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Research article

SPATIAL ASSESSMENT OF QUALITY OF LIFE OF URBAN SLUM DWELLERS AND THE ASSOCIATION WITH URBAN RENEWAL PROGRAMMES IN CALABAR SOUTH LOCAL GOVERNMENT AREA, CROSS RIVER STATE, NIGERIA

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ABSTRACT

Rapid urbanisation in Nigerian cities has expanded the number and spatial extent of informal settlements, yet the quality-of-life implications of neighbourhood deprivation and the practical influence of urban renewal remain insufficiently documented at ward level. This study assessed the spatial distribution of slum conditions, examined their relationship with residents' quality of life, evaluated the association between urban renewal programmes and neighbourhood improvement, and identified priority intervention areas in Calabar South Local Government Area, Cross River State, Nigeria. A cross-sectional descriptive and correlational survey design was integrated with geographic information system analysis. A structured questionnaire was administered to 400 adult residents selected through a multistage procedure across the 12 wards and 14 slum settlements; 396 valid questionnaires were analysed, representing a 99% response rate. Field observation and global positioning system records supported spatial mapping. The instrument achieved a Cronbach's alpha reliability coefficient of 0.84. Descriptive statistics, Pearson product-moment correlation and QGIS-based mapping were used. The results showed that 58.3% of respondents were male, 62.6% were aged 26–45 years, and 64.1% earned below ₦50,000 monthly. The Slum Condition Index indicated very poor conditions in Anantigha (1.82) and Watt Market (1.95), poor conditions in Atamunu (2.14) and Uwanse (2.30), and comparatively good conditions in Orok Orok (3.45). Slum conditions were significantly associated with quality of life ($r = 0.407$, $p < 0.01$, $N = 396$), while urban renewal programmes had a significant but weaker association with improvement in slum conditions ($r = 0.317$, $p < 0.01$, $N = 396$). The spatial evidence identifies Anantigha, Watt Market and Atamunu as priority areas. The study recommends participatory in-situ upgrading, drainage and sanitation investment, affordable-housing support, livelihood protection, culture-sensitive public-space renewal and a continuously updated GIS monitoring system.

KEYWORDS

Slum; Quality of life; Urban renewal; Spatial assessment; Housing; In-situ upgrading; Calabar South.

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Introduction

Urbanisation is one of the defining demographic and spatial processes of the twenty-first century. It concentrates people, employment, innovation and public services, but it also places intense pressure on land, housing, drainage, transport, sanitation and environmental management. Where urban growth is faster than the capacity of governments and housing markets to provide serviced and affordable accommodation, low-income households frequently secure shelter through informal subdivision, overcrowded rental housing, makeshift structures or settlements located on marginal land. These neighbourhoods are commonly described as slums or informal settlements, although the term should be used carefully because it can obscure the social organisation, economic contribution and cultural identity of the people who live there. UN-Habitat (2003, 2020, 2022) defines slum deprivation through overlapping deficits in durable housing, adequate living space, secure tenure, safe water and sanitation. The implication is that a slum is not simply a visually unattractive place; it is a spatial concentration of multiple, mutually reinforcing disadvantages.

The global scale of the challenge makes the quality of life of slum residents a central development concern. Informal settlements often accommodate workers whose labour supports transport, markets, construction, hospitality, domestic services and other sectors essential to urban economies. Yet residents may experience recurrent flooding, blocked drains, unreliable water supply, poor solid-waste collection, exposure to indoor and outdoor pollution, insecure tenure and limited access to health, education and recreation. These conditions shape physical health, psychological wellbeing, safety, social relationships and household expenditure. The World Health Organization's housing and health guidelines emphasise that housing quality, crowding, thermal conditions, injury risks and access to basic services are important determinants of health (World Health Organization, 2018). Similarly, the social determinants of health framework shows that wellbeing is produced

through the conditions in which people are born, live and work, rather than by medical care alone (Commission on Social Determinants of Health, 2008).

Nigeria's rapid urban growth has occurred alongside persistent housing shortages, weak development control, limited municipal finance and substantial inequality. The result is an urban system in which formal housing and infrastructure provision do not consistently match population growth or the purchasing power of low-income households. The World Bank (2016) identifies urbanisation as a potential engine of transformation in Nigeria, but stresses that the benefits depend on better land administration, infrastructure, governance and connectivity. National studies also reveal marked spatial differences in housing quality and access to services, demonstrating that urban averages can conceal severe neighbourhood deprivation (Morenikeji et al., 2017). Poor housing should not be interpreted as an individual failure; it is also the material outcome of land markets, planning institutions, tenure systems, incomes and public investment.

Calabar South Local Government Area is a particularly important setting for examining these relationships. It is an old, densely occupied part of Calabar Metropolis with coastal and low-lying locations, established markets, transport corridors, culturally significant neighbourhoods and a mixture of formal and informal housing. Settlements such as Anantigha, Watt Market, Atamunu, Uwanse, Bayside, Jebes, Orok Orok and Bogobiri contain diverse residential and commercial activities, but many face drainage, sanitation, waste and housing pressures. Earlier analysis of urban renewal in Calabar indicates that physical improvement programmes have operated within wider challenges of implementation, maintenance, finance and public participation (Coker et al., 2013). Land-use and land-cover change in the metropolis further demonstrates continuing built-up expansion and the need for evidence-based spatial management (Awuh et al., 2018).

Recent scholarship published in the Journal of Environmental Sciences and Built Environment Research strengthens the local basis for a spatial and socially sensitive approach. Ajom et al. (2026a) show that GIS can improve sustainable urban planning and development control in Calabar, although access, skills and institutional application remain limited. Ajom et al. (2026b) demonstrate in Obudu that low-income housing may be affordable while still providing poor environmental quality, and they advocate tenure-sensitive, in-situ and service-oriented intervention. Eneyo (2026a), links place readiness in Calabar South with the continuity of Efik and Qua festivals, reminding planners that neighbourhoods and public spaces are also cultural landscapes. These perspectives are directly relevant to urban renewal: improvement should correct environmental deprivation without erasing social networks, informal livelihoods or culturally meaningful spaces.

Statement of the problem

The principal problem is the coexistence of urban renewal activity with persistent and spatially concentrated deprivation in Calabar South. Roads may be rehabilitated, drains opened or public spaces beautified in one location while adjoining households continue to experience overcrowding, poor sanitation, insecure tenure and flood exposure. When programme performance is assessed only through project counts or expenditure, this unevenness may remain hidden. A ward-level or settlement-level perspective is needed because environmental risks and service deficits do not affect the local government area uniformly. The Slum Condition Index and quality-of-life evidence used in this study provide a means of locating disadvantage and relating it to residents' lived experience.

A second problem concerns the limited empirical understanding of whether renewal programmes are producing meaningful improvement for low-income residents. Urban renewal can range from demolition and redevelopment to in-situ upgrading, drainage improvement, waste management, road rehabilitation, housing assistance and tenure regularisation. These approaches have different consequences. Clearance may remove visibly substandard structures but can also displace households, fragment livelihoods and transfer poverty to another location. In-situ upgrading is usually more socially protective, yet it requires coordination, community participation, reliable maintenance and secure funding. Without local evidence, authorities may invest in interventions that are highly visible but weakly aligned with the most serious determinants of quality of life. A third problem is the separation of social data from spatial planning. Conventional questionnaires can identify average perceptions, but averages do not show where deprivation is concentrated. Conversely, maps can display patterns but cannot by themselves explain how residents experience housing, services, safety and renewal. GIS-based urban management in Calabar remains constrained by data, access and institutional capacity (Ajom et al., 2026a). The research gap is therefore both substantive and methodological: there is insufficient integrated evidence linking slum conditions, quality of life, renewal programmes and neighbourhood location in Calabar South. This gap limits priority setting, participatory planning, monitoring and accountability.

Aim and objectives of the study

The aim of the study was to conduct a spatial assessment of quality of life among urban slum dwellers and examine its association with urban renewal programmes in Calabar South Local Government Area, Cross River State, Nigeria.

1. Assess the spatial distribution of slum conditions in Calabar South Local Government Area.
2. Examine the relationship between slum conditions and the quality of life of residents.
3. Evaluate the association between urban renewal programmes and improvement in slum conditions.
4. Identify wards and settlements with the lowest quality of life for targeted intervention.

Research questions

1. How are slum conditions spatially distributed across the selected locations in Calabar South?
2. What relationship exists between slum conditions and residents' quality of life?
3. To what extent are urban renewal programmes associated with improvement in slum conditions?
4. Which locations should receive priority attention based on the spatial and statistical evidence?

Research hypotheses

The study tested the following null hypotheses at the 0.05 level of significance:

1. There is no significant relationship between slum conditions and the quality of life of residents in Calabar South.
2. There is no significant association between urban renewal programmes and improvement in slum conditions in Calabar South.

Significance and contribution of the study

The study is significant for urban planning, public health, housing policy and local governance. It provides a location-specific basis for deciding where drainage, sanitation, waste, housing and public-space investments should be concentrated. It also demonstrates why programme monitoring should combine resident outcomes with GIS layers rather than rely solely on physical project completion. For communities, the evidence can support more transparent engagement with government and reduce the risk that renewal is equated with displacement. For scholarship, the study contributes to the limited body of integrated spatial and quality-of-life research on informal settlements in medium-sized Nigerian cities and connects environmental improvement with cultural continuity and social justice.

Literature review

Slums as multidimensional and spatial deprivation

The concept of the slum has evolved from a narrow emphasis on dilapidated buildings to a multidimensional understanding of deprivation. UN-Habitat's operational criteria focus on durable housing, sufficient living area, improved water, improved sanitation and secure tenure (UN-Habitat, 2003). These dimensions often overlap: insecure tenure discourages household investment; inadequate drains increase flood damage; poor roads constrain waste collection and emergency access; and overcrowding raises the risk of communicable disease and domestic stress. Mahabir et al. (2016) therefore argue that slums should be studied as both social and physical constructs. Their boundaries are not always clear, and administrative categories may fail to reflect the actual morphology or lived experience of a settlement.

Spatial concentration matters because disadvantage is produced through neighbourhood effects as well as individual circumstances. A household may improve its dwelling but remain exposed to contaminated water, open drains, inaccessible roads or neighbourhood crime. Informal settlements are also internally diverse. Some sections may contain durable buildings and active commercial networks, while others occupy wetlands or highly congested plots. Remote sensing and GIS have improved the capacity to detect physical features associated with informal settlements, including high roof density, irregular street patterns, limited open space and hazardous location (Kuffer et al., 2016). However, remotely sensed morphology must be combined with field and social data because roof materials and settlement form do not reveal tenure security, service reliability, household vulnerability or perceived wellbeing.

Housing, environmental conditions and quality of life

Housing is simultaneously a physical structure, a household asset, a site of social reproduction and a determinant of health. Adeoye (2016) shows that urban housing quality reflects the combined condition of the dwelling and its neighbourhood environment. Structural stability, ventilation, lighting, crowding, drainage, water, sanitation, access and security all influence whether housing supports a dignified life. The WHO housing and

health guidelines connect inadequate housing with respiratory illness, injury, heat and cold stress, infectious disease and mental-health burdens (World Health Organization, 2018). These effects are intensified for households with children, older adults, people with disabilities and residents whose livelihoods require working from home.

Quality of life provides a useful outcome because it captures both objective conditions and subjective evaluation. The WHOQOL approach includes physical health, psychological wellbeing, social relationships and environment (WHOQOL Group, 1995). Urban studies extend this framework to neighbourhood satisfaction, mobility, safety, public space and access to facilities. Pacione (2003) argues that urban environmental quality must be understood socially and geographically because the same physical condition may be valued differently across groups, while access to environmental benefits and exposure to hazards are uneven. In the present study, the reported positive correlation between the Slum Condition Index and quality of life is consistent with the expectation that better neighbourhood conditions are associated with better wellbeing.

Health research on slums confirms that deprivation operates through multiple pathways. Ezeh et al. (2017) describe slum health as the product of crowding, environmental exposure, insecure work, weak services and political marginalisation. Lilford et al. (2017) emphasise that improvement requires action beyond the health sector, particularly housing, sanitation, tenure and governance. Settlement morphology can also influence access, ventilation, hazard exposure and service delivery, creating a link between physical form and health outcomes (Friesen et al., 2020). A systematic review of informal settlements in South Africa similarly found that upgrading interventions should be evaluated through health equity and living conditions, not only infrastructure outputs (Weimann & Oni, 2019).

Urban renewal, in-situ upgrading and displacement risk

Urban renewal refers to coordinated intervention intended to reverse physical decline, improve infrastructure, support economic activity and enhance environmental quality. Historically, many renewal programmes relied on clearance and redevelopment. This approach can create new roads, buildings and investment opportunities, but it has often displaced low-income residents and informal enterprises. Contemporary practice increasingly favours in-situ upgrading, incremental housing improvement, service extension and tenure-sensitive planning because these approaches preserve social networks and reduce involuntary displacement (UN-Habitat, 2020). The distinction is not merely technical. It reflects whether residents are treated as beneficiaries and rights-holders or as obstacles to urban modernisation.

The Nigerian context reinforces the need for careful design. Housing affordability, land documentation, infrastructure deficits and institutional fragmentation constrain formal provision. Ajom et al. (2026b) found that makeshift housing in Obudu performs an affordability function for low-income households despite poor environmental conditions. Their recommendation for in-situ upgrading, basic services, tenure-sensitive assistance and incremental low-cost housing is relevant to Calabar South. It suggests that renewal should improve safety and services while recognising why households occupy informal accommodation. Removing a low-cost shelter option without a realistic alternative can increase homelessness, overcrowding or peripheral displacement.

GIS, spatial indices and evidence-based urban management

GIS supports urban renewal by integrating data about buildings, roads, drains, water points, flood zones, waste facilities, public services and household conditions. It enables planners to visualise concentrations of deprivation, compare locations, estimate service gaps and update progress. Kuffer et al. (2016) demonstrate the growing contribution of remote sensing to slum mapping, while Mahabir et al. (2016) caution that physical detection should be linked to social realities. A composite Slum Condition Index is useful because it summarises several dimensions into a comparable score, but the underlying variables and scale direction must remain transparent. In this study, lower SCI scores indicate poorer conditions, and the maps are interpreted alongside survey evidence and field observation.

The local institutional relevance is demonstrated by Ajom et al. (2026a), whose study of GIS for sustainable planning in Calabar reported uneven access and limited use of GIS in development control. This finding implies that producing a map is only the first step. Spatial evidence must be stored in an accessible database, connected to permitting and project monitoring, updated after interventions and used in budget decisions. Staff training, equipment, inter-agency data standards and public transparency are necessary if GIS is to influence implementation. A static map included in a report can diagnose problems, but an operational urban information system can support repeated decisions.

Culture, identity and socially responsive renewal

The built environment is not only a system of shelter and infrastructure; it is also a setting for memory, identity, exchange and cultural performance. This is especially important in Calabar South, where streets, markets,

waterfront areas and neighbourhood spaces support everyday social life and heritage practices. Eneyo (2026a) demonstrates that the continuity and tourism readiness of Efik and Qua festivals depend partly on the condition, accessibility and management of place. Urban renewal can strengthen this relationship by providing clean, safe and accessible public spaces, but it can also weaken it if redevelopment removes communities or interrupts established routes and gathering points.

Effiom, (2026a) deepen this cultural argument. From a semiotic-directorial perspective, movement from stage to street transforms public space into a performance environment in which bodies, costumes, music, spectators and urban routes produce meaning (Effiom, 2026b). His analysis of Efik identity in the Calabar Carnival further shows that performance is a site of negotiation through which identity is represented and renewed (Effiom, 2026b). Although these studies focus on carnival and performance rather than housing, their planning implication is relevant: streets and neighbourhood spaces are cultural infrastructure. Renewal in Calabar South should therefore include cultural mapping, community consultation and protection of access to significant routes, markets and gathering places.

Theoretical and conceptual framework

The study is interpreted through an integrated framework combining the social determinants of health, urban environmental quality and spatial justice. The social determinants perspective explains how housing, sanitation, income, safety and access shape health and wellbeing (Commission on Social Determinants of Health, 2008). Spatial justice introduces a normative question: whether public investment, environmental benefits and development burdens are distributed fairly and whether affected residents have a meaningful voice in decisions. Within this framework, slum conditions are the principal environmental exposure, represented by the Slum Condition Index and associated observations. Quality of life is the resident-level outcome. Urban renewal programmes are an institutional intervention expected to improve the physical and service environment. Household socioeconomic characteristics influence vulnerability and capacity to respond, while location shapes exposure to drainage, flooding, access and public investment. The framework anticipates a positive relationship between better slum-condition scores and quality of life, and a positive relationship between effective renewal and neighbourhood improvement. However, the strength of these relationships may be moderated by affordability, tenure, maintenance, participation and livelihood effects.

Methodology

Research design

The study adopted a cross-sectional descriptive and correlational survey design with a spatial analytical component. The descriptive component documented respondents' socioeconomic characteristics and the condition of selected slum locations. The correlational component tested the relationships between slum conditions and quality of life and between urban renewal programmes and improvement in slum conditions. The spatial component used georeferenced observations and GIS to display variation across locations. This mixed analytical structure was appropriate because the research questions required both statistical association and geographical identification. Cross-sectional evidence cannot establish temporal causation, but it can reveal significant patterns and provide a baseline for subsequent monitoring (Creswell & Creswell, 2018).

Study area

Calabar South Local Government Area is part of Calabar Metropolis in Cross River State, southern Nigeria. It lies approximately between latitudes 4°54'N and 4°58'N and longitudes 8°18'E and 8°24'E. The local government area contains 12 wards and includes long-established residential, commercial, waterfront and market environments. The projected 2024 population used in the study was 530,127. Major low-income and slum locations identified for the wider sampling frame included Anantigha, Bayside, Jebs, Watt Market, Atamunu, Uwanse, Orok Orok and Bogobiri. The area experiences a humid tropical climate with substantial seasonal rainfall. Low-lying terrain, dense development, blocked drains and inadequate waste management can increase local flood exposure.

Calabar South is socially and culturally significant within the metropolis. Its neighbourhoods support markets, transport, informal enterprises, religious institutions and heritage practices. The area's proximity to waterways and central urban activities creates both opportunity and environmental pressure. Land-use change in the broader metropolis has increased built-up surfaces and intensified the need for coordinated drainage, waste and development control (Awuh et al., 2018). The study area is therefore suitable for examining how spatially differentiated settlement conditions relate to quality of life and how renewal programmes are perceived within a dense, culturally important urban setting.

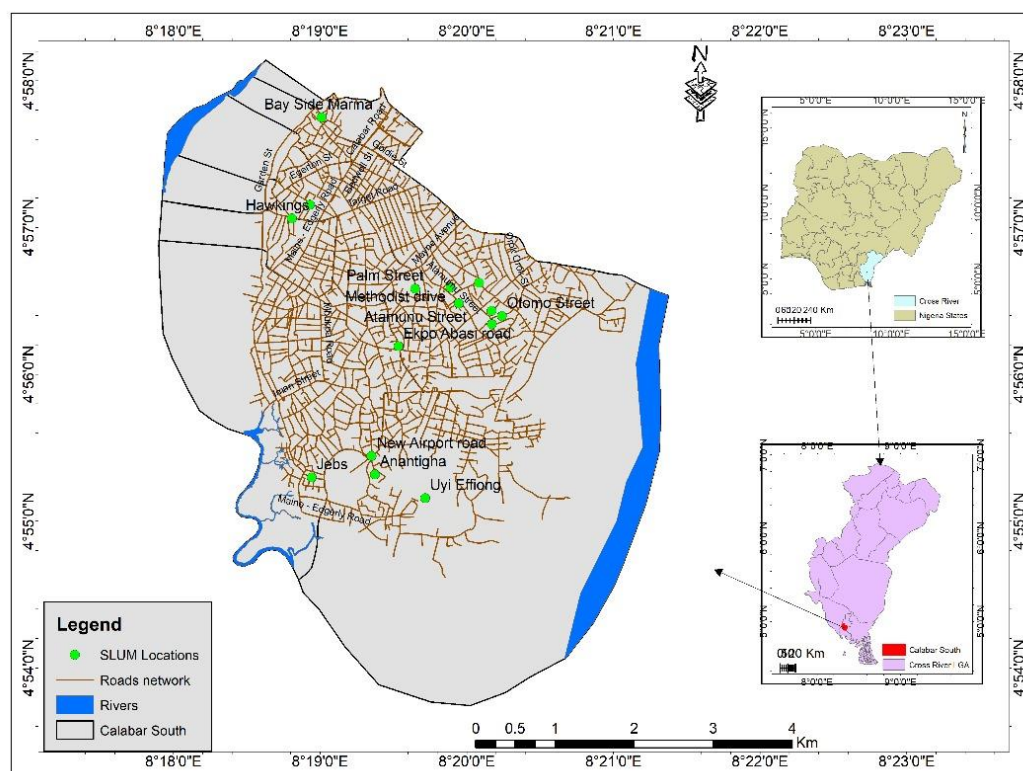


Figure 1. Calabar South Local Government Area

Source: Geographical Information System Unit, Department of Geography and Environmental Science, University of Calabar, Calabar.

Population, sample size and sampling procedure

The target population comprised adult residents of the selected slum and low-income settlements in Calabar South. A sample size of 400 was determined from the projected population of 530,127 using the Taro Yamane formula, $n = N/[1 + N(e^2)]$, at a 5% level of precision (Yamane, 1967). Substituting the population produced a value close to 400, which was adopted to provide adequate representation while remaining feasible for field administration. Of the 400 questionnaires administered, 396 were valid for analysis, giving a response rate of 99%. The high response rate reduced the risk of substantial non-response bias, although it does not remove other limitations associated with self-reported and cross-sectional data. A multistage sampling procedure was used. First, the 12 wards of Calabar South constituted the broad spatial strata. Second, 14 slum or low-income settlements were identified across the wards using reconnaissance, local knowledge and the study's operational criteria. Third, the sample was distributed proportionately so that more populous settlements contributed a larger number of respondents. Fourth, households were selected systematically along accessible residential routes after a starting point was established. One eligible adult respondent was selected from each participating household. Where the initially approached household or respondent was unavailable or declined, the next eligible household was approached in accordance with the field protocol. The procedure sought to balance spatial coverage with practical field access.

Instrument, measurement and data collection

Primary data were collected between June and August 2024 using a structured questionnaire, field-observation schedule and handheld global positioning system records. The questionnaire contained sections on respondent characteristics, housing and neighbourhood conditions, quality-of-life indicators, exposure to urban renewal programmes and perceived improvement. Items were written in clear language and administered by trained field personnel. The observation schedule recorded visible conditions such as drainage, road access, waste accumulation, housing materials, crowding indicators and environmental hazards. GPS coordinates supported the spatial representation of sampled locations and the preparation of thematic maps.

The Slum Condition Index combined relevant environmental and housing indicators into a composite score in which lower values represented poorer conditions and higher values represented better conditions. The quality-of-life measure summarised residents' assessments of physical wellbeing, environmental comfort, safety, access and social experience. Urban renewal exposure and improvement were measured through items relating to infrastructure, sanitation, roads, drainage, housing and environmental works. Composite measurement allows

several related items to be analysed together, but interpretation depends on consistent coding. Consequently, the direction of the indices was retained during analysis so that the positive correlation could be read as better conditions being associated with better quality of life.

Content and face validity were addressed through expert review of the questionnaire and alignment of items with the study objectives. A reliability analysis yielded a Cronbach's alpha coefficient of 0.84, indicating good internal consistency for the composite measures. Reliability does not guarantee validity, but the coefficient suggests that the items measured coherent underlying constructs. During fieldwork, respondents were informed about the study and participation was voluntary. Completed questionnaires were checked for missing or inconsistent responses before coding.

Data processing and analysis

Questionnaire data were coded and analysed with IBM SPSS Statistics version 26. Descriptive statistics, including frequencies, percentages and mean index scores, were used to summarise respondent characteristics and settlement conditions. Pearson product-moment correlation was used to test the two hypotheses. Statistical significance was evaluated at $p < 0.05$, while the reported tables also indicate significance at the 0.01 level. Correlation coefficients were interpreted in relation to direction, magnitude and substantive meaning. Because correlation does not establish causation, the findings are described as associations rather than proof that one variable independently caused another.

QGIS version 3.28 was used to organise georeferenced observations and display the spatial pattern of the Slum Condition Index. The maps identify focal locations and allow comparison between settlement scores and area coverage. Spatial interpretation was conducted alongside the survey results to avoid treating mapped categories as self-explanatory. Figure and table labels were retained from the study. The analysis also recognises that the table and detailed map do not display identical sets of spatial units; this is addressed as a reporting limitation rather than resolved by altering the original results.

Results and discussion

Socioeconomic characteristics of respondents

A total of 396 valid questionnaires were analysed. Male respondents constituted 58.3%, while females accounted for the remaining proportion. The age distribution showed that 62.6% were between 26 and 45 years, indicating that most respondents were in economically active and family-forming age groups. In addition, 64.1% reported monthly incomes below ₦50,000. These characteristics are important because working-age adults commonly carry responsibility for rent, household maintenance, transport, food, education and health expenditure. Low income limits the capacity to purchase formal housing or privately substitute for inadequate public services.

The socioeconomic profile supports a structural interpretation of slum residence. Informal and low-quality housing frequently performs an affordability and location function by allowing households to remain near markets, employment and social networks. Ajom et al. (2026b) found a similar tension in Obudu, where makeshift housing provided low-cost shelter despite poor environmental conditions. The policy implication is that renewal should not make housing physically better but financially inaccessible. Affordability safeguards, phased improvement, rent monitoring, livelihood support and protection against arbitrary eviction are necessary to prevent an intervention from improving the land while worsening the welfare of existing residents.

Spatial distribution of slum conditions

Table 1. Slum Condition Index by Ward

Ward	SCI Score	Condition
Anantigha	1.82	Very Poor
Watt Market	1.95	Very Poor
Atamunu	2.14	Poor
Uwanse	2.30	Poor
Orok Orok	3.45	Good

Table 1 reveals clear spatial differentiation. Anantigha recorded the lowest Slum Condition Index score of 1.82 and was classified as very poor. Watt Market followed with 1.95, also classified as very poor. Atamunu and Uwanse recorded 2.14 and 2.30 respectively and were classified as poor. Orok Orok had the highest score, 3.45, and was classified as good relative to the other locations. The ordering suggests that deprivation is not uniformly distributed across Calabar South and that an area-wide average would conceal the severity of conditions in the lowest-scoring settlements.

The very poor scores in Anantigha and Watt Market can be interpreted in relation to the interaction of housing, drainage, waste, access and density. Coastal or low-lying exposure can magnify the effect of blocked drains and intense rainfall, while dense commercial activity may increase waste generation and pressure on public space. Poor environmental conditions impose direct and indirect costs: floodwater damages household property, stagnant water increases disease risk, inaccessible roads affect emergency response, and repeated repairs consume scarce income. These pathways correspond with the broader evidence that slum health and wellbeing are shaped by the combined physical and social environment (Ezeh et al., 2017; Lilford et al., 2017).

Relationship between slum conditions and quality of life

Table 2. Pearson correlation between slum conditions and quality of life

Variables	r	p-value	N
Slum Conditions & QoL	0.407**	0.000	396

**Correlation is significant at the 0.01 level (two-tailed).

Table 2 shows a statistically significant moderate positive relationship between the Slum Condition Index and quality of life ($r = 0.407$, $p < 0.01$, $N = 396$). Given the coding direction, higher scores represented better slum conditions; the result therefore means that better housing and neighbourhood conditions were associated with better quality of life. Expressed inversely, greater deprivation was associated with lower quality of life. The first null hypothesis was rejected. The coefficient does not imply that the physical environment explains all variation in wellbeing, but it indicates a meaningful relationship that is unlikely to be due to chance in the sample.

The moderate magnitude is substantively plausible. Quality of life is influenced by environmental conditions, but also by income, health, household relationships, employment, security, expectations and access to wider urban opportunities. A single neighbourhood index would not be expected to account for every dimension. Nevertheless, the association confirms that drainage, sanitation, housing and access are not merely aesthetic concerns. They are connected to everyday wellbeing. This supports the WHO housing and health framework (World Health Organization, 2018) and the urban environmental quality perspective advanced by Pacione (2003).

Association between urban renewal programmes and improvement in slum conditions

Table 3. Pearson correlation between urban renewal programmes and slum improvement

Variables	r	p-value	N
Urban Renewal & Improvement	0.317**	0.000	396

**Correlation is significant at the 0.01 level (two-tailed).

The relationship between urban renewal programmes and improvement in slum conditions was positive and statistically significant but weaker ($r = 0.317$, $p < 0.01$, $N = 396$). The second null hypothesis was rejected. The coefficient indicates that greater exposure to or effectiveness of renewal programmes was associated with improved conditions, although the association was low to moderate. This pattern suggests that renewal has contributed to improvement but has not been sufficiently comprehensive, evenly distributed or sustained to overcome the wider drivers of deprivation.

Several factors can explain a modest relationship. First, projects may be spatially selective, benefiting major roads or visible corridors more than interior residential areas. Second, maintenance failures can reduce the durability of drains, roads and waste facilities. Third, infrastructure improvement may not address tenure insecurity, rent escalation or household poverty. Fourth, residents may experience disruption during construction or displacement pressure after land values rise. Finally, programme awareness can vary, causing respondents to interpret the meaning of urban renewal differently. These explanations should be investigated in longitudinal and qualitative follow-up research rather than inferred as proven causes from the present correlation.

Spatial hotspots and mapped area pattern

The GIS analysis identified Anantigha, Watt Market and Atamunu as the principal low-quality-of-life and poor-condition hotspots. This spatial concentration is important because it enables priority setting. Rather than distributing small projects evenly across all locations, authorities can direct integrated packages to the areas where multiple deficits overlap. Such packages should include drain rehabilitation, solid-waste collection, access improvement, water and sanitation, housing safety assessment and household-level flood protection. They should also be coordinated with health surveillance and livelihood support.

Figure 2 displays the spatial pattern of the Slum Condition Index for four focal mapped zones. Anantigha and Watt Market appear within the poorest categories, Atamunu occupies an intermediate poor category, and Orok Orok records the strongest comparative score. The visual pattern reinforces the table's conclusion that conditions vary substantially across the study area. It also demonstrates the communicative value of GIS:

decision-makers and communities can more readily understand a mapped concentration of need than a single metropolitan average.

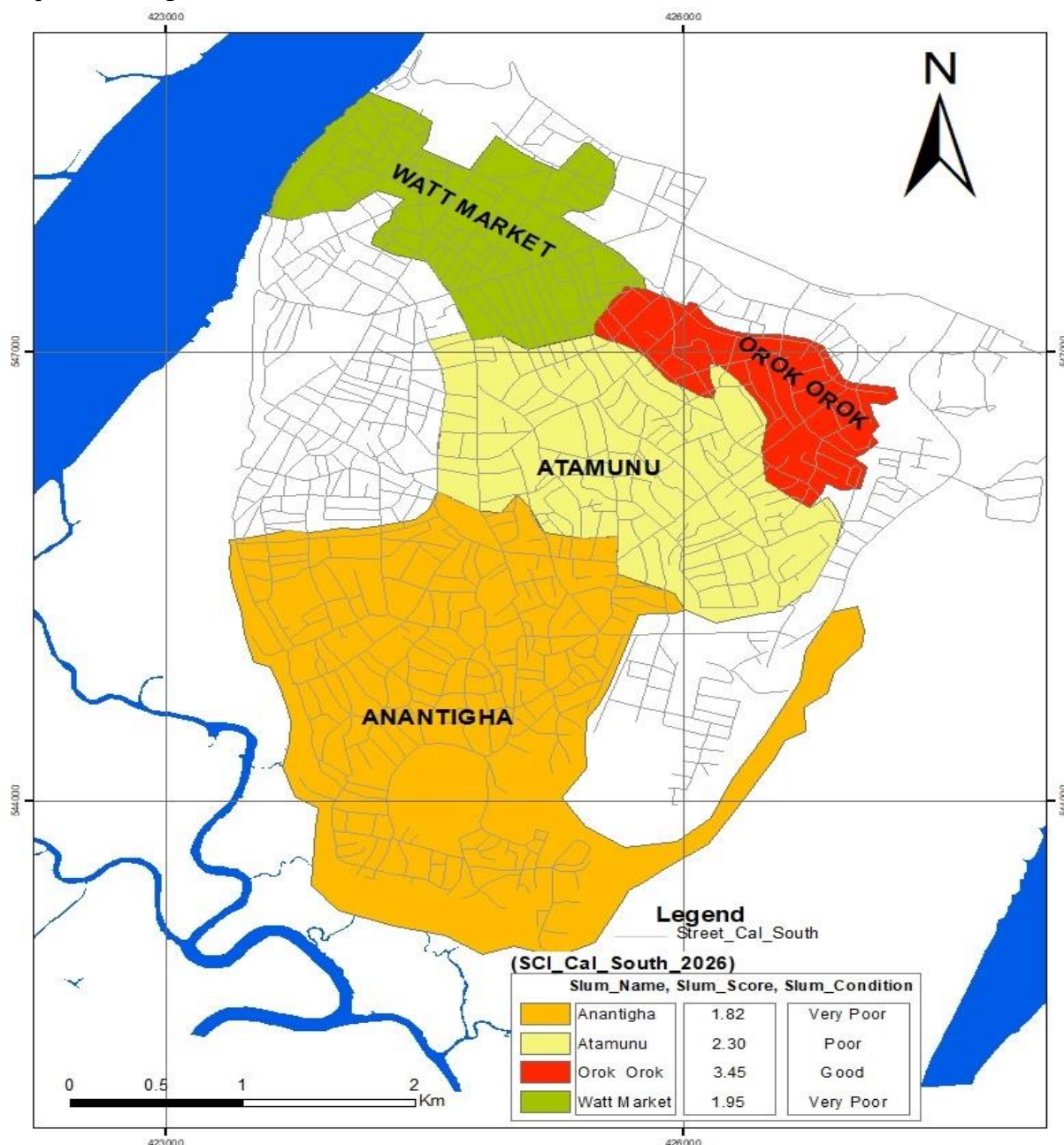


Figure 2. Spatial analysis of Slum Condition Index

Source: Geographical Information System Unit, Department of Geography and Environmental Science, University of Calabar, Calabar.

Figure 3 presents the area-coverage percentage analysis for the mapped Slum Condition Index zones. The visual distribution indicates that the categories occupy different shares of the mapped area, with Anantigha representing the largest of the four displayed zones. Area coverage should not be used as the sole basis for budget allocation because population density, severity, household vulnerability and infrastructure cost also matter. However, it is useful for estimating the physical scale of intervention and planning drainage networks, waste routes and field verification.

The map and Table 1 are not identical in spatial coverage: the table reports five locations, including Uwanse, while the detailed maps display four focal zones. In addition, the figure legend appears to associate a 2.30 score with Atamunu, whereas Table 1 reports 2.14 for Atamunu and 2.30 for Uwanse. The original reported table and figures have been retained, as requested, but the discrepancy should be reconciled before final publication by checking the GIS attribute table, settlement boundaries and map legend. Transparent correction would strengthen reproducibility without changing the substantive conclusion that Anantigha and Watt Market are the poorest locations and Orok Orok performs comparatively better.

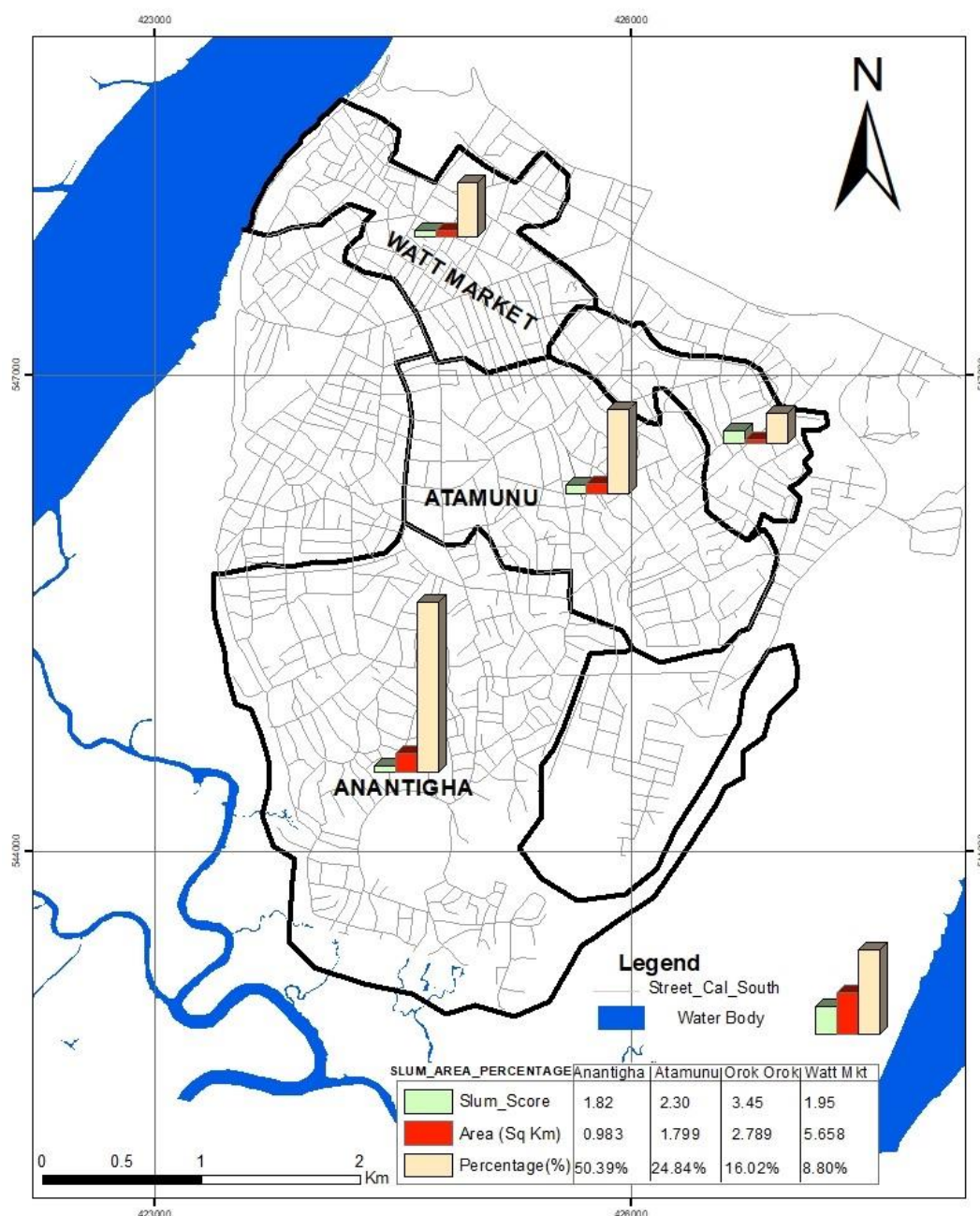


Figure 3. Area coverage percentage analysis of Slum Condition Index

Source: Geographical Information System Unit, Department of Geography and Environmental Science, University of Calabar, Calabar.

Integrated discussion and planning implications

Priority interventions should begin with the hotspot areas, but project design must follow infrastructure systems rather than administrative labels alone. Drainage catchments cross settlement boundaries, waste routes depend on road access, and floodwater moves according to topography. GIS should be used to connect household conditions to drains, roads, waterways, health facilities, schools and waste infrastructure. Ajom et al. (2026a) provide a relevant institutional agenda: digital spatial databases, staff capacity, application to development control and consistent monitoring. The present maps can become the first layer of a more complete Calabar South upgrading dashboard.

Housing intervention should be incremental, affordable and tenure-sensitive. Structural risk assessments can identify buildings requiring urgent reinforcement or relocation, while less hazardous dwellings can be improved through roofing, ventilation, floors, toilets and drainage connections. Micro-grants, low-interest loans, material support and technical advice may help owner-occupiers and landlords, but tenant protection is necessary to prevent improvement costs from producing unaffordable rent increases. Ajom et al. (2026b) demonstrate why affordability and environmental adequacy must be pursued together. A dwelling that is inexpensive but unsafe is

not a satisfactory housing solution; a dwelling that is safe but unaffordable is not accessible to the target population.

Renewal must also protect cultural and economic life. Eneyo (2026) shows that Calabar South's heritage continuity depends on community and place readiness. Effiom (2026a, 2026b) demonstrates that streets and carnival spaces are active sites of performance and Efik identity. Consequently, road widening, market reorganisation and public-space design should map ceremonial routes, gathering points, informal trading and neighbourhood landmarks before construction. Clean, well-lit and accessible spaces can strengthen cultural expression and tourism readiness, but displacement or overregulation can remove the residents and enterprises that give those spaces meaning.

Finally, programme accountability requires measurable outcomes. Each project should specify the baseline condition, target households, expected quality-of-life benefit, completion date, maintenance institution and public feedback mechanism. Post-project surveys and repeated GIS mapping can test whether the relationship between renewal and improvement becomes stronger over time. Community scorecards, geo-tagged photographs and open project maps would make progress visible and help distinguish completed construction from sustained service delivery.

Conclusion

This study assessed the spatial pattern of slum conditions and quality of life and examined the association with urban renewal programmes in Calabar South Local Government Area. The retained results show pronounced spatial inequality. Anantigha and Watt Market recorded very poor Slum Condition Index scores, Atamunu and Uwanse were classified as poor, and Orok Orok had a comparatively good score. Slum conditions were moderately and significantly related to quality of life, while urban renewal programmes were positively but more weakly associated with improvement. The findings establish that neighbourhood environment matters for wellbeing and that renewal has beneficial potential, but also indicate that current intervention is incomplete or uneven. The appropriate response is not indiscriminate clearance. Calabar South requires participatory, in-situ and area-based upgrading that improves housing, drainage, sanitation, access, safety and public space while protecting affordability, tenure, livelihoods and cultural identity. Spatial targeting should direct the most intensive support to the identified hotspots, but planning must also maintain better-performing areas and manage infrastructure systems across boundaries. The study further demonstrates that GIS is most valuable when it becomes part of routine budgeting, development control and monitoring rather than a one-time research output. It was recommended that:

1. Prioritise Anantigha, Watt Market and Atamunu for integrated upgrading packages based on verified household and infrastructure data. The first phase should address drains, flood pathways, waste collection, potable water, sanitation, road access and critical housing-safety risks rather than implement isolated beautification projects.
2. Adopt in-situ and incremental upgrading as the default approach. Demolition or relocation should be limited to demonstrably unsafe locations where risk cannot be reduced on site, and any relocation should include prior consultation, compensation, affordable replacement housing, livelihood access and protection of social networks.
3. Establish a Calabar South urban-settlement GIS database linking building condition, drains, roads, water points, waste facilities, flood exposure, public services and renewal projects. The database should use harmonised settlement boundaries and legends, be updated annually, and support public reporting and development control.
4. Integrate livelihood and affordability safeguards into renewal. Provide technical assistance, targeted grants or low-cost finance for household improvement; protect tenants against arbitrary eviction and excessive post-upgrading rent increases; and provide suitable spaces for traders and home-based enterprises during and after construction.
5. Create community upgrading committees that include women, youth, tenants, landlords, traders, traditional institutions, people with disabilities and relevant agencies. These committees should validate priorities, monitor construction, report maintenance failures and participate in post-project evaluation.
6. Protect cultural landscapes and public-space functions. Before road, market or waterfront renewal, map festival routes, gathering places, heritage features and informal economic uses. Designs should improve cleanliness, safety and accessibility while retaining the spatial practices that support Efik and Qua identity and Calabar's wider cultural economy.
7. Strengthen maintenance and inter-agency coordination. Every completed drain, road, waste facility or public space should have a named responsible institution, operating budget, inspection schedule and community reporting channel. Capital works without maintenance should not be counted as sustained renewal success.

Study limitations and directions for further research

The cross-sectional design identifies associations but cannot establish that urban renewal caused the reported improvements. Questionnaire responses may be affected by recall, expectations or social desirability, and the composite indices depend on the coding and weighting of included items. The spatial maps and table also require final harmonisation of the displayed settlement units and the Atamunu/Uwanse score labels. These limitations do not remove the observed pattern, but they require cautious interpretation. Future studies should use longitudinal designs, project-specific before-and-after measures, household coordinates with appropriate privacy protection, multivariate modelling and qualitative interviews with residents and implementing agencies.

Ethical Statement

The study involved adult participants and questionnaire-based data collection. Participation was voluntary, the purpose and procedures were explained before data collection, and informed consent was obtained. Respondents were free to decline or withdraw without penalty. No names or directly identifying personal information were included in the analytical dataset. Questionnaires and spatial records were handled confidentially, and results are reported in aggregate form so that individual households cannot be identified. Fieldwork was conducted with respect for participants' dignity, safety, cultural values and privacy. The authors declare that the data were used solely for scholarly and planning purposes and that no respondent was exposed to deliberate harm or coercion.

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