

Assessing Social Sustainability in Residential Housing Neighbourhoods of Gwarinpa and Apo, Abuja Nigeria

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ABSTRACT

Social sustainability has become an important dimension of sustainable housing development because it influences residents' quality of life, social inclusion, health, and well-being. This study assessed the social sustainability performance of residential housing in Gwarinpa and Apo, Abuja, Nigeria, using indicators of affordability, accessibility, proximity to essential services, indoor environmental quality, community well-being, and resident satisfaction. Data were collected through household surveys and analysed using descriptive statistics and chi-square tests. The results revealed an overall social sustainability score of 1.43, indicating a moderate level of performance. Gwarinpa recorded a higher composite score (1.51) than Apo (1.34). Affordability was relatively low, with only 12.0% of housing units affordable to low- and mixed-income households, while accessibility emerged as the weakest sustainability dimension (mean = 0.53). Service proximity recorded comparatively better performance (mean = 1.78), whereas green-space provision remained limited (mean = 1.00). Resident satisfaction was moderate (mean = 1.58) and was significantly associated with housing typology, location, maintenance status, thermal comfort, energy-efficiency features, water-conservation features, and household income ($p < 0.05$). The study concludes that improving affordability, accessibility, environmental quality, and community infrastructure is essential for enhancing social sustainability and promoting inclusive residential development in Abuja.

Keywords: social sustainability, residential housing, resident satisfaction, affordability, accessibility, Abuja.

INTRODUCTION

Rapid urbanization across developing countries has intensified the demand for adequate housing, placing significant pressure on urban infrastructure, land resources, and the provision of socially sustainable residential environments. While housing policies have traditionally focused on addressing quantitative deficits, increasing attention is being directed toward the social sustainability of housing as a critical component of sustainable urban development. Social sustainability extends beyond the provision of shelter to encompass affordability, accessibility, health and well-being, social inclusion, community cohesion, and residents' satisfaction with their living environments (Dempsey et al., 2011; Vallance et al., 2011). Consequently, evaluating housing performance through a social sustainability lens has become increasingly important for achieving the objectives of sustainable and inclusive cities envisioned under Sustainable Development Goal 11 (United Nations, 2015).

Residential neighbourhoods play a fundamental role in shaping social well-being and quality of life. Housing that is affordable, accessible to diverse population groups, located near essential services, and supportive of healthy indoor and outdoor environments contributes significantly to residents' physical, psychological, and social well-being (Bramley & Power, 2009; Colantonio & Dixon, 2011). Conversely, deficiencies in these attributes can exacerbate social inequalities, reduce residential satisfaction, and undermine urban sustainability goals. Previous studies have demonstrated that neighbourhood characteristics, including accessibility to services, green-space availability, environmental quality, and opportunities for social

interaction, are important determinants of social sustainability and community resilience (Forrest & Kearns, 2001; Dempsey et al., 2011).

In Nigeria, rapid urban expansion and population growth have resulted in persistent housing challenges, including affordability constraints, inadequate infrastructure, poor environmental conditions, and uneven access to essential services. Although considerable attention has been devoted to housing supply and physical infrastructure provision, less emphasis has been placed on assessing the social sustainability outcomes of residential developments. Existing studies in Nigeria have primarily focused on housing deficits, residential satisfaction, affordability, and housing quality (Ibem & Aduwo, 2013; Jiboye, 2011). While these studies provide valuable insights into specific housing issues, they often examine individual dimensions in isolation and rarely adopt a comprehensive social sustainability framework that integrates affordability, accessibility, health, community well-being, and resident perceptions.

Abuja, Nigeria's Federal Capital City, has experienced substantial residential growth over the past three decades, resulting in the development of diverse housing estates and neighbourhoods characterized by varying socioeconomic and physical conditions. Among these, Gwarinpa and Apo represent two important residential districts that have attracted considerable population growth and real estate investment. Despite their significance within Abuja's urban structure, empirical evidence regarding their social sustainability performance remains limited. Previous investigations have largely concentrated on housing provision, urban growth, and infrastructure development, with relatively little attention paid to the broader social dimensions that influence residents' quality of life and neighbourhood sustainability.

This gap in knowledge is particularly important because socially sustainable housing is increasingly recognized as a prerequisite for creating inclusive, equitable, and resilient urban communities. Without a comprehensive understanding of how residential neighbourhoods perform across multiple social sustainability indicators, policymakers and urban planners may be unable to identify critical deficiencies or develop evidence-based interventions capable of improving housing outcomes. Furthermore, comparative assessments of social sustainability among different residential districts in Abuja remain scarce, limiting the availability of empirical data required to inform sustainable housing policies and neighbourhood planning strategies.

Against this background, the present study evaluates the social sustainability performance of residential housing in Gwarinpa and Apo, Abuja, through an integrated assessment of affordability, accessibility, proximity to essential services, indoor environmental quality, community well-being, and resident satisfaction. By examining the relationships between housing characteristics and residents' perceptions, the study provides a comprehensive understanding of the factors shaping social sustainability in urban residential environments and contributes empirical evidence to support more inclusive, equitable, and sustainable housing development in Nigeria.

MATERIALS AND METHODS

Study Area

The study was conducted in Gwarinpa Estate and Apo Resettlement within the Abuja Municipal Area Council (AMAC), Federal Capital Territory (FCT), Nigeria. Abuja lies between latitudes 8°25'N and 9°20'N and longitudes 6°45'E and 7°39'E. The city experiences a tropical climate characterized by distinct wet and dry seasons, with annual temperatures ranging from approximately 27°C during the rainy season to 37°C during the dry season. The selection of Gwarinpa and Apo was based on their differing residential characteristics, housing typologies, socioeconomic composition, and urban development patterns, which provided a suitable basis for comparative assessment of housing sustainability performance.

Research Design

The study adopted a cross-sectional mixed-methods approach, integrating quantitative and qualitative techniques to assess the social sustainability performance of residential housing. The quantitative component involved household surveys and field observations, while the qualitative component consisted of key

informant interviews with relevant stakeholders in housing development, planning, and management. The methodological design enabled triangulation of findings and provided a comprehensive understanding of sustainability issues within the study area.

Population and Sampling

The study population comprised households residing in Gwarinpa Estate and Apo Resettlement, as well as professionals and institutional stakeholders involved in housing development and management. The household sample size was determined using the Taro Yamane formula yielding sample size of 390 respondents. A total of 300 valid questionnaires were successfully retrieved and used for analysis.

For the quantitative survey, stratified random sampling was employed to ensure representation of major housing typologies, including detached, semi-detached, terraced, apartment, duplex, and mixed-use housing.

Data Collection

Primary data were obtained through structured questionnaires, key informant interviews, and field observations. The questionnaire collected information on demographic characteristics, housing attributes, affordability, accessibility, indoor environmental quality, community well-being, sustainability features, and resident satisfaction. Key informant interviews explored institutional, regulatory, and technical perspectives on sustainable housing development.

Systematic field observations were undertaken using a structured checklist to assess physical housing conditions and sustainability indicators, including building quality, accessibility features, thermal comfort measures, ventilation, green-space provision, maintenance condition, and environmental quality.

Secondary data were obtained from policy documents, housing development records, planning documents, academic literature, and sustainability frameworks, including the National Building Code, Abuja Master Plan, Climate Change Act 2021, UN-Habitat housing indicators, and the IFC EDGE framework.

Data Analysis

Quantitative data were analysed using descriptive and inferential statistics. Descriptive statistics, including frequencies, percentages, means, and composite scores, were used to evaluate sustainability indicators across housing typologies and locations. A composite social sustainability index was developed from affordability, accessibility, service proximity, indoor environmental quality, community well-being, and resident satisfaction indicators. Chi-square tests were employed to examine associations between housing characteristics and resident satisfaction at a significance level of $p < 0.05$.

Qualitative interview data were transcribed and analysed thematically to identify recurring patterns and explanatory factors relating to housing sustainability performance. Findings from surveys, interviews, and field observations were integrated during interpretation to strengthen the reliability and validity of the results.

RESULTS

Social Sustainability Metrics

The assessment of social sustainability covered affordability, accessibility, proximity to essential services, occupant health and indoor environmental conditions, community well-being, and resident satisfaction across Gwarinpa and Apo.

Affordability

Overall affordability was relatively low, with a mean score of 1.52. Apartments recorded the highest affordability score (1.88), followed by terraced houses (1.53), whereas duplexes (0.54) and detached houses

(0.97) recorded the lowest scores. Overall, 12.0% of units were affordable for low/mixed-income households, 31.3% for middle-income households, 37.3% were affordable only to high-income households, and 19.3% were classified as clearly unaffordable.

Table 1. Affordability by housing typology

Housing typology	Low/Mixed income (%)	Middle income (%)	High income only (%)	Unaffordable (%)	Mean
Detached	4.8	17.7	46.8	30.6	0.97
Semi-detached	6.8	25.7	44.6	23	1.16
Terraced	11.8	40.8	35.5	11.8	1.53
Apartment	25.8	43.9	22.7	7.6	1.88
Duplex	0	7.7	38.5	53.8	0.54
Mixed-use	14.3	28.6	42.9	14.3	1.43
Overall	12	31.3	37.3	19.3	1.52

Accessibility

Accessibility was limited across both locations, with an overall mean score of 0.53. Gwarinpa recorded a mean of 0.62 compared with 0.44 in Apo. Overall, 62.0% of units had no accessibility features, while only 2.7% had comprehensive accessibility. Wheelchair ramps were absent in 78.7% of units, and 80.0% had multiple or significant steps without ramp access.

Table 2. Accessibility characteristics of surveyed housing

Accessibility indicator	Gwarinpa (%)	Apo (%)	Overall (%)
No accessibility features	59.4	65	62
Comprehensive accessibility	3.1	2.1	2.7
Proper wheelchair ramps	4.4	3.6	4
No ramps	76.9	80.7	78.7
Step-free access	8.1	6.4	7.3
Multiple/significant steps without ramps	78.8	81.4	80
Mean accessibility score	0.62	0.44	0.53

Proximity to Essential Services

The overall proximity score was 1.78. Markets recorded the highest service-proximity score (1.99), followed by education (1.82), public transport (1.77), and healthcare services (1.53). Gwarinpa recorded higher scores than Apo across all four service categories.

Table 3. Proximity to essential services

Service	Gwarinpa	Apo	Overall
Healthcare	1.64	1.41	1.53
Education	1.89	1.74	1.82
Public transport	1.84	1.7	1.77
Markets	2.05	1.91	1.99
Composite score	1.86	1.69	1.78

Occupant Health and Indoor Environmental Conditions

Indoor environmental conditions showed moderate variation between the two locations. The overall indoor air-quality score was 1.62, while dampness and mould recorded 1.92 and thermal comfort 1.27. Ventilation was rated excellent in 18.0% of units, moderate in 40.7%, limited in 26.7%, and poor in 14.7%. Overall, 28.6% of units showed visible dampness with mould or extensive dampness/mould. Thermal discomfort during peak seasons or most of the year was also reported by a substantial proportion of occupants.

Community Well-Being

Green-space provision recorded an overall mean score of 1.00, with Gwarinpa scoring 1.14 and Apo 0.84. One-third of the surveyed units (33.3%) had no green spaces, while 36.7% had limited provision. Social cohesion recorded an overall mean of 1.65, with Gwarinpa (1.73) again scoring higher than Apo (1.56).

Resident Satisfaction

Overall resident satisfaction was 1.58, with mean scores of 1.65 in Gwarinpa and 1.50 in Apo. Across the sample, 15.3% of residents were highly satisfied, 41.3% satisfied, 29.3% dissatisfied, and 14.0% highly dissatisfied. Duplexes recorded the highest satisfaction score (1.69), followed by semi-detached (1.66) and detached housing (1.61), while mixed-use housing recorded the lowest (1.29). Gwarinpa recorded higher satisfaction than Apo across all housing typologies.

Table 4. Resident satisfaction by housing typology and location

Housing typology	Gwarinpa	Apo	Overall
Detached	1.72	1.48	1.61
Semi-detached	1.76	1.55	1.66
Terraced	1.68	1.45	1.59
Apartment	1.58	1.43	1.5
Duplex	1.8	1.63	1.69
Mixed-use	1.33	1.25	1.29
Traditional	—	1.5	1.5
Overall	1.65	1.5	1.58

Associations with Resident Satisfaction

Chi-square analysis showed significant associations between resident satisfaction and housing typology, location, thermal comfort features, energy-efficiency features, water-conservation features, maintenance status, and household income. Length of residency was not significantly associated with satisfaction.

Table 5. Associations between housing characteristics and resident satisfaction

Variable	χ^2	df	p-value	Significance
Housing typology	24.56	12	0.017	Significant
Location	8.42	3	0.038	Significant
Thermal comfort features	31.82	6	<.001	Significant
Energy-efficiency features	18.37	6	0.005	Significant
Water-conservation features	14.21	6	0.027	Significant
Maintenance status	42.65	6	<.001	Significant
Household income	28.94	9	0.001	Significant
Length of residency	15.23	9	0.084	Not significant

Composite Social Sustainability Score

The composite social sustainability score was 1.43 overall, with Gwarinpa recording 1.51 and Apo 1.34. Gwarinpa recorded higher scores across all nine assessed indicators.

Table 6. Summary of social sustainability indicators by location

Indicator	Gwarinpa	Apo	Overall
Affordability	1.61	1.41	1.52
Accessibility	0.62	0.44	0.53
Service proximity	1.86	1.69	1.78
Indoor air quality	1.68	1.56	1.62
Dampness/mould	2.00	1.83	1.92
Thermal comfort	1.33	1.21	1.27
Green spaces	1.14	0.84	1.00
Social cohesion	1.73	1.56	1.65
Resident satisfaction	1.65	1.50	1.58
Composite social sustainability	1.51	1.34	1.43

Overall, the results indicate measurable differences in social sustainability between the two locations, particularly in accessibility, green-space provision, social cohesion, and resident satisfaction.

DISCUSSION

Social Sustainability Performance of Residential Neighbourhoods

The findings indicate that social sustainability within the study area remains moderate, with an overall composite score of 1.43. Although Gwarinpa consistently outperformed Apo across all assessed indicators, neither neighbourhood demonstrated a high level of social sustainability. This suggests that residential development in Abuja continues to prioritize housing provision and physical infrastructure over broader social sustainability objectives, such as inclusivity, accessibility, affordability, and community well-being. This observation supports the argument that sustainable housing extends beyond the physical dwelling and encompasses social, economic, and environmental dimensions that collectively influence quality of life (Dempsey et al., 2011; Vallance et al., 2011).

The superior performance of Gwarinpa may be attributed to its relatively planned urban structure, better infrastructure, and higher service availability. Previous studies have shown that neighbourhood planning, access to services, and environmental quality significantly influence social sustainability outcomes and residents' well-being (Bramley & Power, 2009; Colantonio & Dixon, 2011).

Housing Affordability and Social Inclusion

Housing affordability emerged as a major challenge, with only 12% of housing units affordable to low- and mixed-income households. More than half of the surveyed units were either affordable exclusively to high-income earners or entirely unaffordable. This finding reflects the growing housing affordability crisis observed across rapidly urbanizing cities in developing countries, where housing prices continue to rise faster than household incomes (UN-Habitat, 2020; World Bank, 2022).

Apartments and terraced houses demonstrated better affordability performance than detached houses and duplexes, suggesting that compact and higher-density housing forms may provide more economically sustainable housing options. Similar findings have been reported by Turok and Borel-Saladin (2016), who argued that compact housing developments can improve affordability through efficient land utilization and reduced infrastructure costs.

The affordability deficit identified in this study also raises concerns regarding social equity and inclusion. Affordable housing is widely regarded as a critical component of social sustainability because it facilitates access to employment opportunities, social services, and urban resources while reducing socioeconomic exclusion (Bramley et al., 2009; UN-Habitat, 2020).

Accessibility and Inclusive Housing

Accessibility recorded the lowest score among all social sustainability indicators, demonstrating a severe lack of inclusivity within the housing stock. More than 60% of the surveyed units lacked accessibility features, while approximately 80% had no wheelchair ramps. These findings indicate that the housing environment inadequately accommodates persons with disabilities, elderly residents, and individuals with mobility challenges.

This result aligns with previous studies that have highlighted limited implementation of universal design principles in residential developments across many developing countries (Imrie & Hall, 2001; Maisel et al., 2018). Universal accessibility is increasingly recognized as a fundamental element of social sustainability because it promotes social inclusion, independence, and equal participation in urban life (United Nations, 2016).

The generally poor accessibility outcomes suggest inadequate enforcement of building regulations and planning standards. Improving accessibility through mandatory universal design requirements would significantly contribute to the creation of more inclusive and socially sustainable communities.

Accessibility to Essential Services and Neighbourhood Livability

Accessibility to essential services was one of the strongest-performing indicators, with an overall score of 1.78. Markets, educational institutions, healthcare facilities, and public transportation services were generally within reasonable proximity to residential areas. These findings support the concept of neighbourhood livability, which emphasizes the importance of providing residents with convenient access to daily services and amenities (Gehl, 2010; Wheeler, 2013).

The higher service-proximity scores recorded in Gwarinpa suggest that planned residential neighbourhoods tend to provide better integration between housing and urban services. Similar observations have been reported by Barton et al. (2015), who found that mixed-use and service-oriented neighbourhood planning contributes positively to both quality of life and sustainability outcomes.

However, healthcare services recorded comparatively lower scores than the other service categories, suggesting potential gaps in healthcare accessibility. Since healthcare access represents a fundamental determinant of community well-being, planning authorities should prioritize equitable distribution of healthcare services within residential districts (World Health Organization, 2021).

Indoor Environmental Quality and Occupant Well-Being

Indoor environmental quality revealed mixed performance across the study area. While indoor air quality and dampness indicators showed moderate scores, thermal comfort remained relatively low. Thermal discomfort was frequently reported by residents, particularly during peak seasonal periods.

These findings are consistent with studies demonstrating that climatic conditions, building design, ventilation systems, and construction materials strongly influence occupant comfort and health outcomes (Frontczak & Wargocki, 2011; Nicol & Roaf, 2017). Poor thermal comfort can negatively affect physical health, psychological well-being, productivity, and overall quality of life.

The occurrence of dampness and mould in nearly one-third of surveyed housing units is equally important. Previous research has linked damp indoor conditions to respiratory illnesses, allergies, and reduced residential satisfaction (Mendell et al., 2011; Fisk et al., 2007). Consequently, improving housing design, maintenance practices, and moisture-control systems could significantly enhance social sustainability outcomes.

Community Well-Being and Social Cohesion

Community well-being indicators demonstrated contrasting results. Green-space provision recorded a relatively low score, while social cohesion achieved a comparatively stronger rating. The limited availability of green spaces, particularly within Apo, suggests inadequate integration of recreational and ecological infrastructure into residential planning.

Urban green spaces contribute significantly to physical health, mental well-being, social interaction, and environmental quality (Jennings & Bamkole, 2019; Wolch et al., 2014). Therefore, their limited availability represents a significant constraint on social sustainability within the study area.

Despite this limitation, social cohesion achieved a moderate score, indicating relatively strong social relationships and neighbourhood interaction. Social cohesion has long been recognized as a key pillar of social sustainability because it promotes trust, collective action, social support, and community resilience (Forrest & Kearns, 2001; Dempsey et al., 2011). The stronger social cohesion observed in Gwarinpa may reflect better environmental conditions and more organized neighbourhood structures that facilitate social interaction.

Determinants of Resident Satisfaction

Resident satisfaction was significantly associated with housing typology, location, thermal comfort features, energy-efficiency features, water-conservation features, maintenance status, and household income. These findings confirm that housing satisfaction is influenced by a combination of physical, environmental, and socioeconomic factors.

Maintenance status emerged as one of the most influential factors affecting satisfaction. This finding is consistent with previous studies showing that building condition plays a critical role in shaping residents' perceptions of quality of life and neighbourhood satisfaction (Ibem & Aduwo, 2013; Mohit et al., 2010).

The significant relationships between satisfaction and thermal comfort, energy efficiency, and water-conservation features further highlight the increasing importance of sustainability-oriented building attributes. Modern residents are increasingly concerned with environmental performance because it influences both comfort and long-term housing costs (Kim et al., 2019; Zalejska-Jonsson, 2014).

In contrast, length of residency was not significantly associated with resident satisfaction, suggesting that current living conditions exert greater influence on satisfaction levels than historical attachment to place.

Implications for Sustainable Housing Policy

The findings collectively indicate that improving social sustainability in Abuja requires greater attention to housing affordability, accessibility, green-space provision, indoor environmental quality, and inclusive neighbourhood planning. While proximity to services and social cohesion performed relatively well, substantial disparities remain between neighbourhoods and housing types.

Consistent with the Sustainable Development Goals, particularly SDG 11, future housing policies should prioritize affordable housing provision, universal accessibility standards, climate-responsive building design, adequate green infrastructure, and effective maintenance frameworks (United Nations, 2015; UN-Habitat, 2020). Such interventions would enhance inclusivity, environmental quality, and overall quality of life while contributing to more socially sustainable urban communities.

CONCLUSION

This study assessed the social sustainability performance of residential housing in the Gwarinpa and Apo districts of Abuja using indicators of affordability, accessibility, proximity to essential services, indoor environmental quality, community well-being, and resident satisfaction. The findings reveal an overall

moderate level of social sustainability, with a composite score of 1.43, while Gwarinpa consistently outperformed Apo across all evaluated dimensions.

Housing affordability emerged as a major challenge, particularly for low- and middle-income households, as a substantial proportion of housing units were affordable only to high-income earners or were entirely unaffordable. Accessibility was identified as the weakest aspect of social sustainability, with most housing units lacking basic inclusive design features such as wheelchair ramps and step-free access. In contrast, proximity to essential services recorded comparatively better performance, indicating that both neighbourhoods benefit from their urban location and access to educational, commercial, transport, and healthcare facilities.

The assessment of indoor environmental quality revealed deficiencies in thermal comfort and the presence of dampness and mould in a significant proportion of housing units, highlighting concerns regarding occupant health and housing quality. Community well-being indicators showed limited provision of green spaces but relatively stronger levels of social cohesion. Resident satisfaction was generally moderate and was significantly influenced by housing typology, location, maintenance condition, thermal comfort, energy-efficiency measures, water-conservation features, and household income.

Overall, the study demonstrates that social sustainability in residential neighbourhoods is not determined solely by housing provision but by the interaction between affordability, accessibility, environmental quality, infrastructure availability, and community characteristics. The superior performance of Gwarinpa suggests that better-planned neighbourhoods provide more favourable social sustainability outcomes. However, the moderate scores observed across both locations indicate significant opportunities for improvement.

The study therefore recommends the adoption of inclusive housing design standards, increased provision of affordable housing, enhancement of green and recreational spaces, improved maintenance and housing management systems, and greater incorporation of climate-responsive design strategies. These interventions are essential for promoting socially sustainable, equitable, and resilient residential environments in Abuja and other rapidly urbanizing cities in Nigeria.

This study contributes to the growing body of social sustainability literature by providing a comprehensive multidimensional assessment of residential housing sustainability within Abuja's planned neighbourhoods. It demonstrates that accessibility, affordability, green-space provision, and environmental quality remain critical constraints to sustainable housing development despite relatively favourable access to urban services. The study further identifies key determinants of resident satisfaction and provides empirical evidence to support policy initiatives aimed at achieving socially inclusive and sustainable urban housing development in Nigeria.

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