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JOURNAL OF SPATIAL INFORMATION SCIENCES ISSN: 2354-3361
VOL. 3, ISSUE 1, PP 290–306, 2026 DOI: https://doi.org/10.5281/zenodo.23206444
PUBLISHED 20-09-2026

www.journals.unizik.edu.ng/jsis

SPATIAL PATTERN AND SOCIOECONOMIC DETERMINANTS OF RURAL POVERTY IN KATSINA STATE, NORTHWESTERN NIGERIA

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DOI: https://doi.org/10.5281/zenodo.23206444

Abstract

Understanding the spatial dimension of poverty is essential for designing pro-poor, location-specific development interventions. This study examines the spatial pattern and socioeconomic determinants of rural poverty across all the Local Government Areas (LGAs) of Katsina State, Nigeria, in 2025. Using a multi-stage sampling procedure, the study surveyed 650 rural households across seven administrative clusters (Katsina, Daura, Funtua, Kankiya, Mani, Dutsin-Ma, and Malumfashi). The household survey captured employment and occupation, education, household size and dependency, land and livestock assets, housing conditions and tenure, access to basic household facilities, health status and physical access to health facilities, road and market accessibility, and agricultural extension services. Foster-Greer-Thorbecke (FGT) indices were computed to generate poverty incidence, depth and severity profiles for each LGA, while a multiple regression model was used to identify the socioeconomic correlates of poverty incidence. Results show marked spatial disparity: poverty incidence increases from south to north, ranging from about 54% in Katsina town to 76% in Sandamu, with the LGAs bordering the Niger Republic recording the highest incidence, depth and severity of poverty. The regression model explained 81.1% of the variation in poverty incidence ($R^2 = 0.811$), with road access, landlessness, dependency ratio, market access and household size emerging among the strongest predictors, alongside significant effects of education, household head's age, livestock value and extension service frequency. Land and income inequality, measured by Gini coefficients, were also higher in the northern and central clusters. The study concludes that geographic marginality, characterised by poor road and market access, high dependency ratios and constrained land access, rather than agricultural potential alone, is closely associated with the spatial concentration of rural poverty in Katsina State. It recommends targeted investment in rural road infrastructure, market access, agricultural extension, improved housing and basic services, healthcare accessibility, and girls' education as priority levers for poverty reduction.

Keywords: rural poverty; spatial pattern; poverty determinants; FGT indices; Katsina State; Nigeria

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1. Introduction

Poverty amidst plenty remains one of the world's most persistent development challenges, and its reduction has been a central and enduring development goal [20]. Poverty is more than a lack of income and resources for a sustainable livelihood; its manifestations include hunger and malnutrition, limited access to education and other basic services, social discrimination and exclusion, and a lack of participation in decision-making, so that economic growth must be inclusive, generating sustainable jobs and promoting equality, if it is to translate into genuine poverty reduction [34]. The World Bank [34] estimated that about 1.2 billion people worldwide, one in every five people on earth, were struggling to survive on less than US$1 per day [33] while about 2.8 billion lived on less than US$2 [4] underscoring the scale of the challenge facing policymakers at local, national and international levels.

One of the most important challenges in addressing poverty is its spatially heterogeneous character [19], which requires that poverty be understood and analysed within its own geographic context rather than treated as a uniform national condition. Geography plays a significant role in understanding poverty because it is inherently a spatial problem [19]. Geographic variation in poverty incidence may be driven by differences in agro-climatic conditions, access to markets, the presence of natural resources such as water for irrigation, and the orientation of public policy [19]. Locational attributes such as soil quality, micro-climate, topography and access to roads and public services are consistently correlated with household income and expenditure [1][31]: upland areas (‘tudu’ in Hausa) typically have less fertile soils and costlier irrigation than lowland ‘fadama’ areas, and their lower agricultural potential depresses population density, which in turn raises the per-capita cost of providing roads, electricity and social services, and increases households' distance from urban centres and the nonfarm opportunities they offer. [17] This compounding of disadvantageous geography, poor infrastructure and low returns to private endowments a “spatial poverty trap”, a condition that can prevent households from escaping poverty regardless of individual effort.

1.1 Statement of the Problem

Nigeria presents a paradox of a resource-rich country whose population remains largely poor: per capita income has stagnated at levels comparable to 1970 [21][31], and poverty in the country is compounded by regional, climatic and ethnic differences reinforced by distinct historical and socioeconomic legacies, as well as by a complex political history in which frequent changes in government have produced sharp swings in economic and social policy that have worsened income distribution. A substantial body of prior research has examined poverty and income distribution in Nigeria [5][25][7] and [22], but this literature has relied heavily on the poverty profile, a bivariate descriptive tool that compares poverty status against one household characteristic at a time. While informative, the poverty profile is limited in usefulness because it shows how poverty correlates with a single characteristic in isolation and therefore tends to oversimplify what is, in reality, a complex, multi-causal relationship.

ISSN: 2354-3361
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Poverty mapping is a complementary tool that has been used in Nigeria in recent years to improve the spatial targeting of poverty-alleviation resources [2], and high-resolution poverty maps have shown that high poverty rates tend to be concentrated in environmentally fragile regions [3]. However, like the poverty profile, poverty mapping does not, on its own, furnish an estimate of the causal linkage between poverty and the variables that influence it; it provides mainly a visual picture of where the poor are located, without explaining why they are located there. For a sustained fight against rural poverty in Katsina State in particular, and Nigeria more broadly, there is therefore a need for pro-poor, location-specific policy grounded in a deeper assessment, not only of the extent of rural poverty and where the poor live, but of the specific socioeconomic factors that explain why poverty is concentrated where it is. At the time of this study, no research had specifically examined the spatial pattern of rural poverty in Katsina State alongside a rigorous, multivariate identification of its socioeconomic determinants, a gap in the literature that this study addresses by focusing on rural poverty at the household level, its extent and its determinants.

This study aims to examine the spatial pattern and socioeconomic determinants of rural poverty in Katsina State, Nigeria, with a view to generating an evidence base for targeted, pro-poor policy. The stated objectives are to: Illustrate the spatial pattern of rural poverty incidence, depth and severity across the 34 Local Government Areas of Katsina State, determine the socioeconomic factors that account for the observed spatial pattern of rural poverty, using a multiple regression model of poverty incidence; and Elucidate the possible reasons for the observed spatial variation in poverty incidence, drawing on the study's regression results and the wider poverty literature.

The stated hypothesis is that there is significant spatial variation in the incidence of rural poverty across the Local Government Areas in the state and that this variation is explained by some socioeconomic factors, including household demographic structure, access to infrastructure, and land and livestock endowments.

2. Study Area

Katsina State is geographically located between latitudes 11°08′00″ North and 13°22′00″ North of the Equator and longitudes 6°52′00″ East and 9°20′00″ East of the Prime Meridian, in the northwestern region of Nigeria, covering approximately 23,938 km² across 34 Local Government Areas. The state had a population of 5,801,584 as at the 2006 census, growing at approximately 3.1% annually, and is predominantly Hausa-Fulani, with Islam as the dominant religion.

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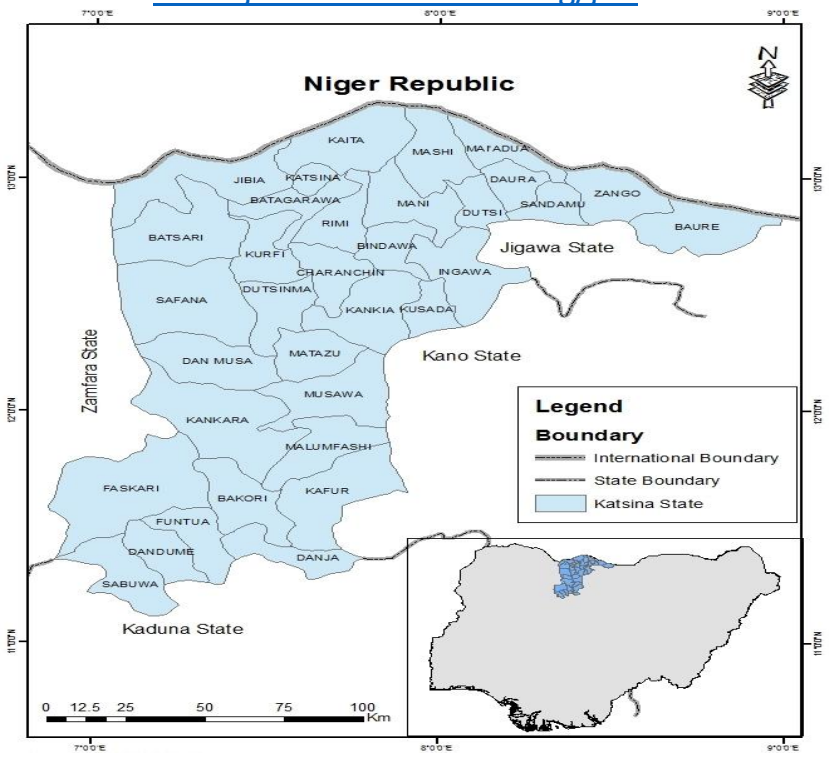


Figure 1: Map of Katsina State Showing LGAs (Source: NASRDA)

Katsina State is predominantly Hausa-Fulani; most of the people speak only Hausa. A great majority of the people are settled cultivators and traders, but there is a considerable number of nomadic cattle Fulanis whose males rear livestock while the females hawk locally prepared fermented milk in towns and villages. A sizable number of migrants from southern Nigeria, especially the Yoruba and Igbos, are found mostly in towns. There are many traditional cottage/craft industries which produce a wide variety of products.

On average, there are 189 persons per square kilometre. Seasonal migration takes place, especially of able-bodied men in the dry season to the southern parts of the state or southern Nigeria in search of part-time jobs.

In addition, the state possesses a large livestock population made up of cattle, goats and sheep as well as poultry. Apart from producing food for human consumption, these agro-products have the potential for providing raw materials that could serve a wide range of industries including food and beverages processing, animal and poultry feed, textiles, pharmaceuticals, as well as leather industries. Informal trading and other micro-entrepreneurship are also playing a crucial role in people's economic life [9][31]. Agriculture is the backbone of the rural economy: more than 75% of the workforce is engaged in farming, cattle rearing or craft production, yet this sector contributes only about 20% of the state's GDP, reflecting low productivity and limited value addition. About 70% of farm households own less than one hectare of land, and the subjective poverty measure places 48% of the population in the core-

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poor category [21]. For sampling purposes, the state was organised into seven administrative clusters: Katsina, Daura, Funtua, Kankiya, Mani, Dutsin-ma and Malumfashi.

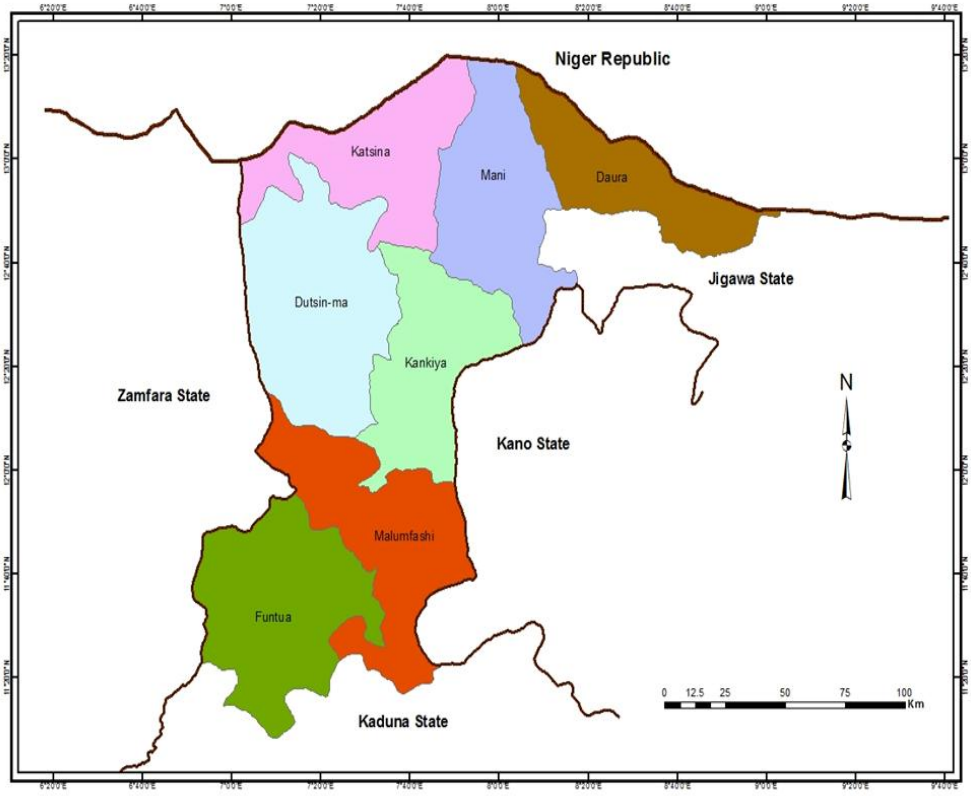


Figure 2: Katsina State showing the seven clusters (Source: Authors' GIS Analysis)

3. Methodology

A reconnaissance survey was conducted before the main fieldwork. This served three purposes: (i) to identify rural settlements and establish contact with the districts and ward heads to facilitate data collection; (ii) to observe, before the formal survey, the available social infrastructure, dominant socio-economic activities, as well as the diversity of livestock within the selected settlements.

A multi-stage sampling procedure was adopted, with the entire state constituting the sampling frame. At the first stage, the 34 Local Government Areas of the state were stratified into seven administrative clusters, namely Katsina, Daura, Funtua, Kankiya, Mani, Dutsin-ma and Malumfashi, to ensure adequate spatial spread of the sample across the state. At the second stage, rural communities within each cluster were identified based on the availability of infrastructural criterion (access to schools, hospitals, roads, electricity and piped water, consistent with the UNDP definition of a rural area) and 16 qualifying communities were selected per cluster, giving 112 communities in total; in the Malumfashi cluster only four Local Government Areas met the criterion, so the shortfall was

redistributed to bring the total to 112. At the third stage, households within each selected community were sampled using the Taro Yamane [35] formula for finite populations:

$$n = N / [1 + N(e^2)]$$

where n is the required sample size, N is the estimated household population of the cluster (derived from the field enumeration of households across the 112 selected communities, totalling 8,850 households), and e is the margin of error, set at 0.1 (10%). Application of the formula to each cluster's household population yielded a combined sample of 650 households, ranging from 91 households in Malumfashi to 94 in Dutsin-ma, with an average of 92–93 households per cluster. Only households that consented and were available to respond were retained in the final sample; no household was compelled to participate.

Primary data were collected between January and October 2025 using structured questionnaires and interview schedules administered to the 650 sampled households, capturing three broad domains of information. Economic characteristics comprised landholding size (hectares per household), land tenure status (owned versus landless), livestock holdings in physical numbers and estimated monetary value, employment and occupation, and household economic activities. Social characteristics comprised health status, physical access to functional health facilities, education (scored on a 0–5 ordinal scale: no education = 0, Primary/Islamiya = 1, Secondary/Quranic = 2, Diploma/NCE = 3, First degree/HND = 4, Master's/PhD = 5), and housing conditions, including housing type, tenure, access to basic household facilities such as radio, television, water and electricity, and household energy source. Demographic characteristics comprised household size and structure, the dependency ratio (computed as the number of household members below 15 and above 64 years of age relative to the number of members of working age, 15–64 years), and the age, sex and occupation of the household head. These variables were selected because each has an established theoretical link to household welfare in the poverty literature [1][12] and because they could be measured consistently across the seven clusters using a single survey instrument. Direct quantitative measures of household exposure to pollution were not included in the available survey dataset; consequently, pollution exposure is not treated as an estimated determinant in the regression model and should be incorporated in future research where appropriate.

Rather than applying the conventional international poverty line of US$1 per day, which does not adequately capture the local cost structure of rural Katsina State, a locally-derived consumer-price-index-based poverty line was constructed following the approach of [16] incorporating the socioeconomic and demographic characteristics of the sampled households. This yielded a monetary poverty line of ₦3,375.00 for the study, against which household welfare was benchmarked to classify households as poor or non-poor, [27].

3.5 Data Analysis

The Foster-Greer-Thorbecke (FGT) class of poverty measures, the most widely applied decomposable poverty index in the development economics literature, was used to compute three indices for each of the 34 LGAs: the incidence of poverty (the headcount ratio, or share of the

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population below the poverty line), the depth of poverty (the average shortfall of poor households' welfare below the poverty line, indicating how poor the poor are on average) and the severity of poverty (which additionally weights the shortfall by its squared value, giving greater weight to the poorest of the poor and thus capturing inequality among the poor). Computing all three indices, rather than incidence alone, is important because two LGAs with identical headcount ratios can differ substantially in how far below the poverty line, and how unequally, their poor populations fall.

A multiple regression model was then estimated to identify the determinants of poverty incidence at the LGA level. Poverty incidence served as the dependent variable, while eleven independent variables, household size, education, dependency ratio, age of household head, persons per room, value of livestock population, population of livestock, landholding, landlessness, road access (mean distance to the nearest all-season road) and market access (mean distance to the nearest major market), together with frequency of extension service visits, were entered as predictors. The general form of the model is:

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \beta 7X7 + \beta 8X8 + \beta 9X9 + \beta 10X10 + \varepsilon$$

where Y is poverty incidence, β1–β10 are the estimated regression coefficients, X1–X10 are the independent variables listed above, and ε is the stochastic error term. Prior to estimation, bivariate (Pearson) correlation analysis was conducted for all pairs of independent variables to screen for multicollinearity; no pairwise correlation exceeded the conventional threshold of 0.8, confirming that the predictors could be treated as sufficiently independent for inclusion in a single regression model. Model fit was assessed using the coefficient of determination (R^2) and adjusted R^2, and the statistical significance of individual predictors was assessed at the 0.01 and 0.05 levels using t-statistics.

4. Results

4.1 Demographic and Socioeconomic Profile of Respondents

The study revealed that farming was the dominant occupation across all clusters, accounting for 91.4% of respondents in Funtua and 91.2% in Malumfashi, and ranging down to 70.9% in Mani, reflecting the varying strength of non-farm alternatives (trading, fishing, hunting and crafts) across the state; trading was the leading secondary occupation, reaching 21.5% in Daura and Mani. The findings therefore show that employment and livelihood structure form an important part of the socioeconomic context within which rural poverty occurs. Average household size ranged from 7 persons in Katsina, Daura, Funtua, Malumfashi and Dutsin-ma to 8 persons in Mani and Kankiya, while dependency ratios were as high as 1:6 in Daura and Mani, compared with 1:3 in Katsina and 1:4 in Dutsin-ma, Malumfashi, Kankiya and Funtua. Educational attainment was low across all clusters, consistent with the predominance of Islamiya (Qur'anic) over formal Western schooling. Health infrastructure and physical access to healthcare were similarly constrained: most communities had, at most, one primary health-care facility, staffed principally by nurses and traditional birth attendants rather than physicians, and travel distances of over one kilometre to the nearest facility were common outside Katsina cluster. Malaria was the most prevalent illness reported (63–80% of households across clusters), followed by dysentery (about 14% overall), both consistent with limited access to potable water and sanitation.

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Housing conditions and access to basic household services, including water and electricity, were also captured as part of the broader socioeconomic assessment. Access to fruit and meat in the household diet was limited, with 65% and 76% of households respectively reporting no regular access, pointing to broader nutritional vulnerability that compounds income poverty in the study area.

Average household size ranged from 7 persons in Katsina, Daura, Funtua, Malumfashi and Dutsin-ma to 8 persons in Mani and Kankiya, with an average of two to three wives per household head. Dependency ratios were as high as 1:6 in Daura and Mani, compared with 1:3 in Katsina and 1:4 in Dutsin-ma, Malumfashi, Kankiya and Funtua, reflecting the prevalence of polygyny and correspondingly large family sizes in the more remote clusters. About 27.9% of household heads fell within the economically productive 36–40 and 41–45-year age brackets combined, consistent with the age profile of household headship recorded in the 2006 National Population Census. Ethnically, the sample was approximately 85% Hausa, with Fulani (about 9–11%) and small Igbo (about 2%) and Yoruba (about 1%) minorities; Islam was the dominant religion, professed by over 90% of respondents in most clusters This findings agrees with the findings of [6][23][28][24] and deviate from the findings of [7][18][10].

Educational attainment was low across all clusters, consistent with the predominance of Islamiya (Qur'anic) over formal Western schooling: between 86.0% (Katsina) and 97.9% (Mani) of household members had, at most, primary or Islamiya-level education, with only a small minority (2.2% in Mani to 14.0% in Katsina) having attained secondary education or above. Katsina and Kankiya recorded the highest literacy levels among the clusters, while Mani recorded the lowest, a pattern broadly consistent with the settlement of Islamic scholarship traditions that regard Western schooling as being of limited practical or spiritual value relative to religious education, This is in line with the findings [6] which pointed out that low education all level among farming households undoubtedly affect their income diversification patterns and that generally, there isa low level of education among the rural farming house hold sand this has implications for their income earning capacity as the respondents may lack there required skill to secure well paid jobs. Health infrastructure was similarly constrained: most communities had, at most, one primary health-care facility, staffed principally by nurses and traditional birth attendants rather than physicians, and travel distances of over one kilometer to the nearest facility were common outside Katsina cluster. Malaria was the most prevalent illness reported (63–80% of households across clusters), followed by dysentery (about 14% overall), both consistent with limited access to potable water and sanitation. Access to fruit and meat in the household diet was also limited, with 65% and 76% of households respectively reporting no regular access, pointing to broader nutritional vulnerability that compounds income poverty in the study area.

4.2 Spatial Pattern of Poverty Incidence, Depth and Severity

Poverty incidence, computed using the FGT framework, varied markedly across the 34 LGAs, ranging from a low of 54.2% in Katsina to a high of 75.8% in Sandamu. Poverty was highest in Kaita, Sandamu, Dutsi, Mani, Zango and Ingawa (75–79%), and in Kusada and Maiadua (70–74%), LGAs concentrated along the border with the Niger Republic. Kankiya, Kurfi and Danmusa recorded

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comparatively lower incidence (60–64%) owing to access to cross-border markets and trade, while Katsina, Funtua, Daura and Malumfashi recorded the lowest incidence overall, benefiting from better access to markets and roads. The same south-to-north gradient was observed for poverty depth and severity, which were highest in Kaita, Sandamu and Baure (depth of 0.34–0.42) and in Kaita, Mani, Rimi, Sandamu, Zango, Maiadua, Kusada, Musawa and Matazu (severity of 0.21–0.32), and lowest in Funtua and Katsina.

Table 1: Highlights of Poverty Indices in Selected Local Government Areas, Katsina State

Selected LGAs	Poverty Incidence (%)	Poverty Depth	Poverty Serity
Katsina	54.21	0.148	0.041
Funtua	58.11	0.162	0.072
Malumfashi	60.79	0.198	0.171
Daura	64.22	0.222	0.1
Kankiya	65.87	0.226	0.161
Zango	74.13	0.342	0.191
Dutsi	74.23	0.342	0.311
Kaita	74.21	0.421	0.313
Sandamu	75.76	0.412	0.321

(Field Survey, 2025).

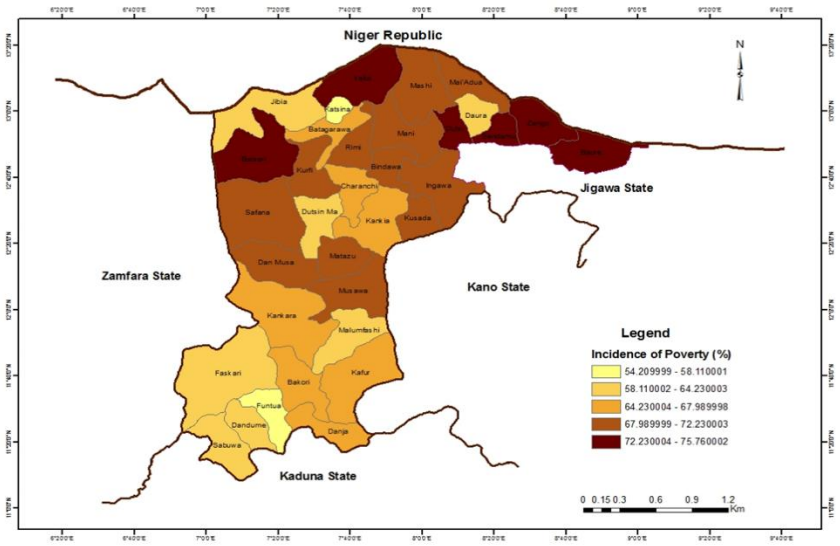


Figure. 3: Spatial Pattern of Incidence of Rural Poverty (Source: NASRDA)

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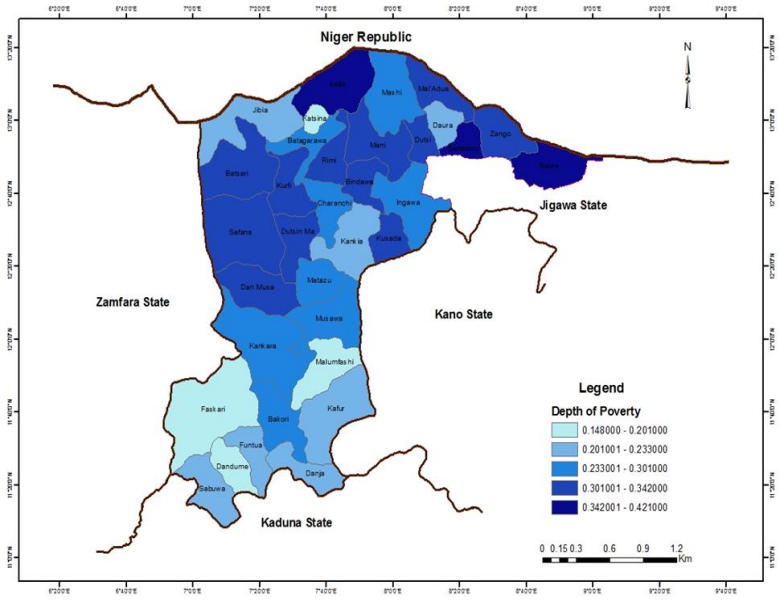


Figure. 4: Spatial Pattern of Depth of Rural Poverty (Source: NASRDA)

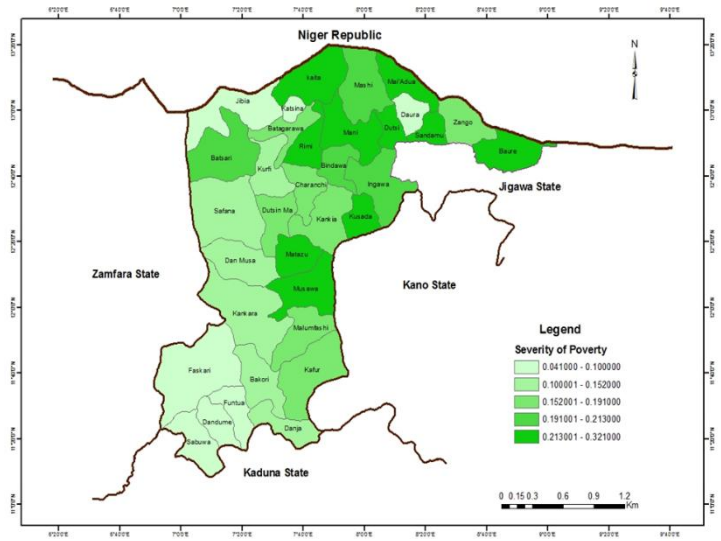


Figure 5: Spatial Pattern of Severity of Rural Poverty (Source: NASRDA)

4.3 Income and Land Distribution

Income inequality (Gini coefficient) was broadly similar across clusters, ranging from 0.31 to 0.33. Still, land inequality was substantially more pronounced and spatially variable, ranging from 0.40 in Funtua to 0.58 in Dutsin-ma; these results show a relationship with the findings of . Land inequality was consistently higher in clusters further from the state capital (Daura, Kankiya, Mani, Dutsin-ma and Malumfashi), even where income inequality remained relatively low, suggesting that unequal access to land, rather than income alone, is a distinct and spatially concentrated driver of rural

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disadvantage. Households were, on average, landless in about 66% of cases, with average landholding among landowning households ranging from 2.91 hectares in Daura to 4.72 hectares in Funtua.

4.4 Determinants of Poverty Incidence

The multiple regression model explained 81.1% of the variation in poverty incidence across LGAs ($R = 0.901$, $R^2 = 0.811$, Adjusted $R^2 = 0.783$, Standard Error of the Estimate = 0.046), an unusually high explanatory power for a cross-sectional social survey that lends confidence to the identified predictors as genuine, rather than spurious, correlates of poverty in the study area, this is in comformity with the illustrations of [13]. Collinearity diagnostics confirmed that no pairwise correlation among the eleven predictors exceeded 0.8, indicating that multicollinearity was not a material threat to the stability of the coefficient estimates. Of the eleven variables entered into the model, five were significant at the 1% level, road access, landholding, dependency ratio, market access and household size, while a further five, education, age of household head, value of livestock population, population of livestock and frequency of extension services, were significant at the 5% level. Persons per room was the only variable that did not achieve statistical significance.

Among the significant predictors, landlessness carried the largest standardized coefficient ($\beta = -0.490$), confirming it as the single strongest determinant of poverty incidence in the model, followed by road access and dependency ratio (both $\beta = -0.314$), frequency of extension services ($\beta = 0.248$), household head's education and age ($\beta = -0.215$ each), market access ($\beta = 0.212$), household size ($\beta = -0.208$) and value of livestock ($\beta = 0.186$). Landholding, though statistically significant, had a comparatively modest coefficient ($\beta = -0.074$), suggesting that the mere possession of land contributes far less to poverty reduction than the absence of land contributes to its intensification, an asymmetry with direct implications for how land-based interventions should be designed and sequenced. this is in line with [26] who found that land ownership by inheritance was the most common ownership structure among farmers in southeast Nigeria.

Table 2: Summary of Multiple Regression Results on Determinants of Poverty Incidence

Variables	Standardized Coefficient (beta)	t-value	Significance
Mean distance to nearest road (access)	-0.314	-4.370	0.001**
Dependency ratio	-0.314	-4.370	0.001**
Landlessness	-0.490	-4.660	0.001**
Market access (distance to market)	0.212	2.847	0.007**
Household size	-0.208	-2.827	0.007**
Landholding (ha per HH)	-0.074	-0.732	0.021*
Frequency of extension services	0.248	2.267	0.028*

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Variables	Standardized Coefficient (beta)	t-value	Significance
Education (household head)	-0.215	-2.221	0.032*
Age of household head	-0.215	-2.221	0.032*
Value of livestock population	0.186	-2.139	0.038*
Persons per room	-0.082	-0.841	0.405 (ns)

(** significant at 0.01; * significant at 0.05; ns = not significant). Source: Field Survey, 2025.)

5. Discussion

The spatial pattern of poverty incidence, depth and severity as revealed in this study, increases from south to north and greatest along the border with the Niger Republic, is consistent with the concept of the "spatial poverty trap" described by [17] whereby disadvantageous geography compounds poor infrastructure and low returns to private investments, making it difficult for households in such locations to escape poverty irrespective of individual effort. This finding also conforms with the findings of [8] five theories of poverty, the geographical-disparities theory, which holds that people, institutions and cultures in certain areas lack the objective resources needed to generate well-being and income and lack the political power to claim redistribution; Shaw's [30] observation that "space is not a backdrop for capitalism but is restructured by it" finds concrete expression in the way road density and market proximity, both products of historical state investment decisions, so strongly predict present-day poverty status across Katsina State's Local Government Areas.

The study shows road and market access as determinants of poverty incidence hence corroborates a well-established literature linking infrastructural connectivity to rural welfare [1][12]: where roads are absent, the mobility of people, goods and services is constrained, raising transaction and transportation costs and limiting access to off-farm income, education and health services. This is consistent with the pattern observed in the results, where Katsina, Funtua, Daura and Malumfashi, the four clusters with the best road and market access, also recorded the lowest poverty incidence, depth and severity, while the border LGAs with the least developed transport networks recorded the highest values on all three indices.

The strength of landlessness and landholding as determinants buttresses the importance of land access to rural livelihoods in an agrarian economy such as Katsina State's, though the shows larger coefficient on landlessness relative to landholding suggests an important asymmetry: losing access to land altogether is far more consequential for poverty status than incremental gains in landholding size are for poverty reduction. This implies that land ownership alone, without good roads, irrigation and modern inputs, is insufficient to lift households out of poverty, consistent with the observation that the state's agrarian reform programme has not translated land access into meaningful poverty reduction. The negative association between household size and poverty incidence, contrary to much of the literature that treats large households as a cause of poverty, suggests that household size may

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in this context be better understood as a consequence of, rather than a cause of, poverty status: larger households may, for instance, reflect a deliberate labour-augmenting strategy among farming households, or a correlate of polygyny and social status rather than a direct driver of deprivation. This finding is at variance with some of the individualistic and cultural theories of poverty reviewed by [8] and merits further investigation using panel or longitudinal data capable of establishing causal direction.

The prominently higher land, relative to income, inequality recorded in the northern and central clusters echoes broader findings that geographic marginality and unequal access to productive assets, rather than income poverty alone, portray the poorest rural areas of northern Nigeria [3][31]. The significance of extension-service frequency and household head's education as determinants further supports the capabilities-based, non-welfarist framing of poverty [29] which locates poverty not merely in a deficit of income but in a gap of the capabilities, knowledge, skills and access to services, needed to convert available resources into well-being. A critical look through [8] cyclical theory of poverty, the co-occurrence of poor roads, weak extension coverage, low education and high dependency in the same northern LGAs is also consistent with a self-reinforcing spiral in which each disadvantage compounds the others: poor roads limit market access and extension coverage, which limits agricultural productivity and household income, which in turn limits investment in education and infrastructure, perpetuating the cycle. Breaking such a cycle is unlikely to be achieved through any single intervention and instead requires simultaneous, coordinated investment across several of its linked components.

In all these findings support a policy shifted away from a narrow focus on income transfers toward integrated investment in rural infrastructure, land governance, agricultural extension and human capital, an position consistent with the study's finding that the regression model, built almost entirely on structural and infrastructural rather than purely individual-level variables, explains over 80% of the spatial variation in poverty incidence across the state.

6. Conclusion and Recommendations

This study revealed that rural poverty in Katsina State exhibits a clear and statistically explicable spatial pattern, concentrated in the sparsely populated, agriculturally constrained northern LGAs, and lowest in and around urban centres with good road and market access. Road and market accessibility, dependency ratio, landlessness and household size are the strongest determinants of poverty incidence, with education, household head characteristics, livestock value and extension access playing a secondary but significant role. Geography and public policy together exert a strong influence on the condition of poverty in the state.

Based on these findings, the study recommends:

i. Investment in rural road infrastructure and market linkages in the northern parts of the state to reduce the transaction costs of accessing markets, health and education services.

ii. Investment in irrigation and modern agricultural inputs alongside land-redistribution or land-titling programme, since land access alone has not translated into measurable poverty reduction.

iii. Expanding the agricultural extension services, particularly in the high-poverty central and northern clusters of the state.

iv. Targeted measures to reduce household dependency burdens, including expanded access to family planning and reproductive health services and investment in women's education, given the demonstrated poverty-reducing effect of education.

v. Developing a state-level poverty monitoring framework that periodically updates LGA-level FGT indices to track the impact of interventions over time.

Implementing all these recommendations will offer a pathway to reducing the depth and severity, and not merely the incidence, of rural poverty in Katsina State.

References

[1] Ajakaiye, D. O., & Adeyeye, V. A. (1999). Concepts, measurement and causes of poverty. CBN Economic and Financial Review, 39(4).

[2] Akintuyi, Wunude, Fasona, Omojola, Daodu and Femi Omo (2015): Poverty Mapping of some Selected Communities in Edo State, Nigeria. Lagos Journal of Geo-Information Sciences (LJGIS) LJGIS Volume 2, Number 1 August 2013 Volume 3, August, 2015 Page 6 An International Journal of the University of Lagos

[3] Akinyemi, A. I. (2006). Rural poverty and environmental degradation in Nigeria. Journal of Human Ecology, 20(3), 199–204.

[4] Alex Addae-Korankye (2012): Microfinance: a tool for poverty reduction in developing countries Journal of Business and Retail Management Research (JBRMR) Vol 7 Issue 1 2012

[5] Anyanwu, J. C. (2005). Rural poverty in Nigeria: Profile, determinants and exit paths. African Development Review, 17(3), 435–460.

[6] Awoniyi, O.A. and Salman, K.K. (2012). Non-farm income diversification and welfare status of rural households in the South West Zone of Nigeria. International Food Policy Research Institute (IFPRI) Paper. Pp. 1-14.

[7] Apata, T. G. (2015). Determinants of rural poverty in Nigeria: Evidence from small-holder farmers in South-Western Nigeria. Journal of Science and Sustainable Development, 4, 15–24.

[8] Bradshaw, T. K. (2006). Theories of poverty and anti-poverty programs in community development. Rural Poverty Research Centre Working Paper No. 06-05.

[9] Bruckner, B.; Hubacek, K.; Shan, Y.; Zhong, H.; Feng, K. Impacts of poverty alleviation on national and global carbon emissions. Nat. Sustain. 2022, 5, 311–320. [CrossRef]

[10] Byela Tibesigwa & Martine Visser and Jane Turpie, 2017. "Climate change and South Africa's commercial farms: an assessment of impacts on specialised horticulture, crop, livestock and mixed farming systems," Environment, Development and Sustainability: A

Multidisciplinary Approach to the Theory and Practice of Sustainable Development, Springer, vol. 19(2), pages 607-636,

[11] Central Bank of Nigeria [CBN]. (2013). Poverty mapping study in Nigeria. CBN in collaboration with the World Bank.

[12] Ellis, F. (2000). Rural livelihoods and diversity in developing countries. Oxford University Press.

[13] Fox, J. (2015). Applied Regression Analysis and Generalized Linear Models (3rd ed.). Sage Publications

[14] Glasmeier, A. K. (2002). One nation, pulling apart: The basis of persistent poverty in the USA. Progress in Human Geography, 26(2), 155–173.

[15] Gummi,U. M. And Asiyamu'azu (2018): Income Determinants of Small Scale Farmers in Wamakko Local Government Area of Sokoto- Nigeria International journal of Humanities and social science inventions vol- 7 issue 01 2018

[16] Imran, M., Ali, A. and Iqbal, M. (2009). Poverty line determination and its correlates. Journal of Applied Sciences Research, 5(8), 1015–1019.

[17] Jalan, J., and Ravallion, M. (1997). Spatial poverty traps? Policy Research Working Paper. The World Bank.

[18] Malaolu, V., & Ogbuabor, J. E. (2013). Training and Manpower Development, Employee Productivity and Organizational Performance in Nigeria: An Empirical Inves-tigation. International Journal of Advances in Management and Economics, 2, 163-177.

[19] Mengxiao Liu , Yong Ge, Shan Hu and Haiguang H (2023): The Spatial Effects of Regional Poverty: Spatial Dependence, Spatial Heterogeneity and Scale Effects 2023, International journal of Geo-Information.

[20] Mohammad Zaki Bin Che Aat, Dr Faridah Jaafar (2025):Addressing Poverty Through Sustainable Development Goal 1: Progress, Challenges, and Opportunities. Internatioal journal of research and innovation in social sciences vol-ix issue IV 2025.

[21] National Bureau of Statistics (2021). Poverty and Inequality in Nigeria 2020. https:// nigerianstat.gov.ng/pdfuploads/Poverty_and_Inequality_in_Nigeria_2020.pdf

[22] Ogwumike, F. O., & Akinnibosun, M. K. (2013). Macroeconomic policy and pro-poor growth in Nigeria. Journal of Economics and Sustainable Development, 4(4), 1–13

[23] Okere, C. P.,& Shittu, A. M. (2012).Patterns and Determinants of Livelihood Diver sification among Farm House holds in Odeda Local Government Area, Ogun State, Nigeria. Paper Presented at the Nigerian Association of Agricultural Economist Conference held at Obafemi Awolowo University, Ile-Ife between 25-27 September, 2012. Theme: Agriculture in the National Transformation Agenda:The Policy Mix.

[24] Olawepo, A. R. (2010). Determining rural farmer's income: A rural Nigeria experience. Journal of African Studies and Development, 2(4),99-108.

[25] Omonona, B. T. (2001). Poverty and its correlates among rural farming households in Kogi State, Nigeria. Unpublished PhD thesis, University of Ibadan..

[26] Onya, C. O., Ajah, J., & Ugwuanyi, O. (2019). Gender and land access in Nigeria: Implications for agricultural development. Journal of Gender Studies in Agriculture, 4(2): 123–136.

[27] Ravallion, M. On measuring global poverty. Annu. Rev. Econom. 2020, 12, 167–188. [CrossRef]

[28] Sallawu H., Tanko L., Nmadu J.N.& Ndanitsa A.M. (2016). Determinants of income diversification among small-scale farmers in Niger State, Nigeria. RJOAS, 2(50), 55-64.

[29] Sen, A. (1999). Development as freedom. Alfred A. Knopf.

[30] Shaw, W. (1996). The geography of United States poverty. Routledge.

[31] Umar Abubakar (2019) : Spatial Pattern of Rural Poverty in Katsina State, Nigeria An Unpublished Thesis Submitted to the Department of Geography, Umaru Musa Yar'adua University Katsina in Partial Fulfillment of the Requirements for the Award of Degree of Doctor of Philosophy (PhD) in Geography 2019

[32] United Nations Development Programme [UNDP]. (2013). Human Development Report 2013. UNDP.

[33] World Bank. (2022). Poverty and shared prosperity 2022: Correcting course. World Bank. https://doi.org/10.1596/978-1-4648-1893-6

[34] World Bank. (2021). Digital Dividends: Poverty Reduction through Connectivity. World Bank Publications.

[35] Yamane, T. (1964). Statistics: An introductory analysis (2nd ed.). Harper and Row.