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SPECIAL ISSUE: CELEBRATING 20 YEARS OF GEOGRAPHY IN KADUNA STATE UNIVERSITY - ADVANCES AND FRONTIERS IN GEOGRAPHY

Community Perception on The Effect of Rural Road Development on Poverty Reduction and Social Inclusion in Yobe North District, Yobe State, Nigeria

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ABSTRACT

Nigeria has made significant strides toward rural infrastructure development, recognizing roads as vital conduits for poverty reduction and social integration. Despite these efforts, rural areas, particularly in the northern Yobe district, still have poor road conditions, which severely limit access to markets, healthcare, and education. This study evaluated the effects of rural road development on poverty reduction and social inclusion in the northern Yobe District. The study obtained data from a questionnaire administered to 400 respondents using purposive sampling techniques. The questionnaire was designed to solicit responses from the respondents on a 5-point scale. The data obtained were analysed using simple percentages and means as well as regression analysis using SPSS. The results revealed that the impact of rural road development on poverty reduction has a generally positive effect on roads, with a grand mean of 2.95. Similarly, the results concerning the role of rural road development in social inclusion indicate a positive impact with a grand mean of 2.91. However, poor funding, corruption, delays in contract execution, and poor project planning remain critical obstacles in road projects. However, the results of the regression analysis indicated no significant relationship (p-value = 0.50) between the dependent and independent variables. The study recommended that the state government, in collaboration with the federal government and SUKUK, should allocate more funds for the construction and maintenance of rural roads to increase access to markets, reduce transportation costs, and create more economic opportunities to increase social inclusion.

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1 Introduction

Nigeria, as a country, has made significant strides in rural infrastructure development, recognizing roads as vital conduits for poverty reduction and social integration. Despite these efforts, rural areas, particularly in the northern Yobe district, remain underdeveloped, with poor road conditions that severely limit access to markets, healthcare, and education. Various empirical studies, notably Yusuf (2024), have consistently shown that inadequate infrastructure entraps rural populations in a cycle of economic and social exclusion, underscoring the necessity for targeted interventions even though investments in rural road networks have measurable impacts on household welfare. Aderogba and Adegboye (2019) applied an ARDL model to demonstrate that road improvements correlate with increases in household income, consumption, and poverty reduction, although long-term maintenance is critical for sustaining such benefits.

Similarly, Akinlolu and Maina (2020) analysed disaggregated government expenditures and reported that allocations to road infrastructure have a significant long-term negative effect on poverty headcounts, reinforcing the strategic importance of public investment in rural roads. However, Olawale (2025) broadens this perspective by illustrating that public spending on social community services, including road infrastructure, substantially improves rural living conditions. These results emphasize that roads not only serve an economic function but also act as catalysts for multidimensional enhancements in social welfare. At the policy level, the Rural Access Agricultural Marketing Project–Scale up (RAAMP-SU), backed by the World Bank, allocates US$500 million (plus US$100 million from the Nigerian government) to rehabilitate and maintain 6,500 km of rural roads and strengthen institutional capacity (World Bank, 2024). The project explicitly targets economic inclusion, such as reduced transport costs, increased farm-gate pricing, and job creation, as well as social inclusion, including improved women's access to healthcare and markets.

Consequently, rural infrastructure, especially road networks, is widely acknowledged as a catalyst for achieving SDG 1 (no poverty) in Nigeria, which hinders leaders from even having access to people at the grassroot

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level, who are the main victims of poverty in Nigeria, and a lack of access poses a challenge to production activities in rural areas (Nwambuko et al., 2023). In the same vein, Nwokocha and Onwukwe (2021) emphasize that access to reliable road networks does more than facilitate trade; it enhances social mobility and community participation. Thus, it is increasingly important to note that transport systems support a wide variety of activities, ranging from commuting to the supply of energy and the distribution of goods and services (Lawan, 2018). Therefore, provision of efficient, safe, and sustainable transport is fundamental for economic growth and the development of regional integration, access to essential public services such as health and education, as well as access to labour markets and gender equality (Lawan, 2022). The study further demonstrated how improved roads enabled residents, particularly women and youth, to engage more actively in political, social, and economic activities. These findings point to a link between infrastructure and social inclusion, an area that deserves deeper investigation in the context of Yobe North, where road access remains limited and social inequality is prevalent.

On the other hand, Nseobot (2023) conducted a national study to assess how rural roads affect poverty and included indicators such as income, access to healthcare, and education. Godowoli (2024) argues that the quality and sustainability of road projects are just as important as their presence. The study highlighted how poorly executed road projects in northern Nigeria often lead to short-term gains followed by long-term deterioration, reversing earlier development benefits. Akpan (2013) stresses the importance of impact assessment mechanisms in measuring rural infrastructure outcomes. Their work revealed that many road-development projects in Nigeria lack clear evaluation frameworks, making it difficult to determine their actual effects on poverty and social inclusion.

Generally, a well-connected road network enables small-scale entrepreneurs to sell their products beyond their local markets and potentially increases their income as well as stimulates local economies (Tiwari & Shukla, 2024). Therefore, the provision of road infrastructure not only lowers the physical barrier between places but also stimulates the movements of people, goods, and services, improves access to markets, social services, and employment by reducing the overall transportation times and costs (Motamed et al., 2014; Ng et al., 2019). In fact, accessibility depends to a large extent on the availability of a good quality road network to deliver, operate, and manage at best competitive advantage (Muhammad, 2018). These benefits support poverty reduction and enhance social inclusion, particularly for women, children, and other vulnerable groups.

The Northern Yobe district continues to experience widespread infrastructure deficits, particularly in rural road connectivity. Many communities remain isolated, making it difficult for residents to access basic services or participate in economic activities. Poor road conditions increase travel time and transport costs, discourage investment, and limit access to health and education facilities. These challenges contribute to deepening poverty and exclusion from social and economic life. Despite government investments and programs such as RAAMP-SU, there is a lack of empirical evidence on the specific impacts of these initiatives in Yobe North, creating a knowledge gap in policy and implementation. Therefore, this study aimed to evaluate the impact of rural road development on poverty reduction among households, assess the role of rural road development in promoting social inclusion within communities, and evaluate the challenges and effectiveness of rural road development in enhancing sustainable livelihoods in the northern Yobe Senatorial District.

2 Materials and Methods

2.1 Study Area

The Yobe North Senatorial district lies between latitude 12° 00′ and 13° 00′ N, and between longitudes 11° 30′ and 10° 30′ E. It is located in northeastern Nigeria, specifically Yobe State, Nigeria. The zone covered a total land area of approximately 45,502 km^2, and the district consists of the following local government areas: the Jakusko, Bade, Karasuwa, Nguru, Machina, and Yusufari local government areas (Figure 1).

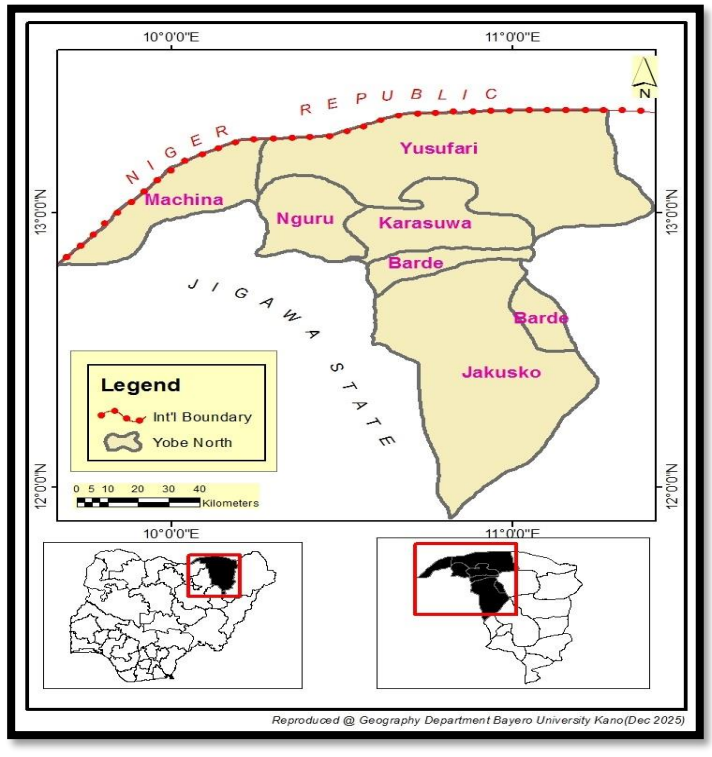

Figure 1: Yobe North District
Source: Department of Geography, BUK (2025)

The district shares boundaries with the Niger Republic to the North, Borno State to the east, Bauchi and Jigawa States to the west, and Gombe State to the south. The total number of people living in the area is 1,281,200 (National Population Commission [NPC], 2006), with Kanuri, Fulani, Bade, Hausa, and Manga being the predominant ethnic groups living in the area. The major economic activities in the area are agriculture, tourism, small-scale industrial activities, and other commercial activities.

2.2 Data sources

The research was designed to collect quantitative data via questionnaires, where a total of 400 respondents (households) were used as samples for the study. The purposive sampling technique (PST) was employed to select three local governments in the six Senatorial districts. The population of households in the three selected areas across the Senatorial districts was 186,455 (Yobe State Government, 2016). This population was used for the study. To determine the sample size, Yamane's (1967) adjusted formula was used on the basis of the calculation of a given population variance from a dichotomous variable at $\pi = 0.50$ and a z score at the 0.05 significance level. The formula is expressed in Eqn. (1):

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

where N is the population size, e is the margin of error (in decimal; e.g., 0.05 for 5%), and n is the required sample size (usually rounded up to the nearest whole number). Therefore,

$e^2 = 0.05^2 = 0.0025$

and, Compute $N * e^2$

$N \times e^2 = 186455 \times 0.0025 = 466.1375$

Then, add 1 to obtain the denominator

$1 + 466.1375 = 467.1375$

Compute the final fraction,

$$\frac{186455}{467.1375} = 399.18$$

Therefore, the sample size is 400

Based on this calculation, 400 respondents (households) were used for the study and were shared proportionately among the three selected areas. A systematic random sampling technique was employed to identify the respondents at each of the study sites. The respondents across the whole study area were selected at an interval of seven houses each, except Machina, where the respondent interval was four due to its population.

2.3 Data Analysis

The data obtained were analysed via descriptive and inferential statistics, including means, standard deviations, ANOVA, and regression analysis, in the Statistical Package of Social Sciences version 25.

3 Results

3.1 Spatial distribution and patterns of UHI hotspots

Table 1 presents the demographic characteristics of the respondents in Yobe Northern District, and the results indicate that males (almost 7 out of 10 respondents) are more involved in agricultural production, processing, and marketing than their female counterparts are, which is in line with the existing cultural landscape. These activities are highly dependent on road infrastructure. This finding is in agreement with that of Galadima (2011), who argued that men in northern Nigeria are often the major users of rural roads for transporting farm produce to markets.

In terms of age, the largest group of respondents (40.0%) was aged 36–45 years, followed by those aged 46–555 years (21.0%), (20.0%) aged 18–25 years and 26–35 years (17.5%), indicating that the majority were in their productive years. This age distribution is important because younger and middle-aged adults are more likely to utilize road infrastructure for farming, trading, and accessing services. Gachassin et al. (2022) reported that rural road projects particularly benefit working-age populations by facilitating access to income-generating opportunities.

The education distribution revealed that most respondents had primary education (37.5%) or secondary education (29.5%), whereas those without formal education accounted for 22.5%, or tertiary education (10.5%). This indicated that there was a moderate literacy level in the study area. Literacy enables rural dwellers to better appreciate and maximize the benefits of infrastructure projects. This aligns with Mikou et al. (2019), who emphasized that education increases awareness and effective use of rural development interventions.

The household income results indicate that 45.0% and 37.5% of the respondents fall within the high-income category, whereas those reporting medium incomes between 15.0% and 2.5% indicate low incomes. This suggests that rural road projects may have improved household earnings by reducing travel time and transport costs, thereby increasing market access. Olawale (2025) similarly reported that road infrastructure has a direct effect on improving rural household incomes in northern Nigeria. The socioeconomic profile of the respondents shows that the study is dominated by active, moderately

educated, and economically engaged individuals, providing a strong basis for evaluating the effects of rural road development on poverty reduction and social inclusion.

Table 1: Sociodemographic characteristics of the respondents

	Variables	Frequency	Percentage
Gender	Male	260	65
	Female	140	35
	Total	**400**	**100**
Age	18–25 years	80	20
	26–35 years	70	17.5
	36–45 years	160	40
	46-55 years	84	21
	56 years & above	6	1.5
	Total	**400**	**100**
Marital Status	Single	80	20
	Married	280	70
	Divorced/Widowed	40	10
	Total	**400**	**100**
Education	No formal education	90	22.5
	Primary	150	37.5
	Secondary	118	29.5
	Tertiary	42	10.5
	Total	**400**	**100**
Occupation	Farming	150	37.5
	Trading	86	21.5
	Civil Service	64	16
	Artisan/Other	100	25
	Total	**400**	**100**
Household Size	1–5 persons	99	24.8
	6–10 persons	121	30.3
	Above 10 persons	180	45
	Total	**400**	**100**
Monthly Income	Less than ₦20,000	10	2.5
	₦20,001–₦50,000	60	15
	₦50,001–₦100,000	180	45
	Above ₦100,000	150	37.5
	Total	**400**	**100**
Length of Stay	5 years	70	17.5
	6–10 years	99	24.8
	Above 10 years	231	57.7
	Total	**400**	**100**

Table 2 shows that the impact of rural road development on poverty reduction among 400 respondents has a generally positive effect, with a mean of 2.95 and a grand standard deviation of 1.00. The respondents agreed that road development increased household income (Mean = 2.98, SD = 1.01), improved access to markets (Mean = 2.95, SD = 1.00), created employment opportunities (Mean = 2.97, SD = 1.02), enhanced agricultural productivity (Mean = 2.95, SD = 1.00), reduced transport costs (Mean = 2.95, SD = 1.01), and improved access to economic services (Mean = 2.95, SD = 1.00).

Table 2: Impact of rural road development on poverty reduction among households in Yobe North.

S/N	Item Statements	HI	M	L	NI	N	Mean	STD	Remarks
1	Increase in household income	160	130	70	40	400	2.98	1.01	Positive
2	Improved access to markets	150	140	70	40	400	2.95	1.00	Positive
3	Increase in employment opportunities	165	120	80	35	400	2.97	1.02	Positive
4	Enhance agricultural productivity	150	130	80	40	400	2.95	1.00	Positive
5	Reduction in transportation cost	155	130	70	45	400	2.95	1.00	Positive
6	Improve access to economic services	150	135	80	35	400	2.95	1.00	Positive
	Grand Mean						**2.95**	**1.00**	

Keywords: HI= High impact: M= Moderate impact: L=Low impact: NO= Not impact

These results indicate that rural road development has significantly contributed to poverty reduction in the district, with moderate variation in respondents' perceptions. This finding supports Nseobot (2023), who reported that rural road development enhances access to markets and reduces the cost of agricultural distribution. Similarly, Nwokocha and Onwukwe (2021) on reduction in rural communities because it improves economic participation and creates opportunities for wealth creation. Thus, rural road development projects in Yobe North Senatorial District appear to have a positive impact on poverty reduction by making rural livelihoods more sustainable and inclusive. The findings of this study align with the literature that rural infrastructure, particularly road development, plays a crucial role in poverty alleviation and social inclusion. Improved road networks reduce travel time and costs, which directly support farmers, traders, and households in improving their income. Furthermore, better roads promote access to education and healthcare, thereby strengthening human capital development.

Table 3 shows that the role of rural road development in social inclusion among 400 respondents has a positive impact, with a grand mean of 2.91 and a grand standard deviation of 0.99. The results revealed that rural roads improved participation in community activities (mean = 2.90), increased access to education (mean = 2.91), increased interaction among groups (mean = 2.92), improved access to healthcare and social services (mean = 2.91), strengthened the sense of belonging (mean = 2.90), and promoted gender and youth participation (mean = 2.92).

These findings suggest that road development has moderately enhanced social inclusion in the district. This is consistent with Godowoli (2024), who observed that rural transport systems are central to bridging the gap between remote communities and urban centers, thereby promoting inclusiveness. Similarly, Akinlolu and Maina (2020) emphasized that rural infrastructure is not only about economic gain but also about social well-being, as it enables residents to access education, healthcare, and social networks. The findings also confirm that social inclusion is fostered when rural communities are better connected to markets, schools, and public services, increasing their participation in socioeconomic activities. Therefore, road development projects in Yobe North Senatorial District have contributed to reducing social exclusion by improving connectivity and enhancing participation in community life.

Table 3: Role of rural road development in promoting social inclusion within communities in Yobe North

S/N	Item Statements	SA	A	D	SD	N	Mean	STD	Decision
1.	Improved participation in community activities	140	136	85	39	400	2.90	0.99	Accepted
2.	Enhancing access to educational opportunities	150	125	85	40	400	2.91	0.99	Accepted
3.	Increases interaction among different groups	148	128	86	38	400	2.92	1.00	Accepted
4.	Better access to healthcare and social services?	147	127	87	39	400	2.91	0.98	Accepted
5.	Strengthened sense of belonging in the community?	146	129	88	37	400	2.90	0.99	Accepted
6.	Improved gender and youth participation in social life	144	130	90	36	400	2.92	0.00	Accepted
	Grand Mean						**2.91**	**0.99**	

Keywords: SA= Strongly Agree: A= Agree: D=Disagree: SD= Strongly Disagree.

Table 4 shows the results of the challenges and effectiveness of rural road development among 400 respondents, indicating that poor funding (24.8%), corruption/delays in contract execution (19.5%), and poor project planning (16.5%) are the major obstacles, whereas community resistance (14.8%) and inadequate maintenance (14.2%) are moderate challenges, and seasonal flooding (10.2%) is a minor issue. These findings suggest that financial constraints, management inefficiencies, and corruption are the most significant barriers to effective rural road development in the district. These findings are in line with those of Yusuf (2024), who reported that road projects in northern Nigeria often fail to achieve long-term goals because of neglect and a lack of proper maintenance. Similarly, Aderogba and Adegboye (2019) noted that without adequate financing and monitoring, rural road projects may deteriorate quickly, reversing the gains made in poverty reduction and social inclusion. Thus, while rural road projects are beneficial, their effectiveness in the Yobe North Senatorial District is limited by persistent structural and financial challenges that must be addressed for sustainable development.

Table 4: Challenges and effectiveness of rural road development in enhancing sustainable livelihoods in Yobe North Senatorial District

Variables	Frequency	Percentage	Remakes/Severity
Poor funding of the road project	99	24.8	Major
Inadequate maintenance	57	14.2	Minority
Seasonal flooding	41	10.2	Moderate
Poor project planning	66	16.5	Moderate
Community resistance	59	14.8	Majority
Corruption delays contract execution	78	19.5	Majority
Total Respondents	**400**	**100**	

However, the persistence of challenges such as inadequate funding and poor maintenance threatens the sustainability of these projects. These challenges indicate that while rural road development is effective in reducing poverty and promoting inclusion, without proper maintenance strategies, the benefits may not be long-term.

No significant relationship (p-value = 0.50) was found between the impact of rural road development on poverty reduction among households (dependent) and challenges and the effectiveness of rural road development in enhancing sustainable livelihoods (independent), given a multiple correlation coefficient (multiple R) of 34.4% and a coefficient of determination (r2) of 11.8% (Table 5). This finding indicates that the challenges and effectiveness of rural road development in enhancing sustainable livelihoods in Yobe North Senatorial District (independent variables) can only predict the impact of rural road development on poverty reduction among households in Yobe North by approximately 34%, assuming that intercepts are included in the equation and can explain up to 12% of the impact. The adjusted r^2 of -10% is said to clarify the issues that arise from the addition of a new variable. Any addition of

an independent variable will have a negative effect on the coefficient of determination. This can be seen from the F critical value of 0.1980069, which indicates that the challenges and effectiveness of rural road development in enhancing sustainable livelihoods in the study area are low. These findings indicate that the challenges associated with rural road development have less of an impact on poverty reduction among households in Yobe North. Thus, there is a fairly equitable investment in the development of rural roads in the study area, which enhances the livelihood of the community.

Table 5: Model Summary of Regression Statistics

Multiple R	0.34426398
R Square	0.118517688
Adjusted R-Square	-0.10185289
Error of the Estimate	0.013952085
F Critical value	0.1980069
p- value	0.5040047160

Therefore, rural road development is key to achieving economic growth and social inclusion; without this development, effectiveness in markets, health care, and education becomes difficult. This finding corroborated the studies by Fan et al. (1999) and Fan et al. (2004) on public expenditure, growth, and poverty reduction in rural Uganda, who reported that investment in rural roads was the highest or second-highest return and lifted more people out of poverty than any other form of public expenditure. Additionally, the study agrees with the findings of Nakamura et al. (2019) on rural roads, poverty, and resilience evidence from Ethiopia, where their study established that rural road development contributed significantly to the welfare of rural households and increased their resilience to adverse weather shocks. This, according to Lawan (2018), makes the transport system an essential part of human activity, which forms the basis of all socio-economic interaction.

4 Conclusion

The study concludes that rural road development projects in Yobe North Senatorial District have positively impacted poverty reduction and social inclusion by contributing to access to markets, reducing transportation costs, and creating economic opportunities. The rural road projects enhanced social inclusion by improving access to schools, hospitals, and government services, as well as fostering stronger community interactions. Despite these benefits, challenges such as poor funding for road projects, corruption, delays in contract execution, and poor project planning remain critical obstacles. The success of rural road development, therefore, depends not only on road construction but also on sustainable maintenance and community participation. Based on the conclusions of the major findings, the study recommended that the state government, in collaboration with the federal government, should allocate more funds to the construction and maintenance of rural roads to continue sustaining more access to markets, reduce transportation costs, and create more economic opportunities. The state government, in collaboration with the federal government and nongovernmental organizations such as SUKUK, should continue to provide more roads to rural areas to enhance social inclusion by improving access to schools, hospitals, and government services, as well as fostering stronger community interactions. Lastly, the state ministry of work and the federal road maintenance agency should intensify proper monitoring and evaluation mechanisms to track the effectiveness of road development projects in poverty reduction and social inclusion.

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