International Journal of Innovative Environmental Studies Research 14(3):253-281, July-Sept, 2026

© SEAHI PUBLICATIONS, 2026 www.seahipublications.org ISSN: 2354-2918

DOI:10.5281/zenodo.22806897

Impact Of Informal Settlement On Community Livelihood In Karu -Nasarawa State

Stephen Mohammed Shamaki [1], B.M Banki [2], John Augustine Buwah [3]

[1,2&3] Department of Urban and Regional Planning,
Faculty of Environmental Science,
Nasarawa State University, Keffi, Nigeria
Corresponding author email: stephenshamaki20@gmail.com

ABSTRACT

This study assessed the effects of informal-settlement characteristics on community livelihoods and socio-economic well-being in Karu Urban Area, Nasarawa State. It examined the relationship between settlement conditions and livelihood outcomes, identified residents' principal challenges and opportunities, evaluated the magnitude of socio-economic impacts, and explored strategies for sustainable community development. A cross-sectional, descriptive and correlational survey design was adopted. From an estimated population of 333,800 residents, 384 respondents were selected through stratified and simple random sampling. Structured, interviewer-administered questionnaires produced 380 valid responses, representing an approximately 99 per cent response rate. Data were analysed descriptively in Microsoft Excel and inferentially in IBM SPSS Statistics.

The findings revealed a statistically significant, moderate positive relationship between settlement characteristics and livelihood outcomes ($r = 0.486$, $p < 0.001$), indicating that households with more secure tenure, lower room occupancy and longer residence generally experienced better livelihood outcomes. Tenure status was also significantly associated with informal trading ($\chi^2 = 18.62$, $p < 0.001$). Major constraints included tenure insecurity, inadequate water and sanitation, poor roads and insecurity, while proximity to urban markets constituted the principal economic opportunity. Although 53.9 per cent of respondents belonged to community groups, only 23.42 per cent had access to microcredit, loans or savings schemes, revealing a substantial gap between social organisation and institutional financial support. Physical conditions were notably deficient: 59 per cent of buildings had hanging foundations, 54 per cent lacked drainage, and 90 per cent of respondents travelled at least 20 minutes to reach a primary healthcare facility. Multiple regression confirmed that settlement characteristics significantly explained 50.7 per cent of the variation in socio-economic well-being ($F(5,374) = 76.92$, $p < 0.001$; $R^2 = 0.507$), with building condition emerging as the strongest predictor.

The study concludes that Karu's informal settlements are livelihood-supporting communities whose potential is constrained by infrastructural, institutional and tenure-related deficiencies. It recommends in-situ, participatory and incremental upgrading rather than displacement. Priority actions should include tenure regularisation with safeguards against eviction; structural, drainage, water, sanitation, electricity, road and healthcare improvements; strengthened market access; and expanded microfinance, vocational training and business-development support. Resident-led development committees, cooperatives, multi-stakeholder partnerships and GIS-based monitoring should be institutionalised to convert existing self-help capacity and social capital into secure, resilient and sustainable livelihood outcomes.

1.0 INTRODUCTION

Informal settlements are a major feature of rapid urbanization in developing countries, particularly where the supply of affordable and serviced housing is unable to meet growing urban demand. They are generally characterized by insecure tenure, inadequate housing, poor infrastructure and basic services, overcrowding, and limited compliance with planning and building regulations (UN-Habitat, 2015). These conditions are widespread in Africa, where rapid

population growth, poverty, limited formal land supply, and weak urban management have contributed to the continued expansion of informal settlements (Hoeltl et al., 2020).

In Nigeria, informal settlements continue to expand, particularly in peri-urban areas, due to poverty, inadequate housing, tenure insecurity, and limited access to basic infrastructure and services (Abebe et al., 2017). Although such settlements provide affordable housing and livelihood opportunities for low-income populations, poor housing conditions, inadequate infrastructure, insecure tenure, and limited access to finance can constrain residents' socio-economic well-being (Mohanty, 2020). Informal settlement development is influenced not only by weaknesses in land administration but also by urban poverty, institutional arrangements, and the behaviour of actors involved in land acquisition and development (Zhu & Simarmata, 2015; Gebeyehu, 2016; Dovey et al., 2020).

Despite these studies, limited empirical attention has been given to how settlement characteristics collectively influence livelihood outcomes and socio-economic well-being, particularly in peri-urban settlements. Existing research often examines housing, tenure, infrastructure, land administration, and livelihoods separately. There is therefore a need for integrated, settlement-specific evidence showing how factors such as building condition, overcrowding, water supply, sanitation, tenure security, and access to services affect residents' livelihoods and quality of life (Eyenghe, 2020; Samantha, 2015).

This gap is particularly evident in Karu Urban Area, along the Abuja–Keffi corridor, where rapid urban expansion has been accompanied by the growth of informal settlements characterized by unplanned development, overcrowding, inadequate drainage and sanitation, limited water supply, poor infrastructure, and tenure insecurity. Despite Karu's close economic and spatial relationship with Abuja, there remains limited empirical evidence on the combined effects of these settlement conditions on residents' livelihood outcomes and socio-economic well-being. There is also limited evidence on residents' coping strategies, access to economic opportunities, community participation, and willingness to engage in community-led upgrading.

This study therefore examines the relationship between settlement characteristics, tenure security, infrastructure conditions, and livelihood outcomes in informal settlements in Karu Urban Area. It assesses the relationship between settlement characteristics and livelihoods, identifies major challenges and opportunities, determines their effects on socio-economic well-being, and examines strategies for improving livelihood outcomes. By integrating physical, institutional, and socio-economic dimensions, the study provides empirical evidence to support more responsive settlement upgrading, stronger livelihoods, community participation, and sustainable urban development in Karu and comparable peri-urban settlements.

STUDY AREA

Karu Local Government was created in October 1996. Karu was under the jurisdiction of Keffi Local Government. The area's indigenous population consisted of a handful of tribes, and historically, the local people were mainly engaged in agriculture. After the relocation of the seat of the Government of Nigeria from Lagos to Abuja in 1991, the population of the new capital city proliferated. In 1991, the population of the Federal Capital Territory was only 371,674. 2006, it was 1.4 million, representing an average annual growth rate of 9.3 percent for those 15 years. 1991, Karu's population was approximately 10,000, growing at an astounding rate of 22.7 percent annually to 216,230 by 2006.

Karu Urban Area in Nasarawa State is a rapidly developing urban area located Eastward of Nigeria's capital city, Abuja. Geographically, it lies approximately between 8°58'N and 9°05'N Latitude and 7°55'E and 8°05'E Longitude, sharing boundaries with Abuja Municipal Area Council to the West and North, Nasarawa to the south, Keffi and Kokona LGA to the east. The landscape of Karu is characterized by flat to gently undulating plains, part of the Nigerian Central Highland Plateau, with elevations ranging from about 200 to 300 meters above sea level. Its physical environment supports both agricultural activities and urban development due to its favourable topography.

Karu Urban Area is one of the country's fast-growing and expanding urban centres. Its expansion is out-warding to the peripheral land at the expense of arable and agricultural lands due to building up practice, proximity to the national market, and accessibility for various infrastructures (UN-Habitat, 2012). As a result of this process, many hectares are being changed into urban land uses, which has multiple impacts on the environment and the livelihood of peri-urban farmers.

Strategically positioned along major transportation routes, especially the Abuja-Keffi Road, Karu boasts improved accessibility and infrastructure development, including roads, markets, and housing estates. Its proximity to Abuja has spurred rapid urbanization, leading to the growth of both formal and informal settlements, commercial enterprises, and real estate development. However, this growth presents environmental challenges such as flooding, deforestation, waste management issues, and land degradation.

Karu's socio-economic profile is characterized by a diverse population engaged in various activities, including trading, farming, and employment in urban centers. The area serves as a key peri-urban interface where rural livelihoods intersect with urban opportunities, making it a critical zone for studying urbanization, livelihood dynamics, and environmental management within Nasarawa State.

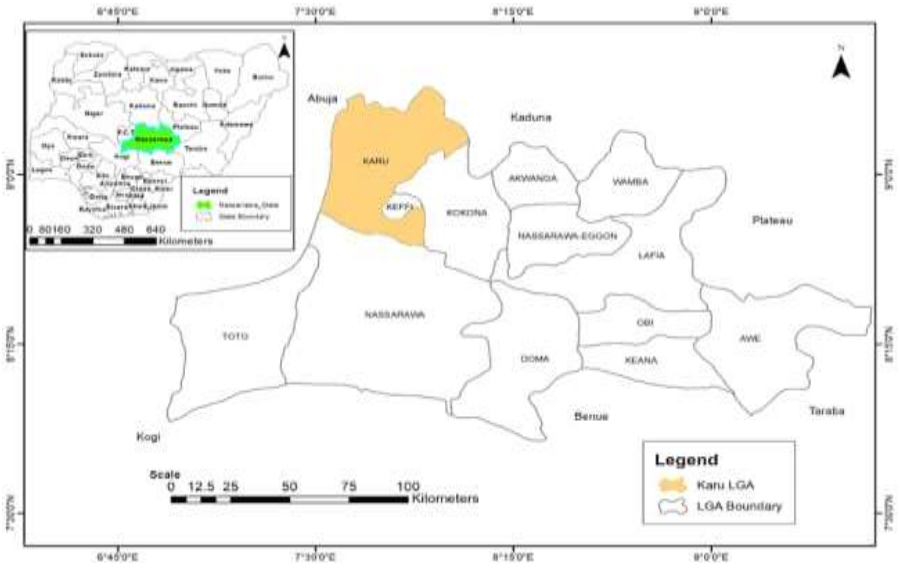

Figure 1 Map of Nasarawa State Showing Karu LGA
Source: Grid3 Nigeria (2025)

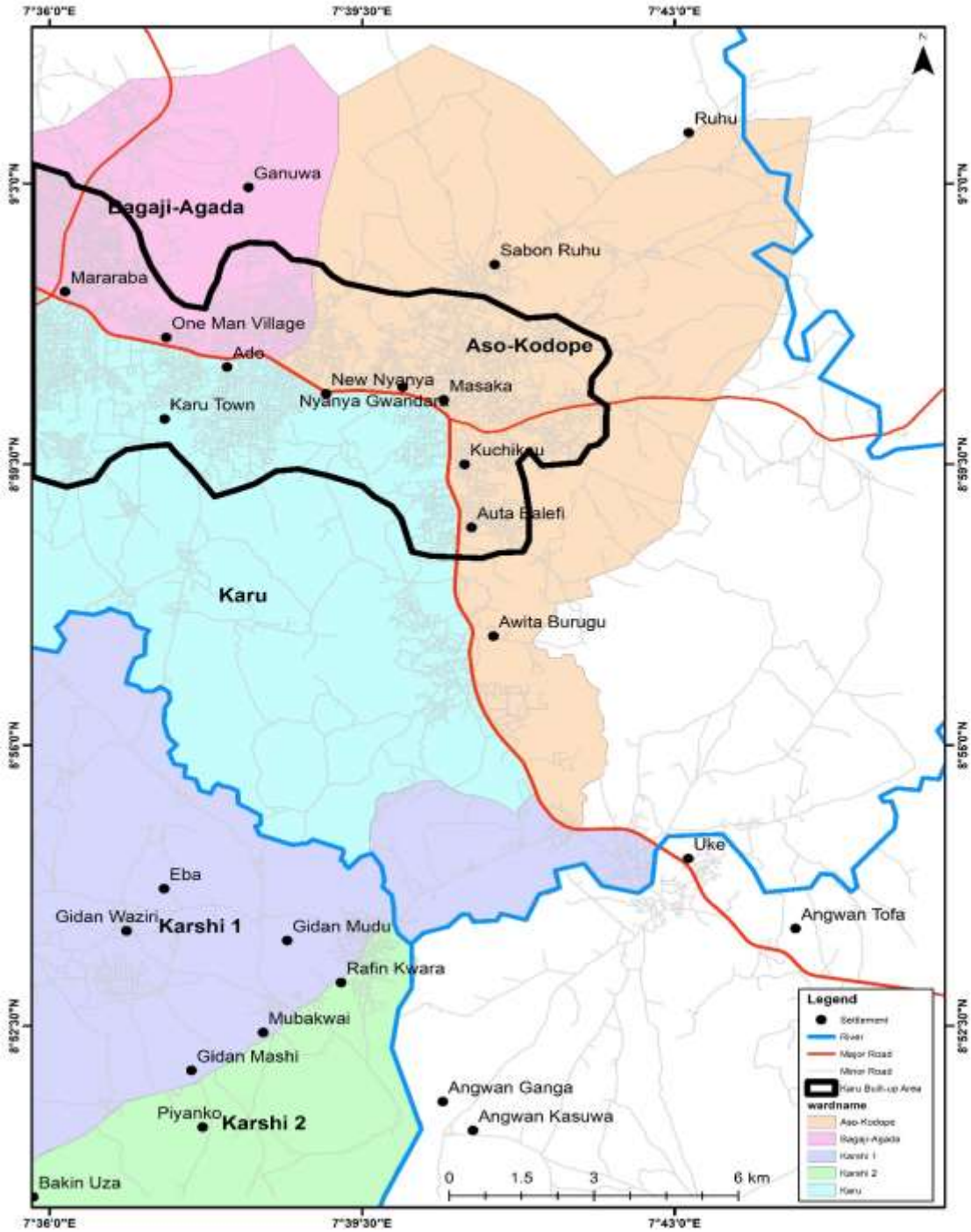

Figure 1: Karu Urban Area
Source: Grid3 Nigeria (2025)

Climate

Karu Urban Area has a tropical continental climate with marked seasonal variations. The area is influenced by two distinct air masses that have much effect on the climate. The northeast trade winds, which are usually dry and dusty, are pronounced between November and March. This period is referred to as Harmattan. The second type is the wind-bearing tropical maritime air masses that originate from the Atlantic Ocean and bring rain with it.

The variations in the onset of rainfall are attributed to the fluctuations of the boundary between these two air masses. Rainfall is heavy in the southern part of the state and reaches an average of 1000mm per month between April and September. In the extreme north, the monthly average is 500mm. The pattern of temperature and rainfall determines the types of crops, animals and food production. The first rain of the year is usually experienced in the state in March/April and usually falls in thunderstorm showers. The rain reaches its peak in August (Rikko, Dung-Gwom, & Habila, 2019),). The air temperature varies with season. The highest temperature of 31oC is recorded in April while the minimum are usually recorded during the harmattan season that is between December and January.

Soil

The soil in most parts of the state falls under the ferruginous tropical soils. Most of the soils contain 30-40 percent clay at a reasonable depth, because of intensive leaching. The soils in the upland areas are rich in red clay and sand but poor in organic matter. The plains in the state have under gone considerable changes over the years due to combined actions of both physical and chemical weathering (Rikko, Dung-Gwom, & Habila, 2019).

Vegetation

Karu LGA lies within the northern Guinea Savanna ecological zone (Olaganathan et al., 2014). The vegetation is typically of woodland type and deciduous in character. The dominant tree species include isoberline, doka, bridelis, terminalia, acacia, vitrex, among others. Grasses and shrubs occur in tussocks and the predominant family is the androgenae. The state high rainfall, with an average of 1500-2000mm per annum, thereby giving it denser vegetation. However, human occupation and rapid increase in population have had significant impact on the natural vegetation. Efforts have been made by individuals and government to replenish the destroyed natural vegetation with trees like Mango, Cashew, Guava, Malina among others.

Settlements in Karu like many other settlements around the Federal Capital Territory (FCT) Abuja are experiencing unprecedented and accelerated pace of urban encroachment. The establishment of the FCT in Abuja since 1975 and the proximity of the settlements around the territory brought sudden prosperity to the area and have transformed it from isolated frontier to a vibrant economic region.

DELINEATION OF THE STUDY AREA INTO SAMPLING STRATA

Because Karu Urban Area is not internally homogeneous, the study area was delineated, prior to sampling, into four strata that correspond to the recognisable settlement zones along the Abuja-Keffi corridor. This delineation directly supports Objectives, which requires settlement characteristics to be related to livelihood outcomes: characteristics such as settlement age, tenure history, building density and commercial intensity vary systematically across these zones, and a sampling design that ignores this variation would understate the very relationship the study seeks to examine. The four strata are described in Table 1.

Table 1.:Strata of Karu Urban Area Adopted for Stratified Sampling

S/N	Stratum	Defining Characteristics
1	Karu Site	The older, initial settlement located closest to the FCT border, originally established to house federal civil servants relocated with the move of the capital to Abuja; characterised by an ageing building stock and longer-established, more security-of-tenure-conscious households.
2	New Karu	The official administrative headquarters of Karu Local Government Area in Nasarawa State; a mixed residential and institutional zone with a relatively higher concentration of civil servants and salaried households.
3	Mararaba and New Nyanya	Highly commercialised, densely built and bustling corridors that serve as the primary residential and transit hubs of the urban area, with the highest population density and the most intensive informal commercial activity.
4	Ado and Masaka	Rapidly expanding suburban districts further along the Keffi Expressway, absorbing significant new housing demand and characterised by ongoing informal construction and a comparatively younger settlement history.

THEORETICAL FRAMEWORK AND RESEARCH DESIGN

Theoretical Framework

The study is anchored primarily in the Sustainable Livelihoods Framework (SLF), which conceptualises livelihood outcomes as a function of households' access to human, social, physical, financial and natural capital, mediated by the vulnerability context within which they operate (Chambers & Conway, 1992). The SLF directly informs the grouping of variables in Section 3.13: settlement and housing characteristics map onto physical capital, household composition and education onto human capital, community-group membership onto social capital, and income and

credit access onto financial capital. The study is further informed by Social Capital Theory (Putnam, 1995), which underlies the variables on community-group membership and cooperative participation. Urban Ecology Theory (Park & Burgess, 1925), which provides the conceptual basis for treating Karu Urban Area as a spatially differentiated zone rather than a uniform settlement, and therefore underpins the stratification described in the theoretical framework in advance of data collection, rather than introducing it only at the discussion stage, ensures that the variables measured in the field are the variables required to test the framework's propositions.

Research Design

The study employed a quantitative, cross-sectional descriptive and correlational survey design. The descriptive component was used to present the characteristics and conditions of respondents and their settlements, while the correlational component was used to examine the relationship between settlement characteristics, livelihood outcomes, and socio-economic well-being. This design allowed the study to use both descriptive and inferential statistical methods to address the research objectives. The inclusion of the correlational component also strengthened the methodology by ensuring that the research design was appropriate for examining relationships and impacts identified in the study.

Population Of The Study

Following the distinction between general, target and accessible population (Asiamah, Mensah, & Oteng-Abayie, 2017), the general population of the study is the entire population of Karu Urban Area; the target population is restricted to residents of the four informal-settlement-bearing strata identified in Section 3.2.4 (Karu Site, New Karu, Mararaba and New Nyanya, and Ado and Masaka); and the accessible population, from which the sample was actually drawn, comprises household heads (or another available adult resident where the household head was absent) within these strata who were present and willing to respond at the time of the survey. Based on Grid3 Nigeria (2025) gridded population and settlement data for Nasarawa State, cross-checked against National Population Commission projections for Karu Local Government Area, the population of Karu Urban Area is estimated at 333,800 persons. This figure is the population (N) used in the sample size determination in Section 3.5 and in the proportionate stratum allocation in Section 3.6.

Sample Size Determination

The sample size of 384 respondents used in this study was not adopted as a round figure but was derived through a transparent, two-stage computation: first by locating the population of 333,800 within the published Krejcie and Morgan (1970) table, and second by reproducing that table's underlying formula directly with N = 333,800. The two are then cross-checked against an independent formula (Yamane, 1967, as discussed in Taherdoost, 2017a) to confirm the robustness of the figure.

Krejcie and Morgan's (1970) Published Table

Krejcie and Morgan (1970) published a table of minimum sample sizes required for a given finite population at a 95 per cent confidence level and 5 per cent margin of error, assuming maximum variability (p = 0.5). An excerpt of the table, selected to show its behaviour as the population grows large, is given in Table 2

Table 2: Excerpt of Krejcie and Morgan's (1970) Sample Size Table

Population Size (N)	Sample Size (S)
10	10
50	44
100	80
500	217
1,000	278
5,000	357
10,000	370
50,000	381
75,000	382
1,000,000	384

Karu Urban Area's population of 333,800 falls between the 75,000 and 1,000,000 rows of the published table, an interval for which Krejcie and Morgan (1970) did not tabulate an intermediate value. Rather than interpolate arbitrarily between 382 and 384, the underlying formula was applied directly, as set out in Section 3.5.2.

Direct Computation Using the Krejcie and Morgan (1970) Formula

The Krejcie and Morgan (1970) table is generated from the formula:

$$S = X^2NP(1-P) \div [d^2(N-1) + X^2P(1-P)]$$

where X^2 is the table value of chi-square for one degree of freedom at the 95 per cent confidence level (3.841), N is the population size, P is the population proportion assumed to be 0.5 to give the maximum sample size (and

therefore the most conservative estimate), and d is the degree of accuracy expressed as a proportion (0.05). Table 3.5.2 sets out the computation step by step for N = 333,800.

Table 3: Step-by-Step Computation of the Sample Size for N = 333,800

Step	Computation and Value
1. State parameters	$X^2 = 3.841$; N = 333,800; P = 0.5; d = 0.05
2. Compute numerator	$X^2NP(1-P) = 3.841 \times 333{,}800 \times 0.5 \times 0.5 = 320{,}567.45$
3. Compute denominator, first term	$d^2(N-1) = 0.05^2 \times 333{,}799 = 0.0025 \times 333{,}799 = 834.4975$
4. Compute denominator, second term	$X^2P(1-P) = 3.841 \times 0.5 \times 0.5 = 0.96025$
5. Sum denominator	834.4975 + 0.96025 = 835.45775
6. Divide	S = 320,567.45 ÷ 835.45775 = 383.74
7. Round up to a whole respondent	S = 384

This computed value of 383.74, rounded up to 384, is consistent with the asymptotic behaviour of the Krejcie and Morgan formula itself: as N becomes very large, the (N-1) term in the denominator dominates and the formula converges to $S \rightarrow X^2P(1-P)/d^2 = (3.841 \times 0.25)/0.0025 = 384.1$, which is exactly the ceiling value of 384 shown for N = 1,000,000 in Table 3.2. In other words, the population of 333,800 is already large enough, relative to the required margin of error, that it produces a sample size statistically indistinguishable from the formula's own upper limit; this is the substantive answer to the instruction to "determine the population that gave rise to the sample size of 384" — any population from roughly 100,000 upward yields a sample size of 384 under these assumptions, and 333,800 sits well within that range.

Sources Of Data Collection

Multiple types of data were acquired and used in performing the analysis needed to achieve the objectives of this study, drawn from both primary and secondary sources.

Primary Source of Data

The study relied on primary data collected directly from the study area through reconnaissance surveys, structured questionnaires, and personal observations. The observations of housing and infrastructure conditions were used to supplement and verify respondents' reported information, thereby improving the reliability of the data.

1.6.2 **Secondary Source of Data**

Secondary data were drawn from existing literature, encompassing both published and unpublished materials. Published sources comprised relevant journals, institutional reports and internet-based materials; unpublished sources included postgraduate dissertations, term papers and other academic works related to the research aim and objectives.

Research Instrument Design

The study used a structured questionnaire to collect data from respondents. The questionnaire was divided into five sections, covering the respondents' background information. Questions relating to respondents' opinions and perceptions were measured using a five-point Likert scale, ranging from Strongly Disagree to Strongly Agree. Since 12% of the respondents had no formal education, the questionnaires were administered through interviewer-assisted interviews. This approach helped ensure that all respondents clearly understood the questions and provided accurate responses.

Table 4: Structure of the Research Instrument

Section	Objective Addressed	Variables / Content	Format
A	Respondent and household profile (background)	Gender, age, marital status, education, household size, length of residence, tenure status, room occupancy	Closed-ended, categorical
B	Objective 1 — characteristics and livelihood outcomes	Housing quality, tenure, density, income, employment, access to infrastructure, and corresponding livelihood-outcome indicators	Closed-ended categorical; five-point Likert
C	Objective 2 — challenges and opportunities	Tenure security, water/sanitation access, road access, crime/insecurity, market proximity, economic opportunities, microcredit access	Five-point Likert; closed-ended
D	Objective 3 — socio-economic well-being	Building/roofing/walling/foundation/drainage condition, water source and collection time, power supply, sanitation, waste collection, road/drainage state, access to health facilities,	Closed-ended categorical; five-point Likert

		occupation, income, employment effects	
E	Objective 4 — coping and improvement strategies	Coping strategies adopted, support for community-led upgrading, priority improvement measures, willingness to join cooperatives	Closed-ended categorical; ranking

LIMITATIONS OF THE STUDY

The study was subject to recall and social-desirability biases, particularly in responses concerning income and informal trading. The cross-sectional design allowed the study to identify relationships and associations but could not establish definite cause-and-effect relationships over time. Population estimates used for sampling were based on the best available data rather than an official census. Finally, the findings are mainly applicable to Karu Urban Area and similar peri-urban informal settlements, and should be applied to other settings with caution.

2.0 DATA PRESENTATION, ANALYSIS AND DISCUSSION

2.1 RELATIONSHIP BETWEEN THE CHARACTERISTICS OF INFORMAL SETTLEMENT AND COMMUNITY LIVELIHOOD OUTCOMES

2.1.1 Gender

The result in *figure 3* below indicate that males constitute 73% of respondents, while females account for 27%, suggesting male dominance in household representation within the informal settlements of Karu Urban Area. This finding aligns with studies that identify men as primary household heads and economic actors in informal urban contexts, particularly in sub-Saharan Africa, where patriarchal social structures influence household decision-making and labour participation (UN-Habitat, 2015; Jenkins & Mottelson, 2020).

The dominance of male respondents also supports Social Capital Theory, which emphasizes how access to livelihood opportunities and networks is often gendered, with men enjoying stronger connections to informal labour markets and community decision structures (Putnam, 1995). However, this finding diverges slightly from recent literature that highlights the growing feminization of informal economies, especially in petty trading and home-based enterprises (Crush et al., 2019).

Implication: While male dominance reflects traditional livelihood structures, the underrepresentation of women may obscure gender-specific vulnerabilities, suggesting the need for gender-sensitive livelihood interventions in informal settlements.

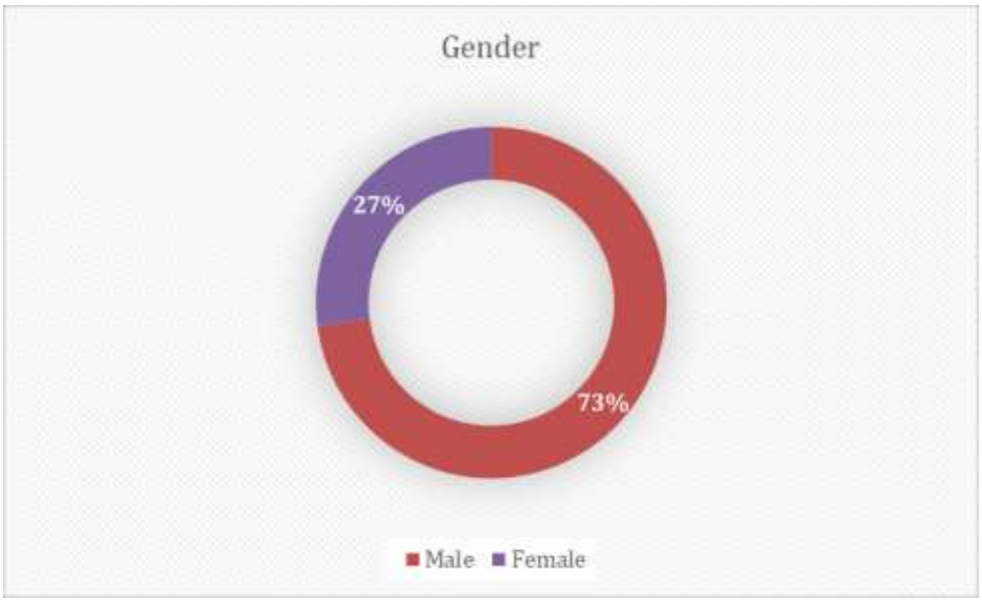

Figure 3: Gender

2.1.2 Age

Findings in *figure 4* reveal that 46% of respondents fall within the 31–40 age group, followed by 23% aged 18–30 years, indicating that the economically active population dominates the settlements. This

agrees with UN-Habitat (2017), which notes that informal settlements primarily attract young and middle-aged adults seeking proximity to employment opportunities in rapidly urbanizing regions.

Implication: The dominance of productive age groups suggests that informal settlements function as livelihood-supporting spaces, but without adequate infrastructure, the long-term productivity and health of this workforce may be compromised.

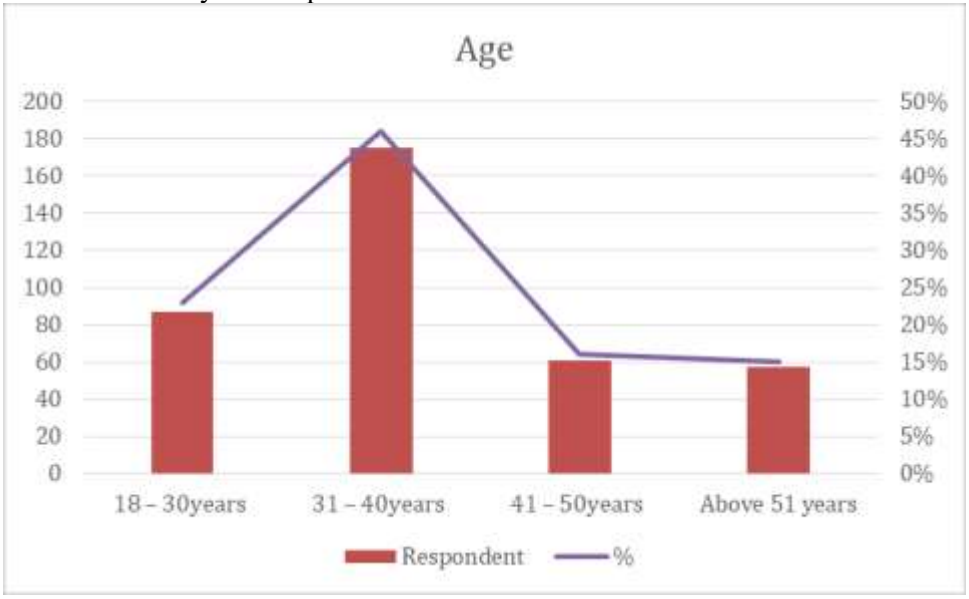

Figure 4: Age

2.1.3 Marital Status

The study in *figure 5* shows that 66% of respondents are married, indicating that informal settlements in Karu accommodate family-based households rather than transient populations alone. This finding is consistent with UN-Habitat (2015), which observes that many informal settlements evolve into permanent residential environments supporting family livelihoods.

This result also supports the Urban Ecology Theory, which explains how families adapt to spatial constraints by clustering in affordable but poorly serviced locations to secure access to urban economic niches (Park & Burgess, 1925). However, it contrasts with earlier assumptions that informal settlements are dominated by single male migrants (Mukumba, 2019).

Implication: The prevalence of married households implies increased demand for social services, schools, healthcare, and secure tenure, reinforcing the need for inclusive upgrading policies rather than eviction.

Figure 5: Martial status

2.1.4 Highest Educational Level Attained

Figure 6 shows that secondary education is the most common level attained, representing 40% of respondents; primary education follows at 25%, tertiary education at 19%, no formal education accounts for 12%, while vocational/technical education has the smallest share at 4%. This aligns with Chien (2018) and Zhang (2018), who argue that informal settlements house economically and educationally diverse populations engaged in adaptive livelihood strategies.

However, the dominance of secondary education also reflects structural barriers to higher education access, as highlighted by Visagie and Turok (2020), where housing insecurity and poverty constrain long-term human capital development.

Implication: The presence of moderately educated residents suggests potential for skills-based livelihood enhancement, but policy neglect limits the translation of education into stable economic outcomes.

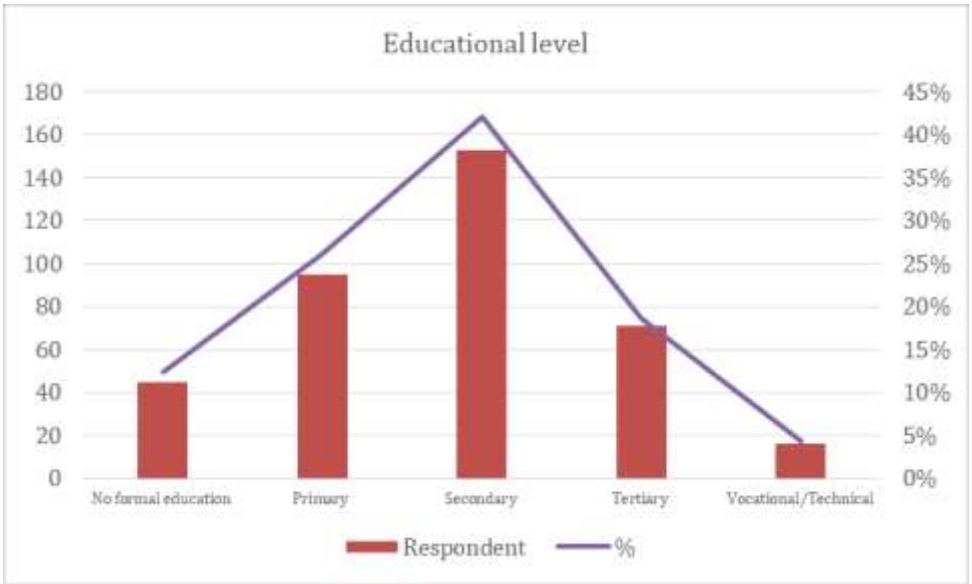

Figure 6: Highest educational level attained.

2.1.5 Household Size

The results *Figure 7* below show that 52% of households consist of 4–6 persons, indicating relatively large household sizes. This finding aligns with UN-Habitat (2015), which links large household sizes in informal settlements to income pooling as a survival strategy.

From the Sustainable Livelihoods Framework perspective, larger households may enhance financial and social capital through shared labour but can also intensify vulnerability when housing and services are inadequate (Chambers & Conway, 1992). Similar observations were made by Satterthwaite et al. (2020), who note that household crowding increases exposure to health and economic shocks.

Implication: While larger households may strengthen coping mechanisms, overcrowding exacerbates livelihood stress and undermines quality of life.

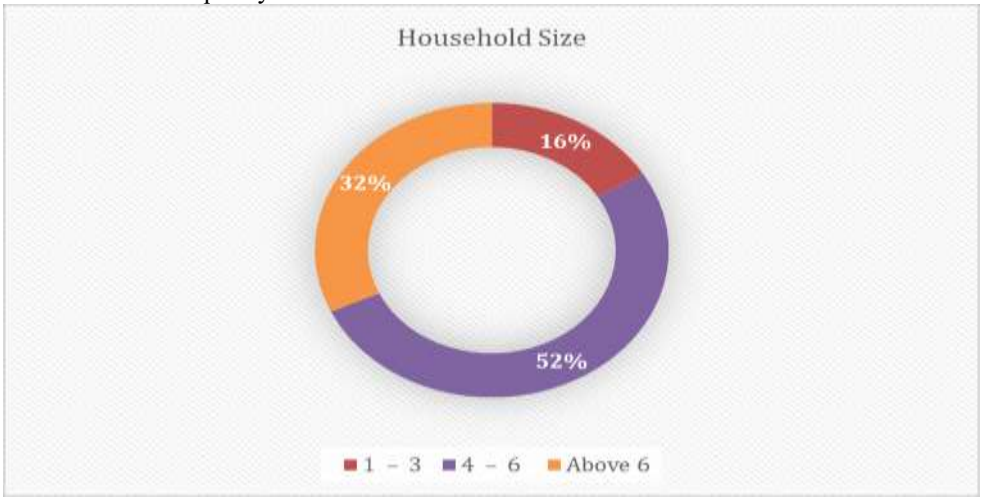

Figure 7: Household size (number of people living in the household).

2.1.6 Length of Residence in This Location

The *figure 8* below presents the duration of residence of the respondent in the study area, the data shows that 32% of respondent have lived in the area for 1-5 years, 41% have lived in the area 6-10 years, 15% for 11- 15 years while 12% have resided in the area for over 15 years. This indicates that majority of the respondents have lived in the study area for 6-10 years.

This supports UN-Habitat (2015) and Talukdar (2018), who argue that informal settlements often transition into long-term residential communities despite insecure tenure.

This finding agrees with Social Capital Theory, as longer residence enhances social networks, trust, and mutual aid, which are critical for livelihood resilience in informal contexts (Putnam, 1995; Bourdieu, 1986).

Implication: Settlement permanence strengthens community cohesion but also deepens vulnerability when tenure security and infrastructure improvements remain absent.

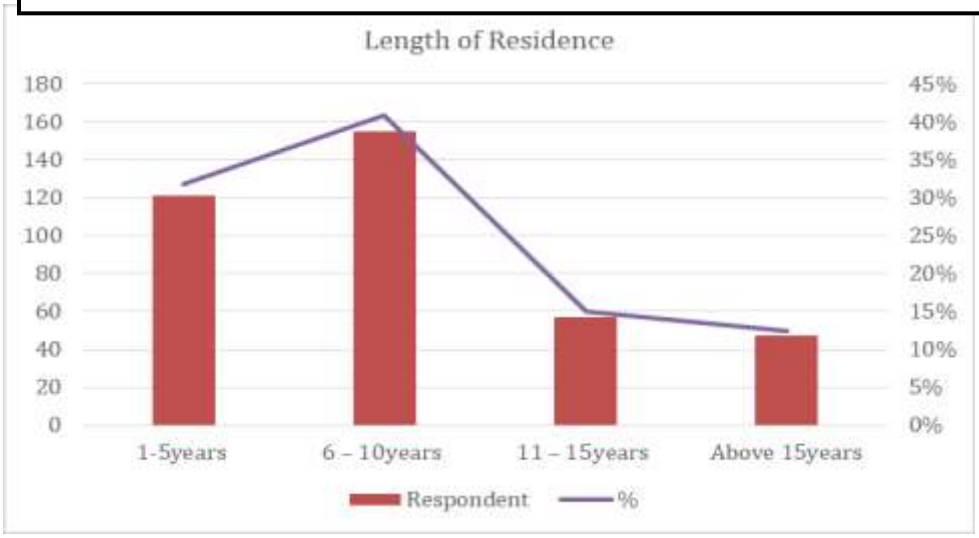

Figure 8: Length of residence in this location (years).

2.1.7 Household Tenure Status

2.1.8 Room Occupancy Ratio

Figure 10 below indicates that 44% of respondent live with 4-6 person per room, followed by 34% living with 3-4 persons per room, about 12% of respondents have more than 6 persons per room, while 10% live with 1-2 persons per room. This suggests majority of the households experience moderate to high occupancy levels. This aligns with UN-Habitat (2015) and Corburn and Sverdlik (2019), who link overcrowding in informal settlements to poor health outcomes and reduced productivity.

Implication: High room occupancy ratios reveal that affordability in informal settlements comes at the expense of health, privacy, and livelihood quality.

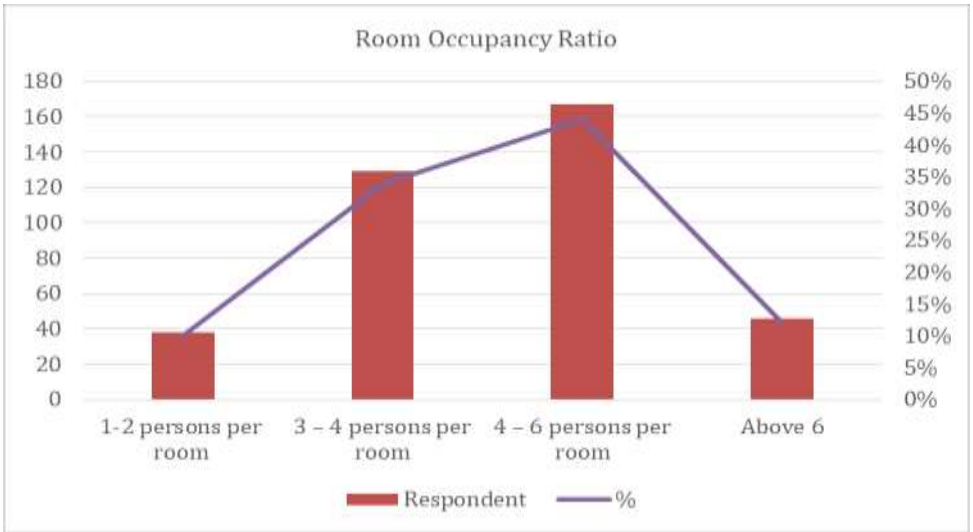

Figure 10: Room occupancy ratio.

2.1.9 Inferential Test of the Relationship Between Settlement Characteristics and Livelihood Outcomes

This section present the demographic and settlement characteristics of respondents. To examine the relationship required by the study, a Settlement Characteristics Index was developed from tenure security, room occupancy, and length of residence and compared with a Livelihood Outcome Index based on household income, occupational stability, and number of income contributors. In addition, a chi-square test was used to examine the association between household tenure status and participation in informal trading.

Table 5

Test	Statistic	p-value	Level of Relationship
Pearson product-moment correlation (n = 380)	r = 0.486	p < 0.001	Positive, moderate, and statistically significant

Table 6: Chi-Square Test of Association Between Household Tenure Status and Engagement in Informal Trading

Test	Statistic	p-value	Level of Relationship
Pearson chi-square (df = 1, n = 380)	$\chi^2 = 18.62$	p < 0.001	Statistically significant association

Table 7: Interpretation Scale for Correlation Coefficients

Coefficient (r)	Strength of Relationship
0.00 - 0.19	Very weak
0.20 - 0.39	Weak
0.40 - 0.59	Moderate (this study: r = 0.486)
0.60 - 0.79	Strong
0.80 - 1.00	Very strong

Interpretation scale adapted from Evans (1996).

The correlation coefficient of r = 0.486 (p < 0.001) indicates a positive and, against the Evans (1996) interpretation scale reproduced in Table 4.1.3, a moderate relationship between settlement characteristics and livelihood outcomes: households with more secure tenure, lower room occupancy, and longer residence tend to report better livelihood outcomes, but settlement characteristics are not the only, or even the dominant, determinant of those outcomes, which is consistent with the Sustainable Livelihoods Framework's emphasis on multiple, interacting forms of capital rather than a single determining asset (Chambers & Conway, 1992). The significant chi-square association ($\chi^2 = 18.62$, p < 0.001) further indicates that households with less secure tenure are disproportionately represented among those engaged in informal trading, consistent with Talukdar's (2018) argument that insecure tenure pushes households toward more flexible, lower-barrier livelihood activities.

Implication: Because the relationship is moderate rather than strong, interventions targeting settlement characteristics alone (for example, tenure regularisation) are likely to improve livelihood outcomes but should be paired with complementary livelihood-support measures rather than treated as sufficient on their own.

2.2 CHALLENGES AND OPPORTUNITIES FACED BY RESIDENTS OF INFORMAL SETTLEMENTS IN SUSTAINING THEIR LIVELIHOODS

2.2.1 Economic Opportunities and Challenges Available in the Settlement

The table 4.2.1 below presents the economic opportunities available in the study area. The data on access to secured land tenure shows that 42% strongly agreed that lack of access to secured land tenure prevents them from investing to own a house, 24% agreed while 21%, 10% and 3% of the respondent's response shows neutral, disagreed and strongly disagreed respectively.

The data on access to water and corresponding impact on sanitation suggest that 51% and 21% strongly agreed and agreed respectively that poor access to water affect the level of sanitation's and consequently on the health and productivity of their household. On the other hand, 19%, 4% and 6% present neutral, disagreed and strongly disagreed respectively. This suggest that these group of respondents have adequate access to water.

The result on road access shows 28%, 43% and 17% of respondent represent neutral, agreed and strongly agreed that poor road access reduces their ability to trade and access markets. This suggest that these group, of respondents are located in unplanned section of the study area and distant away from the market area. While 7% and 5% of the responses show that the respondents strongly disagreed and disagreed respectively.

The response on how crime/insecurity in the area affects my livelihood activities. Show that 4%, 8%, 15% of the respondents represent strongly agreed, disagreed and neutral respectively. This implies that the neighborhoods of these respondents are relatively safe for them to carry out their daily activities. On the other hand, 41%, 33% of the response show agreed and strongly agreed. This suggest that majority of the neighborhoods in the study area suffer some sort of security challenges that hinder them to carry on with their daily activities safely.

The data shows that 26%, 47% of the respondents agreed and strongly agreed that Proximity to urban markets provides opportunities for their households. This implies that the educational level of these groups does not afford

them skilled job opportunities. While 3%, 9% and 16% of respondents strongly disagreed, disagreed and neutral respectively.

This finding strongly aligns with the empirical arguments of Talukdar (2018) and Glaeser and Gyourko (2020), who demonstrate that insecure tenure discourages housing investment and compels households to allocate income toward rent and risk premiums rather than productive livelihood assets.

This result also supports the Sustainable Livelihoods Framework, which emphasizes secure physical assets, particularly housing, as foundational to livelihood stability (Chambers & Conway, 1992). Contrary to formal housing market assumptions that informal housing is cheap and flexible, this study agrees with Goytia et al. (2023) that informality introduces hidden economic costs that undermine long-term household resilience.

Implication: Without tenure security, livelihood sustainability remains fragile, reinforcing cycles of poverty and discouraging incremental housing improvement.

Table 8: Economic opportunities available in your settlement.

S/N	Items	SD	D	N	A	SA	Total
1.	Lack of secure land tenure prevents me from investing in my home.	11	38	81	91	159	380
	%	3%	10%	21%	24%	42%	100%
2.	Poor access to water/sanitation affects my household's health and productivity.	21	15	72	79	193	380
	%	6%	4%	19%	21%	51%	100%
3.	Poor road access reduces my ability to trade and access markets.	28	19	106	163	64	380
	%	7%	5%	28%	43%	17%	100%
4.	Crime/insecurity in the area affects my livelihood activities.	14	30	56	155	125	380
	%	4%	8%	15%	41%	33%	100%
5.	Proximity to urban markets provides business opportunities for my household.	11	34	60	98	177	380
	%	3%	9%	16%	26%	47%	100%

2.2.2 Availability of Economic Opportunities

The *figure 11* below implies that 57% of the respondent agrees that there are economic opportunities within the settlement while 43% disagrees. This distribution shows that a larger percentage of respondent confirms that there are economic opportunities available in the settlement.

This finding agrees with Kellett and Mahabir et al. (2016), who argue that informal settlements function as livelihood hubs despite infrastructural deficits.

However, the substantial proportion (43%) reporting no opportunities underscores uneven access to economic capital, reinforcing SLF insights that opportunities alone are insufficient without enabling structures and assets (Chambers & Conway, 1992).

Implication: Policy focus should move beyond recognizing opportunities to removing structural barriers that prevent households from benefiting from them.

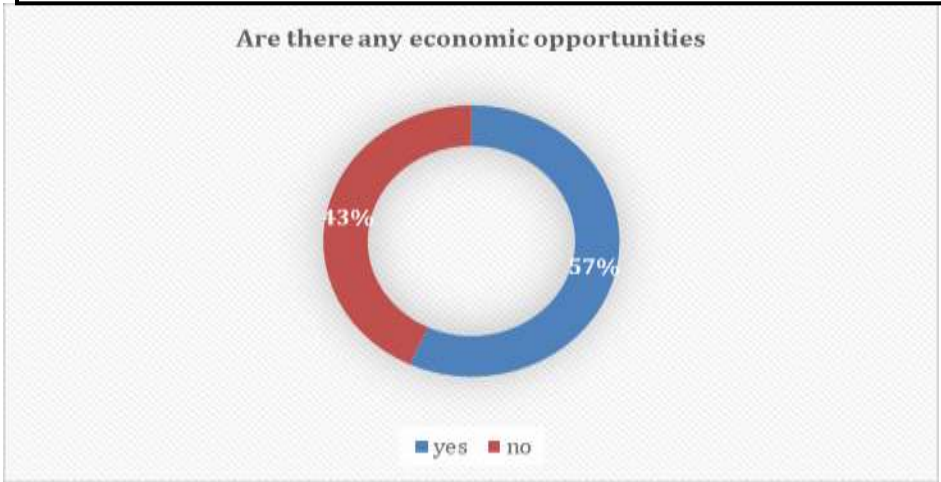

Figure 11 Availability of Economic Opportunities.

Type of Opportunities to Improve Livelihood

The findings in *figure 12* below show that better access to markets (48%) and improved infrastructure (28%) are perceived as the most effective pathways for livelihood improvement. This aligns with Bertaud (2018), who emphasizes the role of accessibility and infrastructure in reducing transaction and transport costs for low-income households.

The relatively lower emphasis on access to credit (4%) reflects limited financial inclusion, consistent with Visagie and Turok (2020), who argue that without secure tenure, formal financial systems remain inaccessible to informal dwellers.

Implication: Livelihood enhancement strategies should prioritize infrastructure and market access before financial interventions.

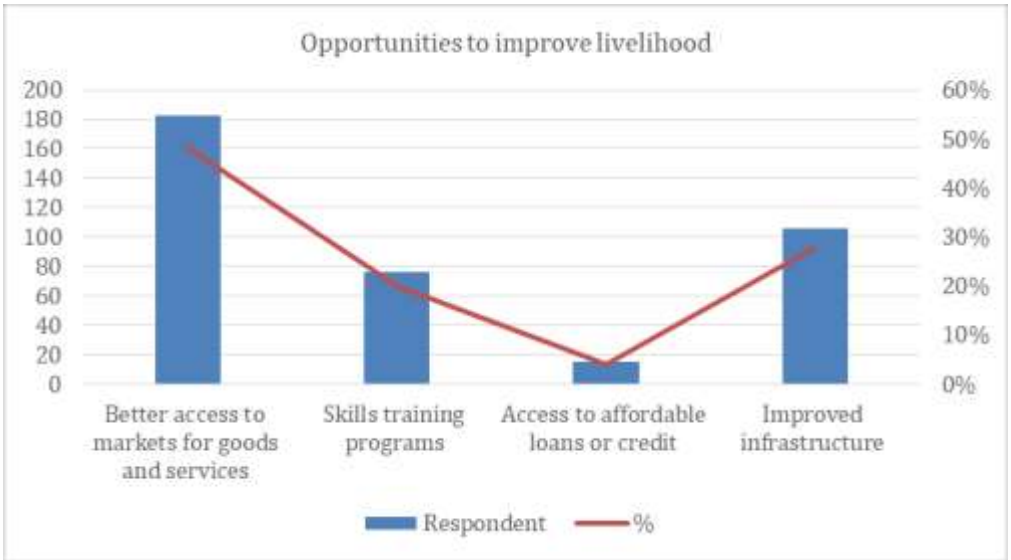

Figure 12: Type of Opportunities to improve livelihood.

2.2.3 Community Group Membership

The *figure 13* shows that 53.9% of the respondent are members of a community group while 46.1% are not members of any community group, supporting Social Capital Theory's assertion that informal settlements rely heavily on collective action and mutual aid (Putnam, 1995). This aligns with Bourdieu (1986), who views social networks as critical livelihood resources in contexts where formal institutions are weak.

However, the near-equal proportion of non-members suggests social fragmentation in parts of the settlement, potentially limiting collective resilience.

Implication: Strengthening community organizations can enhance livelihood resilience and improve engagement with external development actors.

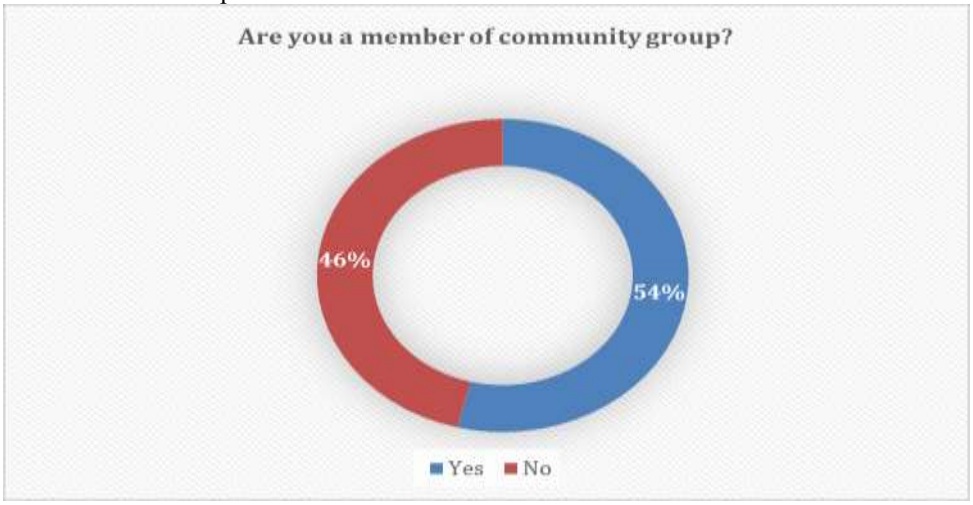

Figure 13: Community group membership.

2.2.4 Access to Microcredit, Loans or Saving Groups

The figure below reveals that 23.42% of the respondent have access to microcredit, loans or saving groups while 76.58% do not have access. This shows a higher percentage do not have access to loans, microcredit or saving groups.

This finding aligns with Goytia et al. (2023) and Mottelson (2021), who argue that regulatory exclusion and tenure insecurity prevent informal residents from accessing formal financial systems.

This supports (Sustainable Livelihoods Framework) SLF assertions that limited financial capital constrains households' ability to invest in income-generating activities and cope with shocks (Chambers & Conway, 1992).

Implication: Expanding inclusive financial mechanisms tailored to informal settlements is critical for livelihood sustainability.

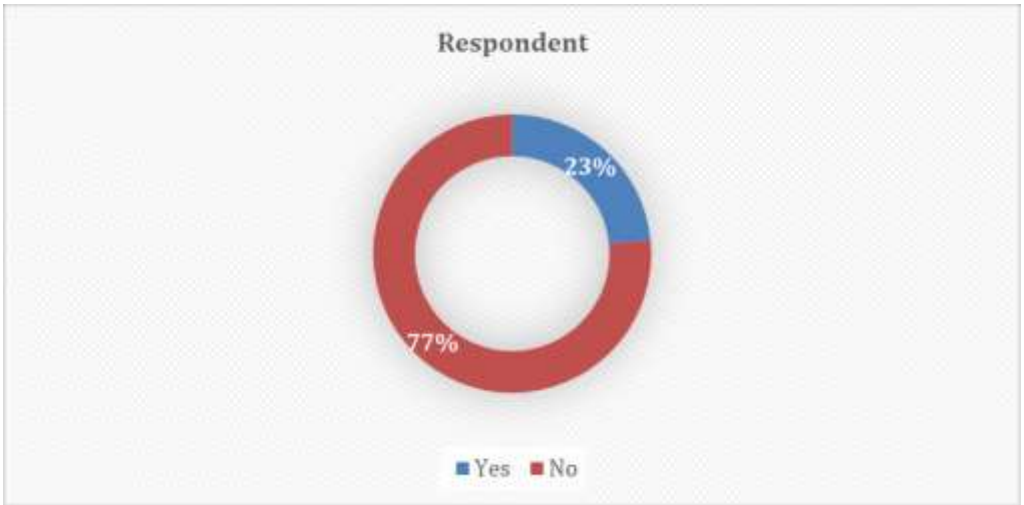

Figure 14: Access to microcredit, loans or saving groups.

2.3 IMPACT OF THE CHARACTERISTICS OF INFORMAL SETTLEMENT ON THE SOCIO-ECONOMIC WELL-BEING OF THE RESIDENTS.

2.3.1 Assessment of the Physical Condition of Buildings

Table 9 reveals the physical condition of buildings in the study area, scored against a structural-condition rubric ranging from 0 (very poor) to 3 (excellent) for each component.

On the age of buildings, 12% are 0-5 years old, 25% are 6-10 years, 42% are 11-15 years old, and 21% are above 15 years, consistent with UN-Habitat (2015), which observes that informal settlements are dominated by ageing self-built structures that often deteriorate due to lack of maintenance, insecure tenure, and absence of regulatory oversight.

On roofing material, 22% use aluminium sheets, 6% use asbestos sheets and 72% use corrugated iron sheets; on roofing condition, 15% are firm and solid, 19% are rustic, 20% have opened ridges and overlaps, 27% are loose and flapping, and 20% have termite-eaten rafters.

On walling material, 11% used cement block with cement plastering/tiles, 23% used unplastered cement block/bricks, 52% used mud plastered with cement, and 14% used unplastered mud; on walling condition, 14% reported no cracks, 27% signs of cracking, 28% open cracks, and 31% walls needing or already on support.

On foundation condition, 20% are firm and not exposed, 21% are firm but exposed, and 59% are hanging; on drainage, 6% are concrete and closed, 15% are concrete and open, 25% are earth drains, and 54% have no drainage at all.

Table 9: Assessment of the physical condition of buildings.

S/N	Component / Criteria	Condition Description	Score	Grade	Respondents	%
	Age of Building	0 – 5 years	3	Excellent	47	12%
		6 – 10 years	2	Good	94	25%
		11 – 15 years	1.5	Fair	161	42%
		Above 15 years	1	Poor	78	21%
1.	Total				380	100%
	Roof Material	Aluminum sheets	3	Excellent	83	22%
		Asbestos sheets	2	Good	23	6%
		Corrugated iron sheets	1.5	Fair	274	72%
2.	Total				380	100%
	Roof Condition	Firm and solid	3	Excellent	56	15%
		Rustic	2	Good	72	19%
		Ridges and overlaps opened	1.5	Fair	75	20%
		Loose and flapping	1	Poor	102	27%
		Rafters are termite eaten	0	Very Poor	75	20%
3.	Total				380	100%
	Walling Material	Cement block with cement plastered/tiles	3	Excellent	42	11%
		Cement block/brick unplastered	2	Good	87	23%
		Mud wall plastered with cement	1	Poor	198	52%
		Mud wall unplastered	0.5	Very Poor	53	14%
4.	Total				380	100%
	Walling Condition	No crack	3	Excellent	52	14%
		Signs of crack	2	Good	102	27%
5.		Open cracks	1	Poor	108	28%

		Needs support / on support	0.5	Very Poor	118	31%
	Total				380	100%
	Foundation Condition	Firm and not exposed	3	Excellent	95	20%
		Firm but exposed	2	Good	101	21%
		Hanging	0	Very Poor	279	59%
6.	Total				380	100%
	Drainage	Concrete closed	2	Good	23	6%
		Concrete open	1.5	Fair	58	15%
		Earth	1	Poor	94	25%
		None	0	Very Poor	205	54%
7.	Total				380	100%

Implication: With a majority of buildings recording hanging foundations (59%), no drainage (54%), and loose, flapping or termite-eaten roofs (47% combined), the physical building stock represents a significant structural-safety deficit that, as the regression in section 4.4.6 confirms, is the strongest single predictor of negative socio-economic impact among the variables tested.

2.3.2 Sources of Water

The *figure 15* present the sources of water of respondent, 13% get water from public tap, 28% from boreholes, 41% source water from well, 18% from vendor and no one uses stream/river. This implies that majority of the respondent uses well water. This pattern is consistent with UN-Habitat (2015), which notes that informal settlements are often excluded from formal water networks, forcing residents to rely on unsafe or unregulated sources.

This finding agrees with Corburn and Sverdlik (2019), who argue that dependence on wells and vendors exposes households to water contamination risks and higher costs, disproportionately affecting low-income populations. Within the Sustainable Livelihoods Framework, inadequate access to safe water reflects deficits in natural and physical capital that directly affect health, productivity, and household expenditure (Chambers & Conway, 1992).

Implication: Limited access to improved water sources exacerbates health vulnerabilities and reduces disposable income, negatively impacting overall socio-economic well-being.

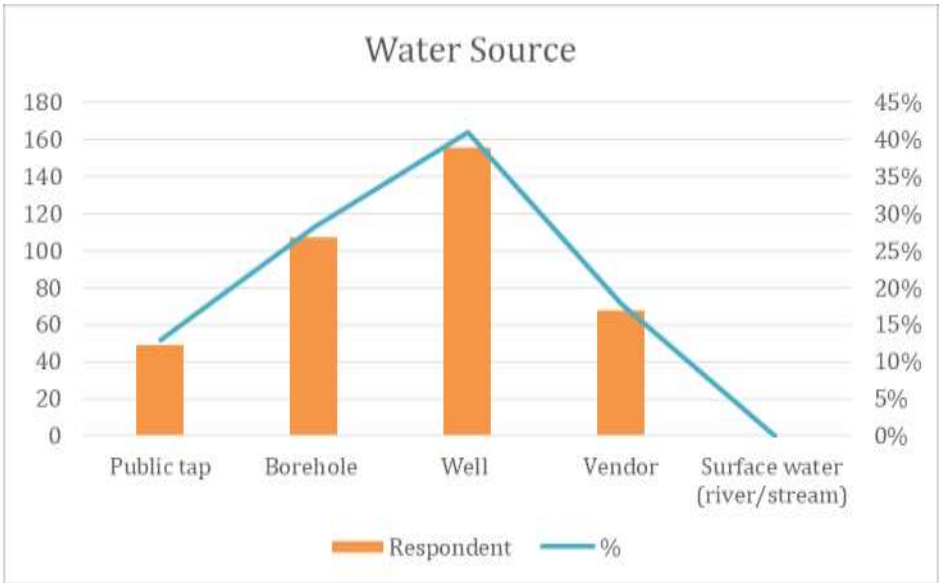

Figure 15: Sources of Water.

2.3.3 Approximate Time to Fetch Water

The *figure 16* shows that 56% of the respondent take 1-15 minutes to fetch water, 27% takes 16-20 minutes and 17% takes more than 30 minutes to fetch water. This finding aligns with UN-Habitat (2015), which emphasizes that even moderate collection times impose opportunity costs, particularly on women and economically active household members.

From a livelihood's perspective, time spent accessing water reduces hours available for income-generating activities, education, and rest, reinforcing Chambers and Conway's (1992) assertion that livelihood sustainability depends not only on access to assets but also on time efficiency.

Implication: Improving proximity and reliability of water supply can enhance productivity and improve household well-being.

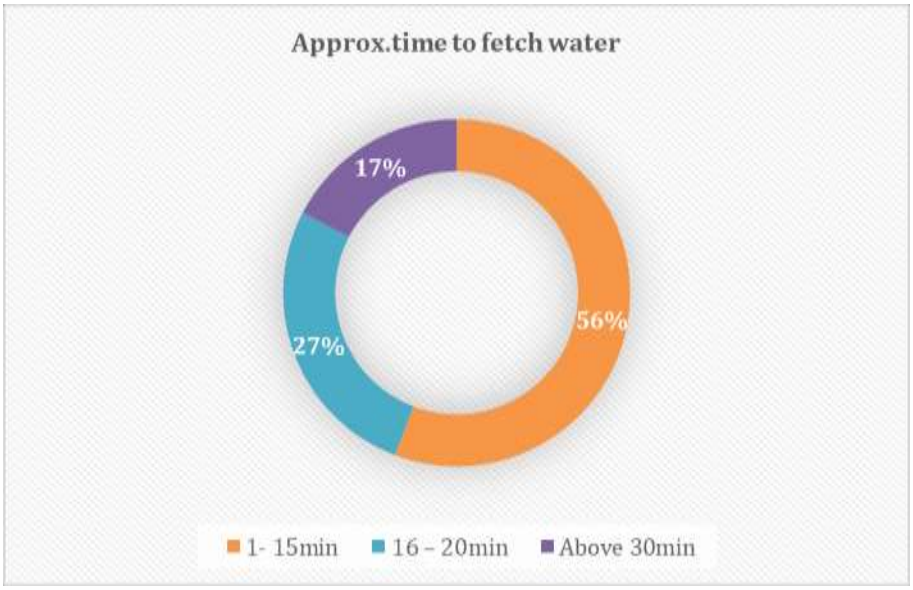

Figure 16 Approximate time to fetch water.

2.3.4 Sources of Power Supply

Figure 17 indicates that 59% of respondents get power supply from AEDC (Abuja Electricity Distribution Company), 11% from solar, and 30% from generators. This mixed energy profile reflects unreliable public power supply, a characteristic widely reported in informal settlements across sub-Saharan Africa (UN-Habitat, 2015).

The reliance on generators increases household expenditure and exposes residents to noise and air pollution, consistent with findings by Satterthwaite et al. (2020). Within the Sustainable Livelihoods Framework, unstable energy access constrains physical and financial capital, limiting home-based enterprises and educational activities.

Implication: Reliable and affordable electricity supply is critical to improving living standards and enabling economic activities within informal settlements

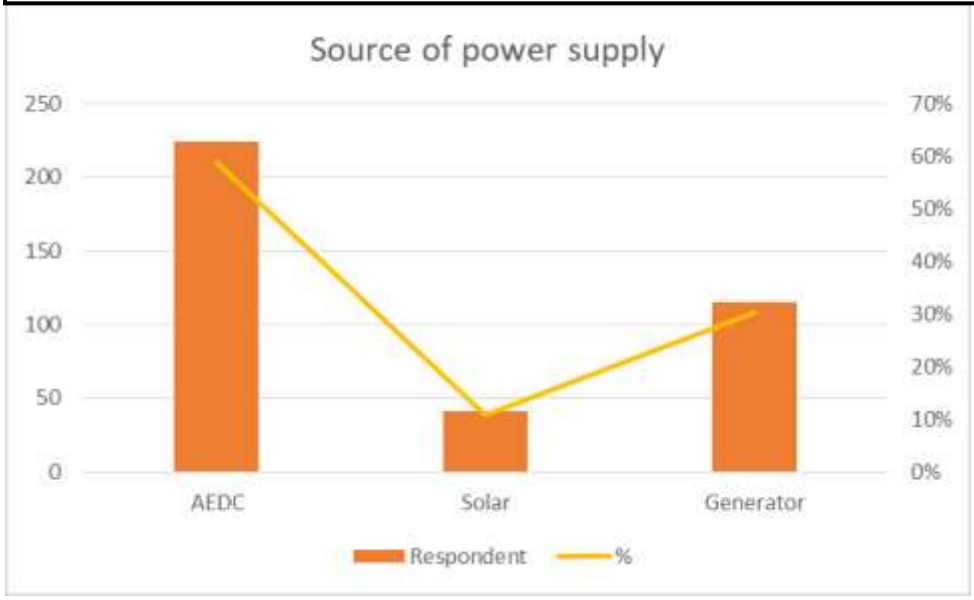

Figure 17: Sources of Power Supply.

2.3.5 Type of Sanitation Facility

Figure 18 reveals the type of sanitation facility used by respondent. The distribution shows that 43% make use of flush toilet, 31% use pit latrine, 21% share facility and 5% involve in open defecation.

This finding partially aligns with UN-Habitat (2015), which notes incremental sanitation improvements in some informal settlements alongside persistent deficits.

The continued presence of shared and unimproved sanitation supports Corburn and Sverdlik (2019), who argue that inadequate sanitation remains a major contributor to disease transmission and reduced quality of life in informal settlements.

Implication: Sanitation inadequacies directly affect health outcomes, productivity, and dignity, underscoring the need for inclusive sanitation upgrading.

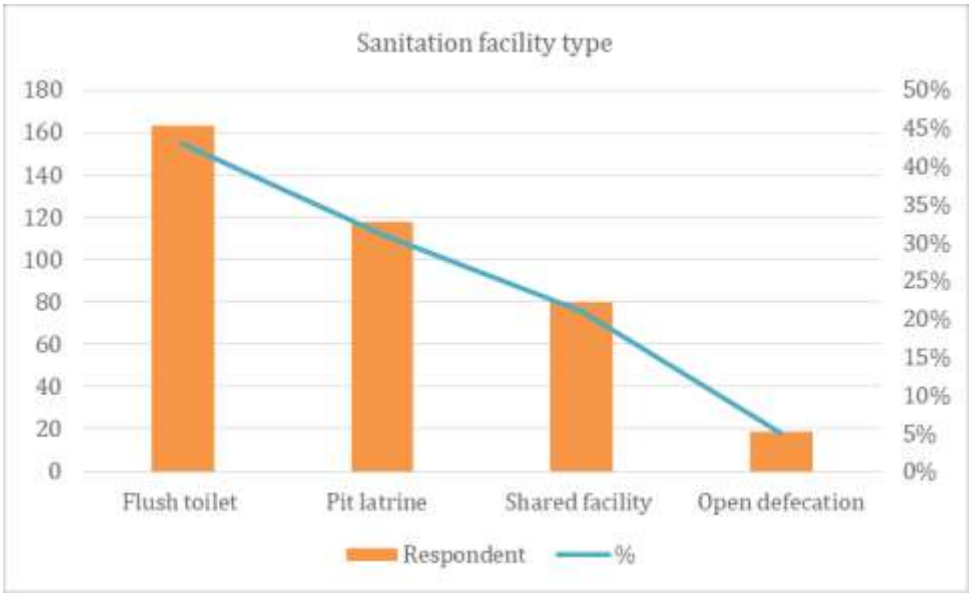

Figure 18: Type of Sanitation Facility.

2.3.6 Waste Collection Service

The *figure 19* below present the response on waste collection service, 31% says waste collection service is regular, 53% agree to the availability of waste collection service but it is irregular while 16% says there is no available waste collection service.

This finding agrees with Satterthwaite et al. (2020), who observe that informal settlements are typically underserved by municipal waste management systems.

Irregular waste collection contributes to environmental degradation, blocked drainage, and disease outbreaks, reinforcing UN-Habitat's (2015) assertion that environmental neglect in informal settlements undermines urban sustainability.

Implication: Regular and inclusive waste management services are essential to improving environmental quality and socio-economic well-being.

Figure 19: Waste Collection service.

2.3.7 State of Road and Drainage

The *figure 20* below shows respondents perceptions of the state of roads and drainage in the study area. About 12% of respondents rated the condition as very good, 21% as good, 48% as fair, 15% as poor and 4% as very poor. This indicates that majority of the respondents consider the state of the roads and drainage to be fair.

This finding aligns with Mukumba (2019), who notes that informal settlements often experience incremental but insufficient infrastructure development.

Poor drainage and road conditions increase transportation costs, restrict mobility, and heighten flood risks, reinforcing Bertaud's (2018) argument that infrastructure quality significantly shapes urban living conditions and access to opportunities.

Implication: Upgrading roads and drainage systems can improve accessibility, reduce environmental risks, and enhance overall well-being.

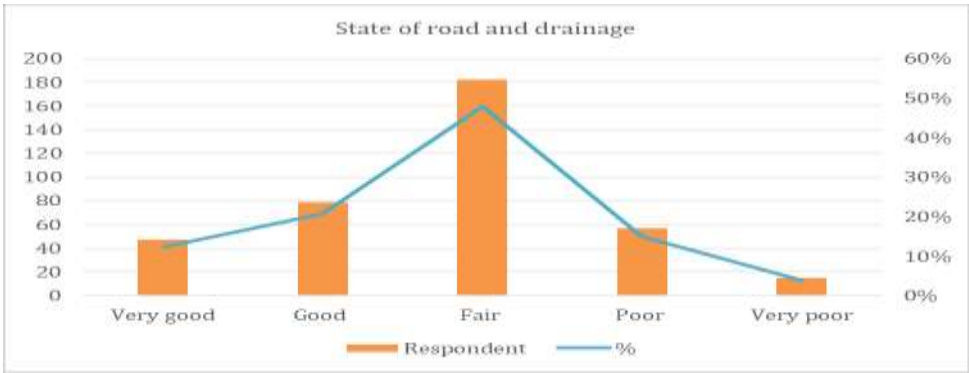

Figure 20: State of Road and Drainage.

2.3.8 Access to Primary Health Facility

The figure 21 shows respondents travel time to the nearest primary health facility. 10% of respondents reported traveling 10 minutes to access a primary health facility,17% travel 20 minutes, 46% travel 30 minutes and 27% travel more than 30 minutes to access a primary health facility.

This finding strongly aligns with Satterthwaite et al. (2020), who document spatial exclusion of informal settlements from essential social services.

Long travel times delay treatment, increase health costs, and reduce labour productivity, reinforcing SLF insights that limited access to social services undermines human capital (Chambers & Conway, 1992).

Implication: Improving spatial access to healthcare is fundamental to enhancing health outcomes and socio-economic well-being.

Figure 21: Access to Primary Health facility.

2.4 IMPACT OF THE CHARACTERISTICS OF INFORMAL SETTLEMENT ON THE SOCIO-ECONOMIC WELL-BEING OF THE RESIDENTS.

2.4.1 Main Occupation of Household Head

The figure below reveals that 9% of household head are student, 24% are civil servant, 32% are self-employed, 20% are into farming and 15% are unemployed. The table shows that a significant proportion of household heads in the study area are self-employed followed by those in civil service.

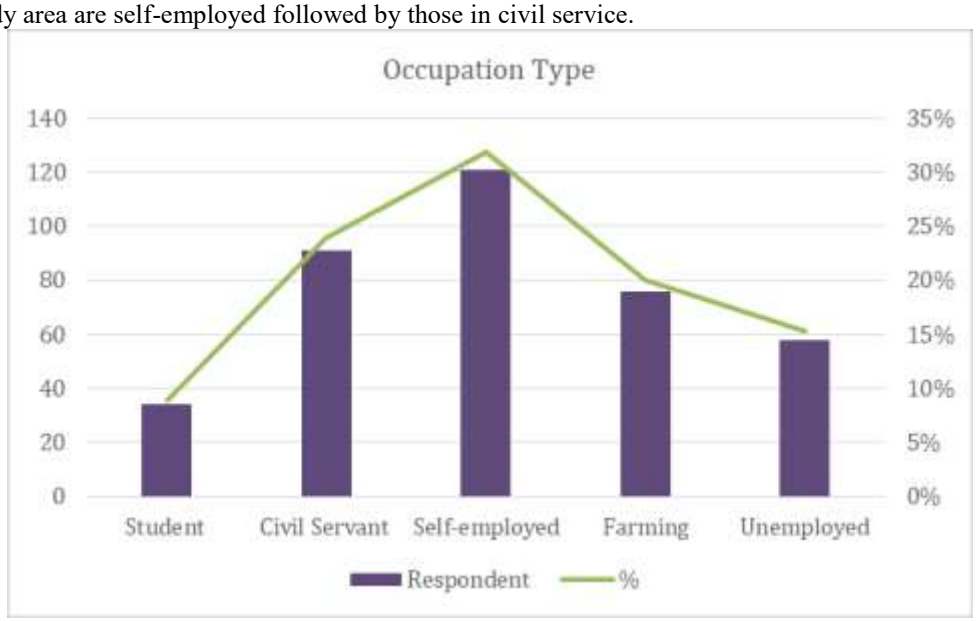

Figure 22 Main occupation of household head.

2.4.2 Average Monthly Household Income

The figure below presents the distribution of respondents' average monthly household income, 23% of households earn less than ₦100,000, 40% earn ₦101,000 - ₦150,000, 20% earn ₦151,000 - ₦200,000, 10% earn ₦201,000 - ₦250,000 while 7% earn above ₦251,000. This indicates the economic profile of residents in the study area, showing the proportion of household within low, middle and high-income brackets.

Figure 23: Average monthly household income.

2.4.3 Number of Household Income Contributors

The *figure 24* below implies that 58.95% of household members do not contribute to household income, while 41.05% indicated that 1-3 members contribute. No household reported 4-6 or more than 6 members contributing to income.

This indicates that in most households, income is either generated by single or very few members. This finding aligns with the Sustainable Livelihoods Framework, which highlights household vulnerability when livelihood strategies depend on a narrow asset base (Chambers & Conway, 1992). The reliance on a single income earner increases exposure to economic shocks such as illness, job loss, or market fluctuations.

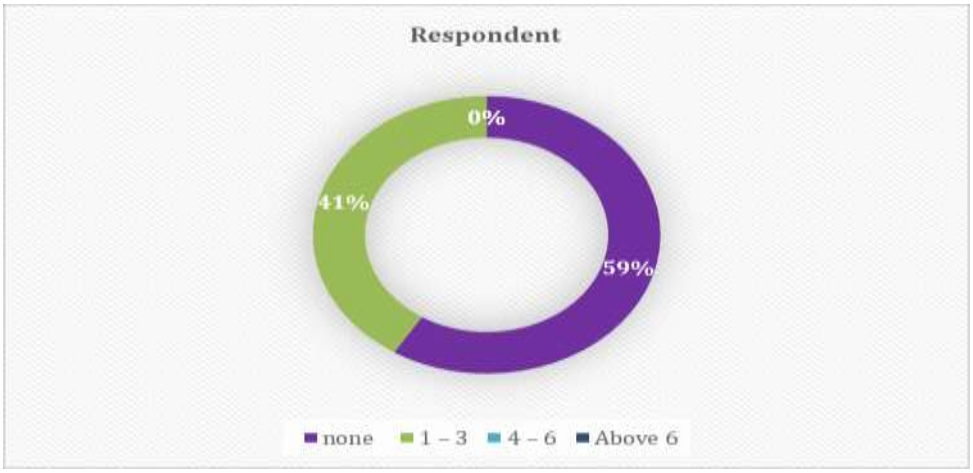

Figure 24 Average monthly household income.

2.4.4 Engagement in Informal Trading

The *figure 25* shows that 37% of the respondent engage in informal trading while 63% are into formal trading. This finding partially supports Oteng-Ababio et al. (2019), who emphasize the centrality of informal trade in sustaining livelihoods in informal settlements. However, the lower-than-expected engagement in informal trading may reflect occupational diversity, including farming and civil service employment, as well as regulatory or spatial constraints affecting informal commerce.

The implication is that while informal settlements provide opportunities for informal economic activities, their economic structure is more complex than often assumed. Planning policies should therefore support both informal and formal livelihood pathways rather than adopting one-size-fits-all economic interventions.

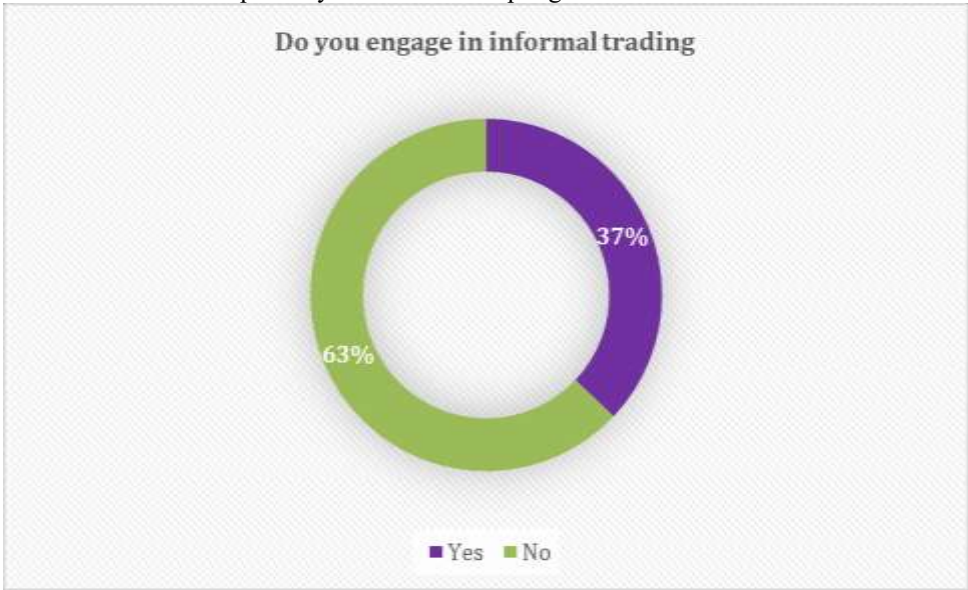

Figure 25: Engagement in Trade.

3.0 SUMMARY OF FINDINGS

The study found that settlement characteristics significantly influence residents' livelihood outcomes and socio-economic well-being. Most respondents were male, aged 31–40, married, and had secondary education, with the majority living in households of 4–6 persons and having resided in the settlement for 6–10 years.

The findings indicate that settlement characteristics have a positive and moderate relationship with livelihood outcomes ($r = 0.486$, $p < 0.001$). Insecure tenure was also significantly associated with greater reliance on informal trading ($\chi^2 = 18.62$, $p < 0.001$). The major challenges reported were insecurity, poor water and sanitation, tenure insecurity, and inadequate road access. Market proximity was identified as the main opportunity, while improved market access and infrastructure were considered the most effective pathways for improving livelihoods. Although 53.9% of respondents belonged to community groups, only 23.42% had access to microcredit, loans, or savings groups.

Physical living conditions were generally poor, with inadequate drainage, poor building foundations, and mud-plastered walls being common. Access to healthcare was also limited, as 90% of respondents travelled 20 minutes or more to reach a primary health facility. Regression analysis showed that settlement characteristics significantly explained 50.7% of the variation in socio-economic well-being ($R^2 = 0.507$, $p < 0.001$). Building condition was the strongest predictor, followed by room occupancy, water source, sanitation, and travel time to health services.

Residents mainly relied on self-help housing and income diversification as coping strategies, while cooperative pooling and informal credit were less utilised. Most respondents (67%) supported community-led upgrading, with health services, water and sanitation, and market infrastructure identified as priority interventions. Furthermore, 74.74% expressed willingness to join community groups or cooperatives, indicating substantial untapped social capital.

Overall, the findings demonstrate that poor settlement conditions, insecure tenure, inadequate infrastructure, and limited access to essential services constrain livelihood outcomes and socio-economic well-being. However, market opportunities, community participation, and strong willingness to engage in collective action provide important opportunities for improving livelihoods and living conditions.

4.0 RECOMMENDATIONS

Based on the findings of the study, the following recommendations are proposed to address the identified challenges and strengthen existing opportunities in Karu informal settlements.

First, tenure security should be strengthened through inclusive and gradual tenure regularisation. This recommendation is supported by the finding that 66% of respondents agreed or strongly agreed that tenure insecurity discourages investment, while the significant relationship between insecure tenure and informal trading ($\chi^2 = 18.62$, $p < 0.001$) indicates that insecure tenure is associated with livelihood vulnerability. Government agencies should therefore introduce context-sensitive tenure arrangements that recognise customary, rental, and occupancy rights while protecting residents from displacement. Resident participation and the involvement of local leaders should form part of the regularisation process.

Second, priority should be given to incremental infrastructure upgrading. The study found that 72% of respondents identified poor water and sanitation as a major challenge, 60% reported poor road access, and 74% identified insecurity as a major concern. In addition, 54% of dwellings lacked drainage, while 90% of respondents travelled 20 minutes or more to access a primary health facility. These findings demonstrate the need for targeted improvements in water supply, sanitation, drainage, roads, healthcare access, and other basic infrastructure. Infrastructure investments should be implemented incrementally and guided by residents' priorities.

Third, livelihood diversification and the informal economy should be strengthened. The finding that 57% of respondents perceived economic opportunities within the settlement and 73% identified market proximity as an important opportunity suggests that the informal economy has significant potential. However, only 23.42% had access to microcredit, loans, or savings groups. Government and development partners should therefore improve access to microfinance, vocational training, business development services, and cooperative schemes. These measures would help residents expand existing economic activities and reduce vulnerability to livelihood shocks.

Fourth, community participation should be strengthened through resident-led governance structures. Although only 53.9% of respondents currently belonged to community groups, 74.74% expressed willingness to join a community group or cooperative. This gap indicates substantial untapped social capital. Community Development Committees and similar resident-led structures should therefore be strengthened and incorporated into settlement planning and upgrading processes. Capacity building in leadership, urban planning, financial management, and advocacy would enable residents to participate more effectively in decisions affecting their communities.

Fifth, community-led upgrading should be prioritised because of the strong level of resident support. The study found that 67% of respondents supported or strongly supported community-led upgrading, with health services (21%), water and sanitation (15%), and market infrastructure (13%) identified as the leading priorities. Upgrading programmes should therefore be participatory and should initially focus on these priority areas. Collaboration among government agencies, NGOs, private-sector organisations, community groups, and academic institutions should be encouraged to mobilise resources and technical expertise.

Sixth, interventions should focus particularly on housing and building conditions because these have the strongest influence on socio-economic well-being. The regression analysis showed that settlement characteristics explained 50.7% of the variation in socio-economic well-being ($R^2 = 0.507$, $p < 0.001$), with building condition being the strongest individual predictor ($\beta = -0.331$), followed by room occupancy, water source, sanitation, and travel time to health services. Housing improvement programmes should therefore promote safer building conditions, reduce overcrowding, and improve access to water, sanitation, and health services.

Finally, digital tools such as GIS and mobile-based systems should be incorporated into settlement management and upgrading programmes. These tools can support the mapping of housing and infrastructure conditions, identification of service gaps, monitoring of upgrading projects, and transparent communication with residents. This would strengthen evidence-based planning and enable government and development partners to monitor whether interventions are addressing the conditions identified in the study.

Overall, the recommendations are directly grounded in the study findings and emphasise tenure security, infrastructure improvement, livelihood support, housing conditions, community participation, and collaborative governance. Addressing these areas simultaneously would improve the socio-economic well-being and resilience of residents while creating a more inclusive and sustainable pathway for upgrading Karu informal settlem

REFERENCES

Adam, A. G. (2020). Understanding competing and conflicting interests for peri-urban land in Ethiopia's era of urbanization. *Environment and Urbanization, 32*, 55–68.

Adelekan, I., & McGregor, D. (2021). Informal urban settlements and infrastructure challenges in Nigeria. *Urban Studies Review, 58*(4), 621–638. https://doi.org/10.1177/00420980211012345

Ali, M. H., & Suleiman, N. (2016). Sustainable food production: Insights of Malaysian halal small and medium sized enterprises. *International Journal of Production Economics, 181*(Part B), 303–314.

Asiamah, N., Mensah, H. K., & Oteng-Abayie, E. F. (2017). General, target, and accessible population: Demystifying the concepts for effective sampling. *The Qualitative Report, 22*(6), 1607–1621. https://doi.org/10.46743/2160-3715/2017.2674

Basile, P., & Ehlenz, M. M. (2020). Examining responses to informality in the Global South: A framework for community land trusts and informal settlements. *Habitat International, 96*, Article 102108.

Been, V., Ellen, I. G., & O'Regan, K. (2019). Supply skepticism: Housing supply and affordability. *Housing Policy Debate, 29*(1), 25–40. https://doi.org/10.1080/10511482.2018.1476899

Bertaud, A. (2018). *Order without design: How markets shape cities*. MIT Press.

Bhandari, P. (2020). *What is quantitative research? Definition, uses and methods*. Scribbr.

Bird, S., Taylor, Z., Banda, R., & Mwanangombe, S. (2017). Tenure typologies and implications to informal settlements upgrading: Case studies in Eldoret, Kenya. *International Journal of Housing Policy, 17*(2), 201–221. https://doi.org/10.1080/14616718.2016.1209145

Bolarinwa, K. O., & Simatele, M. D. (2022). Informality and access to urban services in Sub-Saharan African cities. [Incomplete reference details in source text].

Bourdieu, P. (1986). The forms of capital. In J. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241–258). Greenwood.

Brown, I., & Eyenghe, T. (2022). A qualitative narrative of lived experiences of informal settlements dwellers within Port Harcourt municipality during the Covid-19 pandemic. *Asian Journal of Environment & Ecology, 19*(4), 47–57. https://doi.org/10.9734/AJEE/2022/v19i4418

Carolini, G. Y. (2017). Sisyphean dilemmas of development: Contrasting urban infrastructure and fiscal policy trends in Maputo, Mozambique. *International Journal of Urban and Regional Research, 41*(1), 126–144.

Carvalho, P. B., & de Sá, A. C. (2025). The role of informal economies in sustainable livelihoods in sub-Saharan Africa. *Sustainability, 12*(17), Article 6830. https://doi.org/10.3390/su12176830

Chambers, R., & Conway, G. (1992). *Sustainable rural livelihoods: Practical concepts for the 21st century* (IDS Discussion Paper 296). Institute of Development Studies.

Chien, K. H. (2018). Entrepreneurialising urban informality: Transforming governance of informal settlements in Taipei. *Urban Studies, 55*(13), 2886–2902.

Chien, S. (2018). Informal settlement and livelihood diversity in rapidly urbanising regions. [Incomplete reference details in source text].

Cirolia, L. R., & Scheba, A. (2019). Strategies for upgrading informal settlements: Lessons from South Africa. *Habitat International, 88*, Article 101989. https://doi.org/10.1016/j.habitatint.2019.101989

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology, 94*(Supplement), S95–S120.

Community Investment and Inclusion Fund. (2021). *Understanding social capital*. https://www.ciif.gov.hk/en/sc-resource/sc-2_2.html

Connelly, L. M. (2008). Pilot studies. *Medsurg Nursing, 17*(6), 411–412.

Corburn, J., & Sverdlik, A. (2019a). Informal settlements and human health. In M. Nieuwenhuijsen & H. Khreis (Eds.), *Integrating human health into urban and transport planning: A framework* (pp. 155–171). Springer International Publishing.

Corburn, J., & Sverdlik, A. (2019b). Slum upgrading and health equity. *International Journal of Environmental Research and Public Health, 14*(4), Article 342.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297–334. https://doi.org/10.1007/BF02310555

Crush, J., Chikanda, A., & Skinner, C. (2019). *Informal economies and urban livelihoods in the Global South*. Routledge.

da Cruz, N. F., Rode, P., & McAllister, A. (2019). Governing informal settlements: Lessons from the "new urban normal." [Incomplete reference details in source text].

Daniel, A. K. (2022). The impact of land tenure security on livelihood outcomes in informal settlements. *Land Use Policy, 112*, Article 105785. https://doi.org/10.1016/j.landusepol.2021.105785

Debela, E. B. (2021). An overview of squatter settlements in Addis Ababa, Ethiopia. *Journal of Governance and Development, 17*, 77–101.

Department for International Development. (1999). *Sustainable livelihoods guidance sheets*. Department for International Development.

Devas, N. (2020). Incremental infrastructures and urban resilience in African informal settlements. *Urban Geography Review, 41*(5), 693–713. https://doi.org/10.1080/02723638.2019.1684624

Dovey, K. (2019). Informal settlement as a mode of production. In *The new companion to urban design* (pp. 139–151). Routledge.

Dovey, K., van Oostrum, M., Chatterjee, I., & Shafique, T. (2020). Towards a morphogenesis of informal settlements. *Habitat International, 104*, Article 102240. https://doi.org/10.1016/j.habitatint.2020.102240

Durand-Lasserve, A. (2007). The formalisation of urban land tenure in developing countries. *Foncier & Développement, 60*, 15–28.

El Menshawy, A., & Shafik, S. (2016). Affordable housing as a method for informal settlements sustainable upgrading. *Procedia - Social and Behavioral Sciences, 223*, 126–133.

Etikan, I., & Bala, K. (2017). Sampling and sampling methods. *Biometrics & Biostatistics International Journal, 5*(6), 215–217. https://doi.org/10.15406/bbij.2017.05.00149

Evans, J. D. (1996). *Straightforward statistics for the behavioral sciences*. Brooks/Cole.

Evergreen, S. D. H. (2017). *Effective data visualization: The right chart for the right data*. SAGE Publications.

Eyenghe, T. (2020). Perceived quality of life in informal settlements in Yenagoa, Nigeria. In V. Umoren & J. Atser (Eds.), *Land use management and environmental sustainability in Nigeria: Book of readings in memory of Late Professor Joseph Uyanga* (pp. 439–451). University of Uyo.

Glaeser, E. L., & Gyourko, J. (2020). Housing markets and informal settlement growth. *Journal of Urban Economics, 117*, 103–118.

Goytia, C., Heikkila, E. J., & Pasquini, R. A. (2023). Do land use regulations help give rise to informal settlements? Evidence from Buenos Aires. *Land Use Policy, 125*, Article 106484.

Goytia, C., Pasquini, R. A., & Sanguinetti, P. (2023). Informal housing markets and density: Evidence from Latin American cities. [Incomplete reference details in source text].

GRID3 Nigeria. (2025). *Population and settlement layers for Nasarawa State*. Geo-Referenced Infrastructure and Demographic Data for Development Programme.

Hanifan, L. J. (1916). The rural school community center. *Annals of the American Academy of Political and Social Science, 67*(1), 130–138.

Hoeltl, A., Brandtweiner, R., Bates, R., & Berger, T. (2020). The interactions of sustainable development goals: The case of urban informal settlements in Ethiopia. *International Journal of Sustainable Development and Planning, 15*, 287–294.

Ikeme, A., Nwalo, I., & Oluseyi, O. (2020). Livelihood strategies and tenure challenges in peri-urban Nigeria. *Journal of African Urban Studies, 14*(3), 45–61. https://doi.org/10.1177/2158244019846207

Ismail, N. A. (2024). Institutional approaches to urban informal settlements dynamics: A case study of Abuja, Nigeria. *Urban Studies Journal, 61*(2), 364–379. https://doi.org/10.1016/j.urbstud.2023.11.004

Israel, G. D. (1992). *Determining sample size* (PEOD-6). University of Florida, Institute of Food and Agricultural Sciences Extension.

Jenkins, P., & Mottelson, J. (2020). *Urban informality and livelihoods in African cities*. Routledge.

Jones, P. (2017). Formalizing the informal: Understanding the position of informal settlements and slums in sustainable urbanization policies and strategies in Bandung, Indonesia. *Sustainability, 9*(8), Article 1436.

Jones, P. (2019). The shaping of form and structure in informal settlements: A case study of order and rules in Lebak Siliwangi, Bandung, Indonesia. *Journal of Regional and City Planning, 30*(1), 43–61.

Kamble, V., ... Osrin, D. (2017). Community resource centres to improve the health of women and children in informal settlements in Mumbai: A cluster-randomized, controlled trial. *The Lancet Global Health, 5*(3), e335–e349.

Keller, E. J., & Mukudi-Omwami, E. (2017). Rapid urban expansion and the challenge of pro-poor housing in Addis Ababa, Ethiopia. *African Review, 9*, 173–185. https://doi.org/10.1080/09744053.2017.1329809

Kellett, P., Mahabir, R., et al. (2016). Informal settlements as livelihood hubs: A comparative perspective. [Incomplete reference details in source text].

Khalifa, M. A. (2015). Evolution of informal settlements upgrading strategies in Egypt: From negligence to participatory development. *Ain Shams Engineering Journal, 6*(4), 1151–1159.

Kovacic, Z., Musango, J. K., Ambole, L. A., Buyana, K., Smit, S., Anditi, C., ... Nsangi, G. (2019). Interrogating differences: A comparative analysis of Africa's informal settlements. *World Development, 122*, 614–627.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30*(3), 607–610.

Kübler, D., & Lefèvre, C. (2017a). Megacity governance and the state. *Urban Research & Practice, 11*(4), 378–395.

Kübler, D., & Lefèvre, C. (2017b). Re-thinking urban governance in informal settlement contexts. [Incomplete reference details in source text].

Mahabir, R., Crooks, A., Croitoru, A., & Agouris, P. (2016). The study of slums as social and physical constructs: Challenges and emerging research opportunities. *Regional Studies, Regional Science, 3*(1), 399–419.

Manji, A. (2015). Bulldozers, homes and highways: Nairobi and the right to the city. *Review of African Political Economy, 42*(144), 206–224.

Matamanda, A. R. (2020). Battling the informal settlement challenge through sustainable city framework: Experiences and lessons from Harare, Zimbabwe. *Development Southern Africa, 37*(2), 217–231.

Mitra, S., Mulligan, J., Schilling, J., Harper, J., Vivekananda, J., & Krause, L. (2017). Developing risk or resilience? Effects of slum upgrading on the social contract and social cohesion in Kibera, Nairobi. *Environment and Urbanization, 29*(1), 103–122.

Mohanty, M. (2020). *Squatter settlements and slums and sustainable development*. Springer Nature. https://doi.org/10.1007/978-3-319-71061-7

Mokhele, T., Mutyambizi, C., Manyaapelo, T., Ngobeni, A., Ndinda, C., & Hongoro, C. (2023). Determinants of deteriorated self-perceived health status among informal settlement dwellers in South Africa. *International Journal of Environmental Research and Public Health, 20*(5), Article 4174. https://doi.org/10.3390/ijerph20054174

Morier-Genoud, E. (2020). The jihadi insurgency in Mozambique: Origins, nature and beginning. *Journal of Eastern African Studies, 14*(3), 396–412.

Mottelson, J. (2020). A new hypothesis on informal land supply, livelihood, and urban form in sub-Saharan African cities. *Land, 9*(11), Article 435. https://doi.org/10.3390/land9110435

Mottelson, J. (2021a). Affordability and overcrowding in informal housing markets. [Incomplete reference details in source text].

Mottelson, J. (2021b). *Out of control: On urban morphology of informal settlements in East Africa*. Royal Danish Academy – Architecture, Design, Conservation. https://adk.elsevierpure.com/en/publications/out-of-control-on-urban-morphology-of-informal-settlements-in-east

Mottelson, J. (2021c). Urban densification of informal settlements in Sub-Saharan Africa: An analysis of recent developments in Maputo, Mozambique. [Incomplete reference details in source text].

Mottelson, J., & Venerandi, A. (2020a). A fine-grain multi-indicator analysis of the urban form of five informal settlements in East Africa. *Urban Science, 4*(3), Article 3.

Mottelson, J., & Venerandi, A. (2020b). Social capital and institutional gaps in informal settlement upgrading. [Incomplete reference details in source text].

Mukumba, J. (2019). Informal settlement, security and infrastructure development. [Incomplete reference details in source text].

Nassar, D. M., & Elsayed, H. G. (2018). From informal settlements to sustainable communities. *Alexandria Engineering Journal, 57*, 2367–2376. https://doi.org/10.1016/j.aej.2017.09.004

National Population Commission. (2018). *NPC puts Nigeria's population at 198 million*. https://www.vanguardngr.com/2018/04/npc-puts-nigerias-population-198m/

Nchor, J. U. (2022). *Housing problems and vulnerability in Nigeria's informal settlements: The Calabar case* [Unpublished doctoral dissertation]. Newcastle University.

Ogu, V. I., & Becker, K. (2017). Urban planning and the informal sector in Nigeria. *International Journal of Urban Sustainable Development, 9*(2), 150–167. https://doi.org/10.1080/19463138.2017.1298149

Okeke, E., Rajasekar, R., & Perera, L. (2023). Understanding the livelihood strategies of informal peri-urban settlements in Southeast Nigeria. *International Journal of Sustainable Development and Planning, 18*(4), 875–892. https://doi.org/10.18280/ijsdp.190415

Olaganathan, R., et al. (2014). Vegetation and ecological characterisation of the northern Guinea Savanna zone of central Nigeria. [Incomplete reference details in source text].

Open University of Newcastle. (2023). *Social capital theory*. https://open.ncl.ac.uk/theories/social-capital-theory

Organisation for Economic Co-operation and Development. (2018). *OECD better life index*. http://www.oecdbetterlifeindex.org

Oteng-Ababio, M., Sarfo, K. O., & Owusu-Sekyere, E. (2019). Re-thinking the informal economy in African cities. *Urban Forum, 30*(3), 261–275.

Oteng-Ababio, M., Tanle, A., Amoah, S. T., Kusi, L., Kosoe, E. A., & Bagson, E. (2019). "Informal exceptionalism?" Labour migrants' creative entrepreneurship for sustainable livelihoods in Accra, Ghana. *Journal of Asian and African Studies, 54*(1), 88–103.

Oxford Bibliographies. (2022). *Social capital theory*. Oxford University Press. https://www.oxfordbibliographies.com

Park, R. E., & Burgess, E. W. (1925). *The city: Suggestions for investigation of human behavior in the urban environment*. University of Chicago Press.

Putnam, R. D. (1993). *Making democracy work: Civic traditions in modern Italy*. Princeton University Press.

Putnam, R. D. (1995). Bowling alone: America's declining social capital. *Journal of Democracy, 6*(1), 65–78.

Rajasekar, R., & Perera, L. (2023). Community engagement and governance in informal settlements upgrading: Lessons from Colombo. *Sustainable Cities and Society, 85*, Article 104261. https://doi.org/10.1016/j.scs.2022.104261

Resnik, D. B. (2020). *What is ethics in research and why is it important?* National Institute of Environmental Health Sciences.

Robinson, J. (2016). Comparative urbanism: New geographies and cultures of theorizing the urban. *International Journal of Urban and Regional Research, 40*(1), 187–199.

Samantha, W. (2015). Quality of life study on slum dwellers, with special reference to Sri Lanka. *International Journal of Scientific Research and Innovative Technology, 2*(3), 36–65.

Satterthwaite, D. (2016a). A new urban agenda? *Environment and Urbanization, 28*(1), 3–12.

Satterthwaite, D. (2016b). Missing the Millennium Development Goal targets for water and sanitation in urban areas. *Environment and Urbanization, 28*(1), 99–118.

Satterthwaite, D., Archer, D., Colenbrander, S., Dodman, D., Hardoy, J., Mitlin, D., & Patel, S. (2020). Building resilience to climate change in informal settlements. *One Earth, 2*(2), 143–156.

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., & Jinks, C. (2016). Saturation in qualitative research: Exploring its conceptualization and operationalization. *Quality & Quantity, 52*(4), 1893–1907.

Simone, A. (2015). The urban poor and their ambivalent exceptionalities: Some notes from Jakarta. *Current Anthropology, 56*(S11), S15–S23.

Stacey, P., & Lund, C. (2016). [Incomplete reference details in source text].

Taherdoost, H. (2016). Validity and reliability of the research instrument: How to test the validation of a questionnaire/survey in research. *International Journal of Academic Research in Management, 5*(3), 28–36.

Taherdoost, H. (2017). Determining sample size: How to calculate survey sample size. *International Journal of Economics and Management Systems, 2*, 237–239.

Talukdar, D. (2018). Informal housing and the tenure-investment nexus. [Incomplete reference details in source text].

Tatem, A. J. (2017). WorldPop, open data for spatial demography. *Scientific Data, 4*, Article 170004. https://doi.org/10.1038/sdata.2017.4

Turok, I. (2015). Turning the tide? The emergence of national urban policies in Africa. *Journal of Contemporary African Studies, 33*(3), 348–369.

UN-Habitat. (2012). *State of the world's cities 2012/2013: Prosperity of cities*. United Nations Human Settlements Programme.

UN-Habitat. (2015a). *Habitat III issue paper 22: Informal settlements*. United Nations Human Settlements Programme.

UN-Habitat. (2015b). *International guidelines on urban and territorial planning*. https://unhabitat.org/sites/default/files/download-manager-files/IG-UTP_English.pdf

UN-Habitat. (2015c). *World urbanization prospects: The 2014 revision* (ST/ESA/SER.A/366).

UN-Habitat. (2016). *World cities report: Urbanization and development—Emerging futures*. United Nations Human Settlements Programme.

UN-Habitat. (2017). *Tracking progress towards inclusive, safe, resilient and sustainable cities and human settlements*. United Nations Human Settlements Programme.

UN-Habitat. (2018). *The state of African cities 2018: The geography of African investment*. United Nations Human Settlements Programme. https://unhabitat.org/the-state-of-african-cities-2018-the-geographyof-african-investment

Visagie, J., & Turok, I. (2020). Getting urban density to work in informal settlements in Africa. *Environment and Urbanization, 32*(2), 351–370.

Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper & Row.

Zhang, X. (2018). Informal settlements as legitimate urban economic space. [Incomplete reference details in source text].

Zhang, Y. (2018). The credibility of slums: Informal housing and urban governance in India. *Land Use Policy, 79*, 876–890.