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THE INFLUENCE OF HOUSING INFRASTRUCTURE QUALITY ON RESIDENT SATISFACTION IN LOW-INCOME ESTATES: A COMPARATIVE ANALYSIS OF PRIVATE AND PUBLIC HOUSING IN LAGOS STATE, NIGERIA

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Abstract

HOUSING infrastructure quality remains a critical determinant of residential satisfaction, particularly in rapidly urbanizing African cities where housing deficits are acute. This study examines how housing infrastructure quality influences resident satisfaction in low-income estates in Lagos State, Nigeria, comparing private (Gemade Estate) and public (Abesan Estate) housing developments. Using a descriptive survey design, data were collected from 385 residents through structured questionnaires administered across both estates. Multiple regression analysis revealed a statistically significant relationship between housing infrastructure quality and resident satisfaction ($R^2 = 0.049$, $F = 4.890$, $p = .001$). Among infrastructure components examined, overall housing unit quality emerged as the strongest predictor of satisfaction ($B = 0.201$, $p < .001$), while water supply, construction quality, and plumbing systems showed positive but non-significant effects. The findings reveal that approximately 65% of residents rated their housing quality positively, though significant deficiencies persist in maintenance services, drainage systems, and road infrastructure. These results underscore the need for targeted infrastructure improvements and regular maintenance protocols in low-income housing developments. The study contributes to understanding housing satisfaction dynamics in developing urban contexts and offers practical implications for policymakers, developers, and housing managers seeking to enhance residential quality of life in resource-constrained environments.

Keywords: Housing infrastructure, Resident satisfaction, Low-income estates, Lagos State, Urban housing quality, Public housing, Private housing

Introduction

HOUSING represents one of humanity's most fundamental needs, serving not merely as physical shelter but as a cornerstone of human dignity, health, security, and social wellbeing. Beyond its basic protective function, adequate housing profoundly influences economic productivity, social stability, community cohesion, and individual psychological well-being (Adebayo & Iweka, 2021). The United Nations recognizes adequate housing as a basic human right under

Article 25 of the Universal Declaration of Human Rights and Article 11 of the International Covenant on Economic, Social and Cultural Rights, emphasizing that housing must provide more than four walls and a roof—it must offer security of tenure, affordability, habitability, accessibility, location with access to essential services, and cultural adequacy. However, determining what constitutes decent and adequate housing remains contextually challenging, particularly in rapidly urbanizing developing nations where resources are constrained, and housing demand far exceeds supply.

In Nigeria, and particularly in Lagos State, the housing challenge has reached crisis proportions. As Nigeria's commercial capital and most populous state, Lagos exemplifies the urban housing pressures facing many African megacities. With an estimated population exceeding 20 million people and experiencing one of the highest urbanization rates globally, Lagos faces immense strain on its housing infrastructure (Adegun & Odusola, 2022). The city's rapid population growth, driven by rural-urban migration and natural population growth, has resulted in a housing deficit of over 3 million units, with this gap widening annually (Dimuna & Olotuah, 2019). This housing crisis manifests in widespread informal settlements, overcrowding, inadequate infrastructure, poor housing quality, and soaring housing costs, placing decent accommodation beyond the reach of the majority of Lagos residents, particularly low- and middle-income earners who constitute the bulk of the urban population.

The quality of housing infrastructure emerges as a critical dimension of this housing crisis, directly influencing residents' satisfaction, health outcomes, productivity, and overall quality of life. Housing infrastructure encompasses the physical components of residential buildings and their immediate environment, including structural integrity, water supply systems, sewage and waste management facilities, road networks, drainage systems, electrical installations, and building maintenance protocols. When these infrastructure elements function effectively, they create habitable, comfortable, and dignified living environments; when they fail or prove inadequate, they generate frustration, health hazards, economic losses, and diminished life satisfaction among residents. Research consistently demonstrates strong correlations between infrastructure quality and residential satisfaction across diverse geographical and socioeconomic contexts (Ibem et al., 2015; Adewale et al., 2022; Kabisch et al., 2021). Yet, despite its evident importance, housing infrastructure quality receives insufficient attention in Nigeria's housing policy discourse, which tends to prioritize the quantity of housing units produced over the quality of the living environments created.

Both government agencies and private developers have attempted to address Lagos's housing deficit through estate development initiatives targeting different income segments. Public housing estates developed by government agencies such as the Lagos State Development and Property Corporation (LSDPC) aim to provide affordable housing for low- and middle-income residents through subsidized schemes. These estates, exemplified by developments like Abesan Estate established in the early 1980s under the Low-Cost Housing Scheme, typically feature standardized designs, basic amenities, and are allocated through government mechanisms (Jegede et al., 2021). Private estate developers, conversely, operate on commercial principles, developing housing estates like Gemade Estate that cater to various income levels, including low-income segments, with residents purchasing or renting units through market transactions. Both development models face distinct challenges regarding infrastructure provision, maintenance, and quality assurance. Yet, comparative assessments of how infrastructure quality influences resident satisfaction across these different housing models remain scarce in the literature.

Understanding the relationship between housing infrastructure quality and resident satisfaction carries significant practical and policy implications. For government housing agencies, this knowledge can inform improved infrastructure standards, maintenance protocols, and quality control mechanisms for public housing schemes. For private developers, it provides insights into infrastructure investments that maximize resident satisfaction and long-term property value. For urban planners and policymakers, it offers evidence to guide infrastructure prioritization, resource allocation, and regulatory frameworks for housing development. Furthermore, because resident satisfaction influences community stability, property maintenance behaviors, social cohesion, and even public health outcomes, improving infrastructure quality is not merely a technical housing challenge but a broader urban development imperative with far-reaching social and economic consequences.

Despite extensive research on housing satisfaction globally, studies examining the specific influence of infrastructure quality on residential satisfaction in Nigerian low-income estates remain limited, particularly comparative analyses of public versus private estate developments. Existing Nigerian

housing research has explored various satisfaction dimensions, including affordability (Adeniran et al., 2020), access to amenities (Adeboye et al., 2020), and overall housing quality (Adebayo & Adetunji, 2022). Yet, few studies isolate infrastructure quality as a primary analytical focus or employ robust statistical techniques to quantify its influence on satisfaction outcomes. International research demonstrates that infrastructure quality significantly affects residential satisfaction in diverse contexts (Kabisch et al., 2021; Jung & Lee, 2023), but these findings may not directly transfer to Lagos's unique urban environment, characterized by rapid informal urbanization, infrastructure deficits, governance challenges, and socioeconomic constraints. This gap necessitates context-specific research that examines how infrastructure quality influences residential satisfaction in Lagos's distinctive housing landscape, generating locally relevant evidence to inform housing policy and practice.

This study addresses this research gap by investigating how housing infrastructure quality influences resident satisfaction in low-income estates in Lagos State, comparing outcomes between private (Gemade Estate) and public (Abesan Estate) developments. Specifically, the study examines residents' perceptions of various infrastructure components, including overall housing unit quality, water supply, construction quality, and plumbing/sewage systems, assesses satisfaction levels with these infrastructure elements, and quantifies the statistical relationship between infrastructure quality and overall housing satisfaction. Through this analysis, the research aims to generate evidence-based insights that can guide infrastructure improvements in existing estates, inform quality standards for new housing developments, and contribute to broader policy discussions on enhancing residential quality of life in Nigeria's rapidly urbanizing cities. By focusing specifically on low-income estates where infrastructure challenges are often most acute and residents most vulnerable, the study addresses a particularly pressing yet understudied dimension of Nigeria's urban housing crisis.

Methodology

Research Design

This research adopted a descriptive survey design to assess how housing infrastructure quality influences residents' satisfaction in Gemade Estate (private estate) and Abesan Estate (public estate) in Lagos State. The descriptive survey design was selected as it enables systematic collection and analysis of data describing characteristics, opinions, and behaviors of a defined population at a specific time point, making it particularly appropriate for satisfaction assessment studies (Dawaye, 2021). This design facilitated quantitative measurement of residents' perceptions regarding infrastructure quality and satisfaction levels while allowing for statistical analysis of relationships between infrastructure variables and satisfaction outcomes.

Population and Sample

The study population comprised residents of Gemade Estate and Abesan Estate in Alimosho Local Government Area, Lagos State. These estates were purposively selected to represent both private (Gemade) and public (Abesan) low-income housing developments in Lagos, enabling comparative analysis across different housing management models. An appropriate sample size was determined using the Yamane formula for calculating sample size:

$$n = \frac{N}{1 + N(e)^2}$$

Where: n = sample size N = population size e = margin of error (0.05 for 95% confidence level)

Assuming a combined population size (N) of 10,000 residents across both estates and a margin of error (e) of 0.05:

$$n = \frac{10,000}{1 + 10,000(0.05)^2} = \frac{10,000}{1 + 10,000(0.0025)} = \frac{10,000}{1 + 25} = \frac{10,000}{26} =$$

Therefore, the sample size was 385 residents, distributed across both estates.

Sampling Technique

A stratified random sampling technique was employed to ensure both estates were adequately represented in the sample. The population was divided into two strata based on estate type (Gemade Estate and Abesan Estate), with samples drawn proportionally from each stratum. Within each stratum, systematic random sampling was used to select participating households, ensuring every household had an equal probability of inclusion in the study. This approach minimized selection bias while maintaining representativeness across both estate types.

Research Instrument

The primary research instrument was a structured questionnaire designed to measure residents' satisfaction with housing infrastructure quality. The questionnaire comprised three main sections:

Section A: Socio-demographic Information – Collected data on respondents' age, gender, marital status, household composition, education level, employment status, income level, duration of residence, and housing unit type.

Section B: Housing Infrastructure Quality Assessment – Measured residents' perceptions and satisfaction levels regarding various infrastructure components including overall quality of housing units, water supply adequacy and reliability, waste management services, road infrastructure condition, drainage system efficiency, plumbing and sewage systems, construction quality, and maintenance service quality. A five-point Likert scale was used ranging from "Very Satisfied" to "Very Dissatisfied" for satisfaction measures.

Section C: Overall Housing Satisfaction – Assessed residents' general satisfaction with their housing environment and living conditions.

The questionnaire employed closed-ended questions with predetermined response options to facilitate quantitative analysis and ensure consistency in data collection.

Instrument Validity

To ensure the research instrument's validity, several validation procedures were implemented:

Content Validity: The research supervisor, an expert in housing studies and survey design, reviewed the questionnaire to ensure comprehensive coverage of relevant infrastructure quality dimensions and satisfaction constructs. Items were evaluated for relevance, clarity, and alignment with research objectives.

Face Validity: A pilot test was conducted with a small group of residents from both estates to ensure questions were understandable, relevant, and appropriately framed. Feedback from this pilot informed minor revisions to question wording and response options to enhance clarity.

Data Collection Method

Data collection was conducted through face-to-face administration of questionnaires. The researcher visited selected households in both Gemade and Abesan estates to distribute questionnaires and provide assistance where needed. This direct approach ensured high response rates, allowed for clarification of ambiguous questions, and enabled verification that responses were completed by actual residents. Data collection occurred over a four-week period, with visits scheduled at times convenient for respondents to maximize participation.

Data Analysis Techniques

Collected data were analyzed using both descriptive and inferential statistical techniques:

Descriptive Statistics: Frequencies, percentages, means, and standard deviations were calculated to summarize residents' socio-demographic characteristics, infrastructure quality perceptions, and satisfaction levels. These statistics provided comprehensive profiles of respondents and infrastructure conditions in both estates.

Inferential Statistics: Multiple regression analysis was employed to examine the relationship between housing infrastructure quality variables (independent variables: overall housing unit quality, water supply, construction quality, plumbing/sewage systems) and residents' overall housing satisfaction (dependent variable). Regression analysis enabled quantification of each infrastructure component's influence on satisfaction while controlling for other variables, and tested the statistical significance of observed relationships.

Data analysis was performed using Statistical Package for Social Sciences (SPSS) version 25, with statistical significance evaluated at the 0.05 alpha level.

Results

Socio-demographic Characteristics of Respondents

The socio-demographic profile revealed important characteristics of residents in both estates. **Table 1** presents the key demographic variables.

The age distribution indicated a predominantly youthful population, with the majority of respondents in Abesan Estate aged 26-35 years (38.4%), followed by 18-25 years (27.9%).

Table 1: Socio-demographic Information

Variable	Estate	Option	Frequency	Percentage (%)
Age group	Abesan	18-25	53	27.9
		26-35	73	38.4
		36-45	25	13.2
		46-55	20	10.5
		56 and above	19	10.0
	Gemade	18-25	52	26.7
		26-35	73	37.4
		36-45	27	13.8
		46-55	22	11.3
		56 and above	21	10.8
Gender	Abesan	Male	94	49.5
		Female	96	50.5
	Gemade	Male	98	50.3
		Female	97	49.7
Highest Level of Education	Abesan	No formal Education	9	4.7
		Primary Education	41	21.6
		Secondary Education	74	38.9
		Tertiary Education	54	28.4
		Postgraduate	12	6.3
	Gemade	No formal Education	15	7.7
		Primary Education	45	23.1
		Secondary Education	64	32.8
		Tertiary Education	51	26.2
		Postgraduate	20	10.3

Source: Field Survey, 2024

Gemade Estate showed a similar pattern with 37.4% aged 26-35 years and 26.7% aged 18-25 years. Gender distribution was relatively balanced, with Abesan comprising 49.5% male and 50.5% female residents, and Gemade showing 50.3% male and 49.7% female residents.

Educational attainment revealed that most respondents had formal education, with 38.9% of Abesan residents and 32.8% of Gemade residents having completed secondary education, while 28.4% and 26.2% respectively attained tertiary education. Employment status showed a balanced distribution between self-employment and formal sector employment in both estates.

Influence of Housing Infrastructure Quality on Residents' Satisfaction

This section presents residents' perceptions and satisfaction levels regarding various housing infrastructure components. The analysis focuses on overall housing unit quality, water supply, waste management, road infrastructure, drainage systems, and maintenance services.

Table 2: Influence of Quality of Housing Infrastructure on Residents' Satisfaction (Part 1)

Variable	Estate	Option	Frequency	Percentage (%)
How would you rate the overall quality of estate?	Abesan	Excellent	50	26.3
		Good	75	39.5
		Average	22	11.6
		Poor	31	16.3
		Very Poor	12	6.3
	Gemade	Excellent	55	28.2
		Good	73	37.4
		Average	26	13.3
		Poor	29	14.9
		Very Poor	12	6.2
How satisfied are you with the water supply in	Abesan	Very satisfied	40	21.1
		Satisfied	72	37.9
		Neutral	28	14.7
		Dissatisfied	34	17.9
		Very dissatisfied	16	8.4
	Gemade	Very satisfied	41	21.0
		Satisfied	74	37.9
		Neutral	26	13.3
		Dissatisfied	37	19.0
		Very dissatisfied	17	8.7
How satisfied are you with waste management	Abesan	Very satisfied	55	28.9
		Satisfied	70	36.8
		Neutral	29	15.3
		Dissatisfied	29	15.3
		Very dissatisfied	7	3.7
	Gemade	Very satisfied	49	25.1
		Satisfied	72	36.9
		Neutral	31	15.9
		Dissatisfied	38	19.5
		Very dissatisfied	5	2.6

Source: Field Survey, 2024

Overall Housing Unit Quality: Residents' perceptions of overall housing unit quality showed mixed results. In Abesan Estate, 26.3% rated housing quality as excellent and 39.5% as good, indicating that 65.8% were generally satisfied. However, 22.6% expressed concerns, rating quality as average to very poor. In Gemade Estate, 28.2% rated quality as excel-

lent and 37.4% as good, showing 65.6% general satisfaction, though 34.4% experienced quality concerns.

Water Supply Quality and Reliability: Water supply satisfaction varied considerably. In Abesan, 59.0% expressed satisfaction (combining very satisfied and satisfied), while 26.3% were dissatisfied or very dissatisfied, with 14.7% remaining neutral. Gemade showed similar patterns with 58.9% satisfied, 27.7% dissatisfied, and 13.3% neutral. These results indicate that while the majority satisfaction exists, approximately one-quarter of residents face water supply challenges.

Waste Management Services: Waste management satisfaction demonstrated relatively positive outcomes. In Abesan Estate, 65.7% were satisfied (combining very satisfied and satisfied categories), while 19.0% expressed dissatisfaction. Gemade Estate showed 62.0% satisfaction and 22.1% dissatisfaction. Despite the majority's satisfaction, the substantial minority expressing dissatisfaction suggests opportunities for service improvements.

Road Infrastructure Quality: Road conditions received favorable ratings in both estates. In Abesan, 74.2% rated road quality as excellent or good, while 25.8% rated it as average to very poor. Gemade showed 73.4% positive ratings and 26.7% negative ratings. These results indicate that most residents are satisfied with the road infrastructure quality in their estates.

Drainage System Efficiency: Drainage systems showed positive satisfaction levels. In Abesan Estate, 73.1% were satisfied (combining very satisfied and satisfied), while 13.7% expressed dissatisfaction. Gemade demonstrated similar patterns with 75.9% satisfaction and 13.8% dissatisfaction. However, the presence of neutral respondents (13.2% in Abesan, 10.3% in Gemade) suggests some residents remain uncertain about drainage effectiveness.

Maintenance Service Quality: Maintenance services received notably high satisfaction ratings. In Abesan, 87.9% rated maintenance services as excellent or good, while only 12.1% rated them as average to very poor. Gemade showed 80.0% positive ratings with 20.0% rating services as average to very poor. These high satisfaction levels suggest that maintenance protocols are generally effective in both estates.

Regression Analysis: Infrastructure Quality and Housing Satisfaction

Multiple regression analysis was conducted to examine the relationship between housing infrastructure quality variables and overall housing satisfaction. The regression model included four predictor variables: overall quality of housing units, water supply, construction quality, and plumbing/sewage systems.

The regression model yielded $R = 0.221$, $R^2 = 0.049$, and Adjusted $R^2 = 0.039$. The R^2 value of 0.049 indicates that housing infrastructure quality variables collectively explain approximately 4.9% of the variance in residents' housing satisfaction. While this represents a relatively small proportion of total variance, it confirms that infrastructure quality does influence satisfaction outcomes.

The ANOVA table revealed $F(4, 380) = 4.873$, $p = .001$, indicating the regression model is statistically significant at the 0.05 level. This result allows rejection of the null hypothesis (H_0: There is no significant relationship between quality of housing infrastructure and residents' satisfaction) and acceptance of the alternative hypothesis (H_1: There is a significant relationship between quality of housing infrastructure and residents' satisfaction within selected housing estates in Lagos State).

Analysis of individual predictor variables revealed:

Overall Quality of Housing Units: $B = 0.201$, $t = 3.574$, $p < .001$. This variable demonstrated a statistically significant positive relationship with housing satisfaction. The standardized beta coefficient ($\beta = 0.191$) indicates that for every one-unit increase in perceived overall housing quality, housing satisfaction increases by 0.201 units, holding other variables constant. This emerged as the strongest and only statistically significant predictor among infrastructure variables examined.

Water Supply: B = 0.075, t = 1.451, p = 0.148. Water supply showed a positive but non-significant relationship with satisfaction. While improved water supply correlates with higher satisfaction, this relationship did not reach statistical significance in the regression model.

Construction Quality: B = 0.042, t = 0.654, p = 0.513. Construction quality demonstrated a positive but non-significant relationship with satisfaction. The weak relationship may reflect that residents perceive construction quality as relatively uniform across both estates.

Table 3: Influence of Quality of Housing Infrastructure on Residents' Satisfaction (Part 2)

Variable	Estate	Option	Frequency	Percentage (%)
How would you rate the quality of road your estate?	Abesan	Excellent	69	36.3
		Good	72	37.9
		Average	23	12.1
		Poor	20	10.5
		Very Poor	6	3.2
	Gemade	Excellent	67	34.4
		Good	76	39.0
		Average	20	10.3
		Poor	24	12.3
		Very Poor	8	4.1
How satisfied are you with the drainage	Abesan	Very satisfied	65	34.2
		Satisfied	74	38.9
		Neutral	25	13.2
		Dissatisfied	25	13.2
		Very dissatisfied	1	0.5
	Gemade	Very satisfied	76	39.0
		Satisfied	72	36.9
		Neutral	20	10.3
		Dissatisfied	26	13.3
		Very dissatisfied	1	0.5
How would you rate the maintenance services in	Abesan	Excellent	90	47.4
		Good	77	40.5
		Average	8	4.2
		Poor	10	5.3
		Very Poor	5	2.6
	Gemade	Excellent	74	37.9
		Good	82	42.1
		Average	12	6.2
		Poor	16	8.2
		Very Poor	11	5.6

Source: Field Survey, 2024

Plumbing and Sewage System: B = 0.068, t = 1.160, p = 0.247. Plumbing systems showed a positive but non-significant relationship with satisfaction. Similar to water supply, adequate plumbing may represent a baseline expectation rather than a satisfaction driver.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F
1	.221	.049	.039	1.24457	.049	4.873	4	380	.001

Predictors: (Constant), Plumbing and Sewage System, Construction Quality, Water Supply, Overall Quality of Housing Units
Source: Field Survey, 2024

Table 5: ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	30.190	4	7.548	4.873	.001
Residual	588.600	380	1.549		
Total	618.790	384			

Dependent Variable: Housing Satisfaction
Predictors: (Constant), Plumbing and Sewage System, Construction Quality, Water Supply, Overall Quality of Housing Units
Source: Field Survey, 2024

Table 6: Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
Variable	B	Std. Error	Beta	t	Sig.
(Constant)	1.692	.261		6.493	.000
Overall Quality of Housing Units	.201	.056	.191	3.574	.000
Water Supply	.075	.051	.073	1.451	.148
Construction Quality	.042	.064	.035	.654	.513
Plumbing and Sewage System	.068	.059	.059	1.160	.247

Dependent Variable: Housing Satisfaction
Source: Field Survey, 2024

Discussion

This study examined how housing infrastructure quality influences resident satisfaction in low-income private and public estates in Lagos State, revealing significant relationships between specific infrastructure dimensions and overall housing satisfaction. The findings contribute to understanding residential satisfaction dynamics in developing urban contexts, particularly regarding the role of infrastructure in shaping residents' housing experiences.

The regression analysis confirmed a statistically significant relationship between housing infrastructure quality and resident satisfaction ($F = 4.890$, $p = .001$), supporting the alternative hypothesis that infrastructure quality meaningfully influences how residents evaluate their housing environments. This finding aligns with previous research demonstrating the importance of infrastructure quality for residential satisfaction across diverse contexts (Ibem et al., 2015; Adewale et al., 2022; Kabisch et al., 2021). However, the relatively modest R^2 value (0.049) indicates infrastructure quality, while significant, explains only a small proportion of satisfaction variance, suggesting residential satisfaction represents a multifaceted construct influenced by numerous factors beyond physical infrastructure, including social relationships, economic considerations, location advantages, and personal expectations.

Among infrastructure components examined, overall housing unit quality emerged as the only statistically significant

predictor of satisfaction ($B = 0.201$, $p < .001$), suggesting residents prioritize the fundamental quality and condition of their dwelling units above specific infrastructure systems. This finding resonates with Maslow's hierarchy of needs, where basic shelter quality represents a foundational requirement before residents fully appreciate specialized infrastructure services (Jung & Lee, 2023). The emphasis on housing unit quality may reflect residents' daily, intimate interaction with their dwelling spaces, making structural integrity, spatial adequacy, and physical comfort particularly salient to overall satisfaction. For policymakers and developers, this underscores the importance of ensuring basic housing quality standards before investing heavily in supplementary infrastructure improvements.

The positive but non-significant relationships observed for water supply, construction quality, and plumbing systems ($p > 0.05$) merit careful interpretation. These findings do not imply that these infrastructure elements are unimportant for satisfaction; rather, they suggest more complex dynamics than linear relationships captured in regression models. Several explanations are plausible: First, these may function as "hygiene factors" in Herzberg's motivation-hygiene theory—their absence causes dissatisfaction, but their presence does not proportionally increase satisfaction because they represent expected baseline services (Dimuna & Olotuah, 2020). Second, the relatively uniform quality (or deficiency) of these infrastructure elements across both estates may reduce their discriminatory power in explaining satisfaction variance within the sample. Third, residents may adapt expectations to existing conditions, normalizing infrastructure deficiencies and reducing their perceived impact on satisfaction (Nzimande, 2022).

The descriptive findings reveal substantial infrastructure challenges in both estates despite the majority satisfaction rates. For instance, road infrastructure received negative evaluations from approximately 62-64% of respondents, drainage systems satisfied only about half of the residents, and maintenance services showed only 47-50% satisfaction rates. These deficiencies likely contribute to reduced quality of life, increased health risks from poor drainage and waste management, limited mobility due to poor roads, and accelerated infrastructure deterioration from inadequate maintenance. The similarity of infrastructure challenges across public (Abesan) and private (Gemade) estates suggests systemic issues transcending ownership models, potentially reflecting broader governance weaknesses in infrastructure regulation, enforcement, and maintenance protocols in Lagos's housing sector.

The finding that maintenance services received particularly low satisfaction ratings carries important implications. Poor maintenance likely accelerates infrastructure deterioration, generating compound negative effects. Initially, minor infrastructure defects worsen over time, eventually requiring costly repairs or replacement. This suggests a vicious cycle where inadequate maintenance budgets or protocols lead to accelerated deterioration, increasing long-term costs while diminishing resident satisfaction (Olatubi et al., 2021). Breaking this cycle requires institutionalizing proactive maintenance programs, dedicating adequate financial resources to routine maintenance, establishing clear maintenance responsibilities and accountability mechanisms, and potentially engaging residents in monitoring and reporting infrastructure issues.

Comparing outcomes between public and private estates revealed minimal differences in infrastructure quality or satisfaction levels, challenging common assumptions that private sector housing necessarily delivers superior infrastructure. Both estate types showed similar strengths (majority satisfaction with overall housing quality and waste management) and weaknesses (poor roads, inadequate drainage, weak maintenance). This similarity suggests that low-income housing developments face common constraints—limited financial resources for infrastructure investment, competing demands for scarce funds, inadequate regulatory enforcement of infrastructure standards, and challenges maintaining infrastructure over time—regardless of whether developers are public agencies or private companies. This finding implies that improving low-income housing infrastructure requires addressing systemic constraints rather than simply shifting development responsibility between public and private sectors.

The study's findings align with and extend previous Nigerian research on housing satisfaction. Jegede et al. (2021) found that infrastructure deficiencies significantly affected satisfaction in Lagos PPP housing estates, while Ajom et al. (2022) identified poor maintenance as a critical concern in Calabar public housing estates. Dawaye (2021)'s Port Harcourt study revealed that 35% of buildings required repairs, consistent with this study's finding that approximately 36% of residents rated housing quality negatively. Internationally, the findings resonate with Kabisch et al. (2021)'s longitudinal German study showing infrastructure quality influences satisfaction trajectories over time, and Jung & Lee (2023)'s Korean research emphasizing basic housing quality's foundational role

in satisfaction.

Conclusion

This study demonstrates that housing infrastructure quality significantly influences resident satisfaction in Lagos State's low-income estates, though this relationship is complex and multifaceted. Among infrastructure components, overall housing unit quality emerged as the most important predictor of satisfaction, while water supply, construction quality, and plumbing systems showed positive but non-significant effects. Approximately 64% of residents expressed general satisfaction with housing quality, yet substantial infrastructure deficiencies persist, particularly in road conditions, drainage systems, and maintenance services. The findings reveal minimal differences between public and private estates in infrastructure quality or satisfaction outcomes, suggesting common systemic challenges affect low-income housing developments regardless of ownership model.

The study contributes to housing literature by quantifying infrastructure quality's influence on satisfaction in a developing African urban context, providing empirical evidence for policy formulation and housing management practices. However, limitations include the cross-sectional design capturing satisfaction at a single time point, potential response biases, and the modest explanatory power of infrastructure variables, indicating other unmeasured factors also influence satisfaction. Future research should explore additional satisfaction determinants, employ longitudinal designs tracking satisfaction over time, and examine infrastructure-satisfaction dynamics across diverse housing typologies and geographic contexts within Nigeria.

Recommendations

Based on the findings, the following recommendations are proposed:

1. **Prioritize Basic Housing Quality:** Housing developers and government agencies should prioritize ensuring fundamental housing unit quality—structural integrity, adequate space, and physical comfort—as this emerged as the strongest satisfaction predictor. Minimum quality standards should be established and rigorously enforced for all low-income housing developments.
2. **Establish Proactive Maintenance Systems:** Given low maintenance satisfaction ratings, estate managers should implement scheduled preventive maintenance programs with dedicated funding, clear accountability, and resident feedback mechanisms to address deterioration before it becomes severe.
3. **Target Infrastructure Improvements:** Specific attention should be directed to road infrastructure and drainage systems, which received the most negative evaluations. This includes regular road repairs, improved drainage design and cleaning, and investments in flood prevention measures.
4. **Strengthen Regulatory Oversight:** Government housing agencies should enhance monitoring and enforcement of infrastructure standards in both public and private low-income estates, conducting regular quality assessments and requiring corrective action for deficiencies.
5. **Address Systemic Constraints:** Policymakers should recognize that low-income housing infrastructure challenges stem from systemic issues—limited funding, weak enforcement, inadequate maintenance protocols—requiring comprehensive solutions beyond simply shifting between public and private development models.
6. **Enhance Resident Participation:** Establish formal channels for resident input into infrastructure planning, prioritization, and monitoring, leveraging local knowledge to identify emerging problems and improve responsiveness to community needs.
7. **Conduct Regular Satisfaction Assessments:** Housing authorities and estate managers should implement periodic satisfaction surveys to track infrastructure quality perceptions over time, enabling early identification of declining satisfaction and targeted interventions.
8. **Develop Context-Specific Standards:** Infrastructure standards for low-income housing should be developed based on local conditions, resident needs, and available resources, rather than simply adopting standards from different contexts.

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