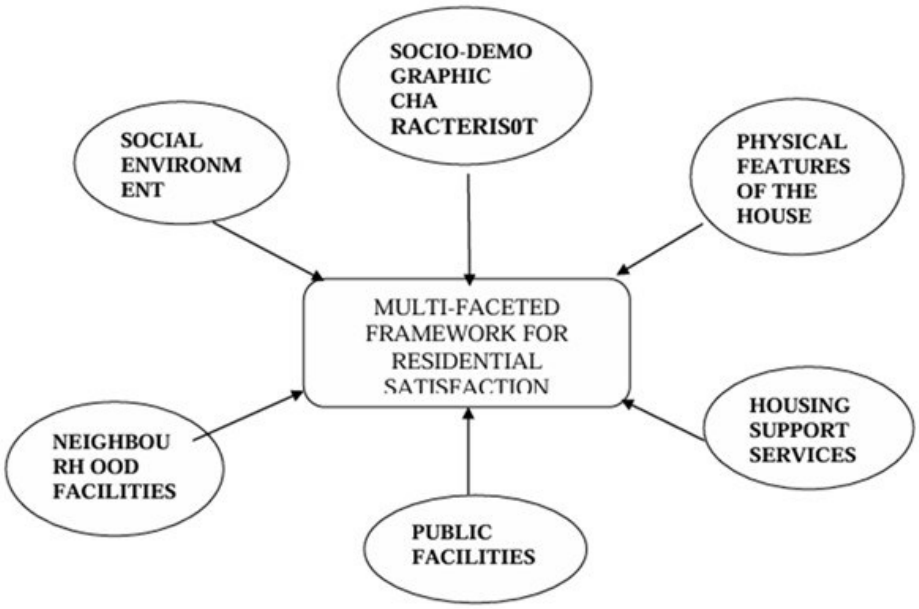


Figure 2: Concept Model
Source: Mohammed (2021)

Determinants of Building Performance in Residential Estates

The empirical review examines various studies on the multifactorial nature of building performance in residential estates across diverse urban contexts in developing countries. Many of these studies emphasize the role of socio-economic variables in shaping housing quality and durability. For instance, Emami et al. (2021) found that income level, educational attainment, and occupation significantly affect the ability of residents to maintain and upgrade their homes in public housing

schemes. Similarly, Babalola (2020) observed that housing satisfaction and durability are often compromised in low-income settings due to poor maintenance culture and limited user awareness. These findings are reinforced by Habila et al. (2023), who identified that occupants' socioeconomic conditions influence their behavior towards energy use, sanitation, and building preservation. Climatic adaptability and environmental responsiveness are equally critical in ensuring building performance. In a study conducted by Kaushik et al. (2025), climate-sensitive design strategies were shown to enhance thermal comfort and energy efficiency, reducing long-term operational costs. Errante et al. (2022) also documented how passive design interventions and local material use contribute positively to resilience and indoor comfort in warm-humid environments. Ige et al. (2017) further observed that poor climatic design integration—especially regarding ventilation and orientation—leads to overheating and accelerated wear in Nigerian housing estates. Mohammed (2021) emphasized that the absence of context-specific design standards often results in buildings that underperform both functionally and environmentally.

Design-related factors have also received significant empirical attention. According to Ezennia and Hoskara (2021), the spatial layout, accessibility, and overall planning of residential estates are critical determinants of performance. Their study highlighted that estates with poorly planned infrastructure—such as narrow roads, inadequate drainage, and poor ventilation—tend to deteriorate more quickly. Martin-Goni et al. (2024) supported this by demonstrating that professional design quality and construction supervision result in improved occupant satisfaction and reduced long-term maintenance needs. Iyegere et al. (2023) and Olayiwola et al. (2020) noted that legacy planning systems in Nigeria often overlook essential urban design principles, thereby limiting the functionality and livability of modern estates. Institutional frameworks and governance structures also influence the performance of residential buildings. Maina et al. (2021) and Nkpite & Okoye (2020) revealed that fragmented policies, weak enforcement mechanisms, and lack of stakeholder collaboration hinder sustainable building maintenance and monitoring. Mbazor et al. (2024) further found that housing authorities often lack the capacity and resources to manage post-occupancy needs, leading to rapid deterioration, especially in social housing developments. Ukpong et al. (2023) observed that public housing in Nigeria is frequently marred by inequitable service distribution, poor facilities, and mismanagement, with the urban poor disproportionately affected.

In summary, the empirical evidence strongly supports a multidisciplinary view of building performance, integrating climatic responsiveness, design standards, socio-economic dynamics, and institutional governance. Collectively, these studies offer a valuable basis for evaluating and enhancing residential estate performance in rapidly urbanizing regions of the Global South.

Identification of Gaps in Literature

This section outlines key research gaps associated with the assessment of climatic, design, and socio-economic influences on the performance of residential buildings in developing urban settings. While various studies have evaluated components of building performance, several critical areas remain underexplored, particularly in the context of fast-growing cities in the Global South.

i. Fragmented Integration of Climatic, Design, and Socio-Economic Factors: Much of the existing literature examines climatic conditions, design practices, or socio-economic status in isolation rather than adopting a comprehensive framework. For example, studies such as those by Emami et al. (2021) and Babalola (2020) discuss user satisfaction and housing adequacy, but do not holistically integrate climatic stressors or architectural performance

in varying urban contexts. This segmentation limits understanding of the synergistic impact these variables have on long-term building performance.

ii. Insufficient Focus on Climate-Responsive Housing Design in Low-Income Settings: Although Kaushik et al. (2025) and Errante et al. (2022) offer insight into sustainable and climate-sensitive construction methods, most of these studies are case-specific or based on experimental models with limited real-world application in low-income urban settings. The performance of residential buildings under local environmental pressures, such as heat, rainfall, and humidity, remains inadequately studied in many African cities.

iii. Lack of Contextual Socio-Economic Analyses Related to Housing Durability: There is a scarcity of studies that thoroughly examine how socio-economic variables such as income, education, and housing tenure affect building performance. For instance, Ukpong et al. (2023) and Martin-Goni et al. (2024) identify disparities in housing quality across income groups, but do not evaluate how these disparities impact maintenance behavior or structural longevity. Similarly, Habila et al. (2023) and Mohammed (2021) report on the influence of user awareness and financial capacity, but lack longitudinal data that captures ongoing housing degradation or adaptation strategies.

iv. Limited Research on Institutional and Policy Impacts on Building Performance: Despite discussions on policy shortcomings in urban housing delivery, such as those by Maina et al. (2021), Nkpite & Okoye (2020), and Mbazor et al. (2024), the link between regulatory enforcement, stakeholder coordination, and building functionality remains vague. More in-depth inquiry is needed into how institutional frameworks either support or hinder sustained building performance in public and private housing estates.This study aims to address these gaps by thoroughly assessing both the availability and quality of inclusive design features in Lagos State's public and private primary schools, thereby contributing valuable insights toward enhancing equitable learning environments in the Nigerian educational context.

METHODOLOGY

This study adopts a Systematic Literature Review (SLR) as its research methodology. An SLR is a methodical and transparent process for gathering, evaluating, and synthesizing existing research to comprehensively address a defined research question while minimizing bias (Dewey & Drahota, 2016). This approach is particularly suitable for exploring complex topics such as the determinants of building performance in residential estates, where diverse factors like climatic, design, and socio-economic influences intersect. By systematically identifying, selecting, and critically appraising relevant studies, the SLR ensures that findings are based on credible, high-quality evidence, thereby providing a reliable foundation for understanding current knowledge and gaps in developing urban contexts.

For this review, twenty peer-reviewed articles were selected due to their direct relevance to climatic conditions, architectural design, and socio-economic factors affecting residential building performance in developing urban settings. These studies span various geographical locations, primarily focusing on African urban environments but also drawing from comparable developing contexts. Articles were sourced from established academic databases including Scopus, ScienceDirect, JSTOR, Google Scholar, and SpringerLink, using targeted keywords such as "building performance," "climatic influence," "design determinants," and "socio-economic factors." Selection criteria emphasized methodological rigor, empirical grounding, and relevance

to residential estates. The compiled literature provides a comprehensive, multi-faceted understanding of how different determinants interact to influence building durability, usability, and sustainability, thus guiding future research and policy formulation in these settings.

FINDINGS AND DISCUSSION

The review of determinants affecting building performance in residential estates within developing urban settings reveals a complex interplay between climatic, design, and socio-economic factors that shape overall building durability and occupant satisfaction. Climatic influences such as temperature variations, humidity, and exposure to harsh weather conditions have been shown to accelerate material degradation and impact thermal comfort, necessitating the integration of climate-responsive design strategies like natural ventilation and shading to mitigate these effects (Kaushik et al., 2025; Errante et al., 2022). Design considerations, including spatial configuration, choice of materials, and maintenance planning, play a crucial role in enhancing building resilience and adaptability. Research indicates that the adoption of sustainable materials and modular construction techniques can significantly reduce maintenance challenges and improve building lifespan in resource-limited contexts (Emami et al., 2021; Ige, 2017; Babalola, 2020

Socio-economic factors profoundly influence the capacity of residents to maintain and upgrade their homes, thereby affecting building performance outcomes. Studies highlight that lower-income households and those with insecure tenure often face barriers to accessing quality building services and infrastructure, resulting in uneven building conditions and accelerated deterioration (Ukpong et al., 2023; Mbazor et al., 2024; Mohammed, 2021). Educational attainment and community engagement also determine maintenance behavior and awareness, which are essential for sustaining building functionality over time (Habila et al., 2023; Emami et al., 2021). The literature further underscores that disparities in service provision and infrastructural quality within residential estates exacerbate socio-economic inequalities and undermine overall building performance (Nkpite & Okoye, 2020; Martin-Goni et al., 2024). These findings collectively emphasize the need for integrated approaches that consider climatic adaptation, culturally relevant design, and socio-economic empowerment to foster sustainable residential environments in developing urban areas.

Table 2: Analysis of Research Articles Relating to Building Performance

S/N	Title of Article & Author's & Year	Aims & Objectives	Methodology	Results	Limitation of study
1	Maina (2021). Socioeconomic and demographic predictors of residential satisfaction within public housing estates in Northern Nigeria.	This study examines relationships between SES and demographic data of residents and levels of satisfaction with their housing environment in Northern Nigeria. Objectives to guide this inquiry include: 1. Exploring levels of association between SES and demographic variables with RS. 2. Determining predictors of RS from SES and demographic data of public housing residents in the study area.	The study adopted a quantitative survey approach, sampling 1,033 housing units from eight public housing estates across Northern Nigeria's three geopolitical zones. Using Yamane's formula and accounting for low response rates, 335 questionnaires were distributed, with 178 valid responses analyzed.	The study found that residential satisfaction in Northern Nigeria's public housing was significantly influenced by marital status, income, and length of stay, with demographic factors having a stronger impact than socioeconomic ones.	The study is limited by its focus solely on public housing estates in Northern Nigeria, excluding other regions and private housing contexts, which may affect the generalizability of its findings.
2	Iyegere (2023). Residential estate; evaluation of thermal comfort essentials for residential buildings in Uyo housing estates	This study aims to evaluate thermal comfort essentials and propose effective architectural and urban design solutions for residential estates in Uyo, Akwa Ibom State. The objectives include assessing current thermal comfort conditions, evaluating its impact on residents, and examining the design strategies employed by professionals. It also seeks to identify suitable architectural and urban interventions to enhance thermal comfort in the study area.	The research methodology involves selecting a sample of residents from various housing estates in Uyo, using a sampling method to choose specific residential buildings for analysis due to the impracticality of studying the entire population. The study focuses on estates such as Ewet Housing Estate and Shelter Afrique, with data collected from an estimated population of households to evaluate thermal comfort essentials in social housing.	The research reveals significant socioeconomic disparities within Akwa Ibom State, particularly in infrastructure development, with Uyo enjoying better road connectivity and social amenities compared to other local government areas. These inequalities highlight the urgent need for more balanced distribution of resources to promote even development across the state..	This study faced limitations including small sample sizes, controlled environments that may not fully represent real-world conditions, and variability in individual thermal comfort responses. Additionally, ethical considerations and cost and time constraints restricted the scope and design of the research.
3	Ukpong, Akah, & Abubaker, (2023). Improving residential outdoor space experience in developing countries: Evidence from a housing estate in Nigeria.	This study aims to evaluate the aesthetic and functional quality of outdoor residential spaces in Ewet housing estate, Akwa Ibom State, Nigeria, while identifying factors that	The study employed a combination of critical field observation using an expert observation schedule and a structured questionnaire survey administered to residents of Ewet	The study found that despite high-quality houses in Ewet housing estate, poor site design, lack of maintenance, and inadequate outdoor	The study focuses solely on a single housing estate in the south-south geopolitical zone of Nigeria, which may limit the generalizability of the

		constrain quality site development. It also seeks to develop conceptual recommendations to improve residential site development for architects, planners, and policymakers in Nigeria and other developing countries.	housing estate, selected through stratified random sampling. Data were analyzed using weighted averages on a 5-point Likert scale and simple regression to assess factors influencing residential site development.	spaces significantly diminish the overall residential environment. Homeowners identified the absence of clear site development guidelines and limited space as major constraints, highlighting the need for both authorities and residents to prioritize functional and aesthetic outdoor values to improve residential site quality	findings to other regions. Additionally, the subjective nature of homeowners' preferences and lifestyle variations may affect the consistency of the data collected on outdoor residential space experiences.
4	Mohammed (2021). Impact of project quality management on the performance of residential estates in North-central Nigeria.	The aim of this study is to examine the effects of project quality management on the performance of residential buildings in North-Central Nigeria, with specific objectives to investigate factors influencing residents' satisfaction, assess the contribution of quality cost to estate performance, evaluate current quality management practices, and develop a sustainable quality management model for residential estates in the region.	This research adopts a quantitative explorative approach, collecting numeric data from occupants of selected residential estates and stakeholders in the North-central region of Nigeria. A simple random sampling technique was used to select a representative sample of 337 participants from an estimated population of 1,925, with data gathered from both primary and secondary sources.	Research is still ongoing.	The study is limited to only four states within the North-Central geopolitical zone of Nigeria, which may not fully represent the entire region. Additionally, it focuses solely on quality management practices adopted by developers in selected residential estates, excluding other factors that might affect building performance.
5	Nkpite, & Esau. Appraising elements of post-occupancy evaluation influencing improvement of residential satisfaction in public housing estates In Nigeria.	The main aim of this study is to appraise the factors influencing the improvement of residential satisfaction in Federal Housing Estates, Abia State, Nigeria. Specifically, the study seeks to examine the aspects and expectations of post-occupancy evaluation (POE) on residential satisfaction and to	The study used an investigative Post Occupancy Evaluation (POE) approach, targeting residents who have lived for more than five years in Federal Housing Estates at Ogbo-Hill and Umuahia, Abia State. A sample of 75 households was selected from 105 housing units, and primary data were	The study found that key aspects influencing residential satisfaction in Federal Housing Estates include architectural design, maintenance management, functional support for daily activities, economic returns,	The study is limited to Federal Housing Estates located in Ogbo-Hill Aba and Umuahia in Abia State, Nigeria, focusing only on the types of residential buildings within these estates. Although it would have been ideal to

		identify the key elements of POE that enhance residential satisfaction in these estates.	collected through self-administered, face-to-face questionnaires using a 5-point Likert scale, with analysis based on mean scores to determine levels of resident satisfaction.	and adherence to building standards. Additionally, factors such as resident feedback, participatory maintenance, innovative tools, effective procurement, and building lifecycle management were identified as crucial determinants for improving residential satisfaction and promoting sustainable built environments.	cover all public housing estates in Nigeria, the scope was restricted to these locations, with the intention that the findings may help improve public housing conditions nationwide.
6	Okoye, Olotuah, & Ezeji. (2020). Tenure of residents as a determinant of maintenance conditions of residential buildings in housing development corporation estates In Enugu	The aim of this study is to investigate the relationship between the tenure status of residents and the maintenance conditions of physical elements in residential buildings within ESHDC estates in Enugu metropolis. The specific objective is to assess how residents' tenure status influences the upkeep and condition of these public housing buildings.	The study employed a survey research design using a multistage stratified random sampling method to select 326 respondents from four ESHDC housing estates in Enugu metropolis, chosen based on their age (before and after 2000). Data were collected from residents across the selected estates—Ekulu East, Golf Course, Republic Layout, and Riverside Estate—proportionate to the number of housing units in each estate.	The study found that residents with long or permanent tenure tend to maintain their buildings better, leading to improved maintenance conditions in public housing estates. Additionally, fostering a sense of collective or shared ownership among residents without long tenure can enhance their responsibility towards building maintenance.	The study is limited to ESHDC residential estates in Enugu metropolis and does not cover other public housing estates in Nigeria, which may have different maintenance practices and conditions.
7	Ige, Binuyo, & Jimoh. (2017). Maintenance practice and occupant's satisfaction in public housing estates: An Osogbo, Nigeria perspective.	The aim of this study is to investigate residents' satisfaction and maintenance practices in Nigerian public housing estates to improve the quality and sustainability of these estates. The specific objectives are to assess the	The study used primary data collected through questionnaires distributed to residents and estate surveyors in Osogbo public housing estates, with responses measured on Likert scales to assess infrastructure conditions and	The study found that while some public housing infrastructures in Osogbo are in relatively good condition, occupant satisfaction with their utilization varies	The limitation of the study is that it focuses primarily on maintenance practices and resident satisfaction without covering all aspects of housing provision or

		level of occupant satisfaction and to identify the factors affecting maintenance culture and housing conditions in public estates.	resident satisfaction. Data analysis involved calculating weighted mean scores for satisfaction and infrastructure quality, along with severity indices and chi-square tests using SPSS to examine factors affecting maintenance.	significantly. It also revealed that simply providing facilities is insufficient; effective maintenance must focus on both the quality of infrastructure and how well they meet residents' needs through coordinated management.	including private housing estates for comparison.
8	Kaushik, Singh, & Kapshe. (2025). Changing vertical wind profile and its importance for wind-induced natural ventilation in high-rise buildings–a case of Pune.	Natural ventilation behaves quite differently in tall buildings compared to low-rise structures. Therefore, measuring the wind conditions at the building site is essential before designing wind-driven natural ventilation systems. This paper emphasizes the importance of gathering site-specific wind data and points out the discrepancy between actual measured wind speeds and those commonly used in design practices.	This method involves an experimental study to measure the wind speed available at a height of 100 meters in a warm and humid climate. Additionally, an analytical mathematical model using interpolation based on secondary wind data was applied to estimate wind velocity at this elevation. The study compares these two approaches to identify differences in predicting the vertical wind profile	The current approach of relying on wind rose diagrams and predictive mathematical models should be validated with actual site-specific wind data before being utilized as input for designing natural ventilation in upper floors.	Further research could explore how wind speed varies around the middle section of the building, calculate an average rate of wind velocity decrease, and develop a generalized wind input guideline for design purposes. Introducing a correction factor for changes in wind velocity could improve the accuracy of vertical wind profile predictions by aligning them more closely with real-time data. This study focuses solely on outdoor wind speeds at different heights on the windward side of the building and is specific to the region studied.
9	Errante. (2022, June). A green technological rehabilitation of	The study aims to evaluate the performance of public housing in	The study employed a questionnaire-based survey targeting heads of	The study revealed that tenants rated water supply,	A limitation of the study is its reliance on tenants' subjective

	the built environment. From public residential estates to eco-districts.	Lagos, Nigeria, by assessing tenants' perceptions of residential quality. The objective is to identify key indicators influencing housing satisfaction, including neighborhood conditions, access to amenities, and dwelling characteristics, to inform improvements in public housing development.	households across four randomly selected public housing estates in Lagos, using systematic sampling to collect data from 1,232 housing units, with 1,022 valid responses analyzed. Data were evaluated using weighted Likert-scale ratings for twenty housing quality indicators, and a correlation matrix was applied to assess relationships between variables at 0.01 and 0.05 significance levels.	ventilation, lighting, and privacy as the most adequate housing quality indicators, while space adequacy, drainage, and electricity supply were seen as inadequate. Significant correlations among several variables suggest that improvements in key housing components can enhance overall residential performance and satisfaction.	perceptions, which may introduce bias and not fully capture objective housing quality. Additionally, the study's focus on specific public housing estates in Lagos may limit the generalizability of the findings to other regions or housing contexts.
10	Martin-Goñi, Avellaneda, & González. (2024). Energetic and functional rehabilitation of residential buildings in Europe: analysis and cataloguing of the strategies used	This study aims to analyze innovations in the energy-oriented rehabilitation and redevelopment of multi-family housing estates, focusing on improving their functional and technical aspects. It seeks to systematically evaluate contemporary rehabilitation cases to guide effective strategies for addressing the obsolescence of existing housing stock.	The methodology involves selecting a diverse sample of post-war European residential buildings based on six criteria related to their original construction and recent rehabilitations, followed by data collection and analysis to evaluate functional and technical improvements. This process includes defining the sample, studying each case, creating an analysis system, and verifying the results to assess the effectiveness of contemporary rehabilitation interventions.	The findings highlight that thermal performance improvements should be integrated with functional and architectural upgrades to effectively resolve the obsolescence of post-war residential buildings. Additionally, the use of industrialized construction technologies in renovations can shorten construction times, reduce tenant disruption, optimize resource use, and minimize environmental impact, as demonstrated by the successful cases studied and	The study is limited to examining housing estates primarily built between the 1960s and 1980s in the European Union and focuses on their energy performance, environmental impact, and rehabilitation potential without covering newer building types or other geographic regions.

				initiatives like the E2ReBuild project.	
11	Olayiwola, & Shakede. (2020). Socioeconomic determinants of formal residential land affordability in Ibadan, Nigeria.	This study aims to examine the socioeconomic determinants affecting the affordability of formal residential land in Ibadan. The objective is to generate insights that can inform policies to enhance equitable access to secure and decent housing plots for urban residents.	The study employed a purposive and systematic sampling approach to survey 354 original plot allottees across 30 government residential estate schemes in Ibadan, selected from a sampling frame of 4,602 accessible allottees. Data was collected using structured questionnaires distributed based on plot density, with medium-, high-, and low-density areas receiving 185, 152, and 17 copies respectively.	The study found that access to loan, education level, family size, and income are significant socioeconomic determinants of residential land affordability in Ibadan. Among these, access to loan emerged as the most influential factor in predicting land affordability, while income level was the least contributing factor.	The study is limited to the formal residential land market in Ibadan and does not cover the informal land acquisition processes or other cities, which may have different socioeconomic dynamics and policy frameworks.
12	Babalola, Ibem, Olotuah, Opoko, Adewale, & Fulani. (2020). Housing quality and its predictors in public residential estates in Lagos, Nigeria.	The aim of this study is to assess the perceived quality of housing and identify its key predictors in government-constructed residential estates in Lagos State, Nigeria. It specifically investigates how factors such as housing unit characteristics, housing type, estate security, and building maintenance influence residents' perceptions of housing quality.	The study employed a questionnaire survey administered to 379 residents across 15 government-built residential estates in Lagos and used descriptive statistics and categorical regression analysis (CATREG) to analyze the data.	Findings show that over 50% of residents rated their housing quality positively, and the top four predictors of housing quality were housing unit adequacy, housing type, estate security, and building maintenance, collectively explaining about 66% of the variance.	The study is limited to government-constructed residential estates in Lagos State and may not fully represent housing quality dynamics in privately developed or informal settlements.
13	Emami, & Sadeghlou. (2021). Residential satisfaction: A narrative literature review towards identification of core determinants and indicators.	This study aims to review residential satisfaction (RS) by exploring its theoretical foundations and synthesizing empirical studies to identify its key determinants. It seeks to uncover which theories underpin RS and to categorize existing research	A systematic narrative review approach was used, with 107 studies selected based on defined inclusion and exclusion criteria following a structured search strategy.	The review identified four primary determinants of RS: urban policy and planning, design principles, social milieu, and residents' attributes, offering interdisciplinary insights and	The study is limited by its focus on previously published literature, which may exclude emerging or unpublished insights and underrepresent studies from less-researched regions.

		findings into core thematic areas influencing RS.		highlighting the concept of residential dissatisfaction.	
14	Ibem, Opoko, Adeboye, & Amole. (2013) Performance evaluation of residential buildings in public housing estates in Ogun State, Nigeria: Users' satisfaction perspective.	This study aims to assess the performance of residential buildings in public housing estates in Ogun State, Nigeria, focusing on how well they meet occupants' needs and expectations. The specific objectives are to examine the physical characteristics of residential buildings constructed between 2003 and 2009 and to evaluate residents' satisfaction with their physical, spatial, locational, aesthetic, and cost attributes.	The study found that residents' satisfaction was highest with spatial layout, thermal comfort, and cost-effectiveness, while dissatisfaction was noted in areas like service quality and air quality. Factor analysis identified key dimensions influencing satisfaction, highlighting the physical, locational, and economic attributes as critical to building performance.	The study found that residents in public housing estates in Ogun State were generally satisfied with their buildings, especially in terms of privacy, spatial comfort, and aesthetic appeal, though dissatisfaction was noted in water and electricity supply, security, and the adequacy of space for larger households. Factor analysis identified five key dimensions influencing satisfaction, with building type, location, and appearance being the most significant.	The study is limited by its focus on public housing estates within a specific timeframe and geographical area (Ogun State), which may affect the generalizability of the findings to other regions or housing typologies in Nigeria.
15	Ibem, & Amole. (2013). Subjective life satisfaction in public housing in urban areas of Ogun State, Nigeria.	This study aims to examine the relationship between residents' satisfaction with housing environments and their overall subjective life satisfaction in public housing within urban Ogun State, Nigeria. The objectives include identifying key housing components affecting satisfaction and analyzing how these components influence residents' perceived quality of life.	This study used a quantitative cross-sectional survey of residents in 10 public housing estates in Ogun State, selected based on housing delivery strategies and income levels. Data were collected via structured questionnaires from 452 valid respondents between December 2009 and February 2010 to assess socio-economic characteristics and resident satisfaction.	The study found that residents were generally satisfied with housing unit characteristics and social environment but dissatisfied with the location of the estates and provision of housing services like water and electricity. Additionally, factors such as income, marital and tenure status, state of repairs, housing delivery strategy, and satisfaction with residence size, management, and services significantly	The study is limited to public housing estates in urban areas of Ogun State and relies on self-reported data, which may be subject to personal bias and may not capture seasonal or long-term variations in satisfaction.

				predicted residents' subjective life satisfaction.	
16	Habila (2023). Assessment of residential satisfaction as a determinant of neighbourhood choice among residents of public housing estates in Owerri, Imo state, Nigeria.	The aim of the study is to assess the level of residential satisfaction as a determinant of neighbourhood choice among residents of public housing estates in Owerri. To achieve this, the study objectives include assessing the socio-demographic and physical characteristics of the residents and estates, examining residents' satisfaction levels, and identifying factors influencing their neighbourhood choice.	This study adopted a quantitative research approach using surveys to collect primary data from residents of selected public housing estates in Owerri, Nigeria. Data collection involved questionnaires, oral interviews, and personal observations, supplemented by secondary data from literature and housing records to analyze residents' satisfaction and neighbourhood choice.	The study found that residents of public housing estates in Owerri, who are predominantly middle-class earners, expressed a fair level of residential satisfaction influenced mainly by factors such as low housing rent, availability of water, and adequate security. Additionally, there was a strong positive correlation in residential satisfaction between federal and state housing estates, although this difference was not statistically significant.	The study is limited to assessing residential satisfaction and neighbourhood choice only within selected public housing estates in Owerri, which may not represent other housing types or regions. Additionally, the findings may be constrained by the demographic and geographic scope, limiting the generalizability to broader contexts outside Owerri.

Source: Author (2024)

CONCLUSION AND RECOMMENDATIONS

This study on the determinants of building performance in residential estates within developing urban settings reveals the significant influence of climatic, design, and socio-economic factors on the durability, usability, and overall quality of residential buildings. Climatic conditions such as temperature variations, humidity, and rainfall patterns profoundly affect material longevity and occupant comfort, necessitating climate-responsive architectural strategies to mitigate their adverse impacts (Kaushik et al., 2025; Errante et al., 2022). Concurrently, building design elements including material selection, spatial configuration, and maintenance practices are crucial in ensuring resilience and adaptability in resource-constrained environments (Emami et al., 2021; Ige, 2017; Babalola, 2020). Socio-economic variables such as household income, education, and housing tenure further shape residents' capacity to maintain and upgrade their homes, resulting in uneven building performance across different residential estates (Ukpong et al., 2023; Mbazor et al., 2024; Mohammed, 2021).

Despite the wealth of research addressing these factors individually, there remains a need for integrative studies that holistically consider these determinants to foster sustainable urban housing development.

In response to these findings, this review recommends that stakeholders prioritize the integration of climate-adaptive design principles into urban planning and building regulations to enhance resilience against environmental stressors (Kaushik et al., 2025; Errante et al., 2022). Architects and developers should adopt sustainable, durable materials and flexible design solutions that facilitate maintenance and future modifications (Emami et al., 2021; Ige, 2017). Socio-economic challenges must be addressed through inclusive housing policies that improve affordability, security of tenure, and community engagement in building upkeep (Ukpong et al., 2023; Mohammed, 2021; Habila et al., 2023). Moreover, fostering collaboration between government agencies, private developers, and residents can ensure equitable distribution of services and infrastructure, promoting healthier and more resilient residential environments in rapidly urbanizing regions (Mbazor et al., 2024; Nkpite & Okoye, 2020). Such coordinated efforts are essential for enhancing the performance and sustainability of residential estates in developing urban settings.

There are human and natural resources in Nigeria which if properly harnessed can boost aquaculture production there by creating job opportunities for the youth, development of rural areas, reduction in rural-urban migration, income earning and increase in protein supply to the populace. It is believed that aquaculture has the tendency to contribute significantly to the local fish production in the country if improved technologies are adopted by the fish farmers (Olaoye *et al.,* 2016).

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