RANKING OF INFRASTRUCTURAL DEVELOPMENT AND ITS EFFECT ON POVERTY REDUCTION IN ONDO CITY, NIGERIA

Tope R. Oziegbe, Monday I. Egharevba, Ighiwiyisi R. Irughe[1] & Oluwatope A. Samuel[2]

Department of Economics[1]
Adeyemi Federal University of Education, Ondo, Nigeria
oziegbetope@yahoo.com, egharevbami@aceondo.edu.ng,
irugheir@afued.edu.ng

Department of Accounting[2]
Adeyemi Federal University of Education, Ondo, Nigeria
ayomidesamuel1998@gmail.com

Abstract

This study examines the relationship between infrastructural development and poverty reduction in Ondo City, Nigeria, with a particular focus on how households rank different infrastructure sectors and how these perceptions align with poverty outcomes. Using primary survey data collected from 300 households, the study integrates descriptive analysis with econometric modelling to capture the welfare relevance of infrastructure ranking from the perspective of lived household experiences. Non-income poverty is measured using a Principal Component Analysis (PCA)-based index constructed from indicators of education, health, road, and electricity deprivation, while monetary poverty is proxied using households' self-reported income changes. The core explanatory variables are households' perceived rankings of road, electricity, and water, sanitation and hygiene (WASH) infrastructure. The results reveal that perceived improvements in electricity and road infrastructure are significantly associated with lower income poverty in the study area. In contrast, WASH infrastructure perceptions are shown to display an insignificant association with poverty. The findings demonstrate that households' perceptions of infrastructure are closely aligned with tangible welfare outcomes, and that infrastructure sectors imposing frequent and visible economic constraints are ranked as most poverty-reducing. It is therefore recommended that poverty-oriented infrastructure strategies in Ondo City prioritise electricity and roads, among others.

Keywords: Electricity reliability, Infrastructural development, Nigeria, Ondo City, Poverty reduction, Road connectivity, WASH services.
JEL Codes: 018, R50, I32

1. Introduction

Poverty continues to afflict Ondo City, even as Ondo State outperforms many other Nigerian states in overall poverty reduction. The 2022 Nigeria Multidimensional Poverty Index report found that 27 per cent of Ondo State's population experienced multidimensional poverty well below the national average of 63 per cent (Adeleke et al., 2022). Nevertheless, urban areas like Ondo City face entrenched deprivation, with many residents lacking reliable access to quality education, healthcare, safe housing, and consistent income. Such

multidimensional poverty is exacerbated by rapid urbanisation and infrastructure deficits (Adeleke et al., 2022).

Extensive research underscores the importance of infrastructure in reducing poverty. Owolabi et al. (2024) identified electricity access as a critical determinant in narrowing income inequality in Nigeria, finding significant short-term impacts (Owolabi et al., 2024). Similarly, Pelz et al. (2023) demonstrated that reliable electricity supply in peri-urban Nigeria directly enhances productivity and well-being for households and SMEs (Pelz et al., 2023). Economic research also shows that infrastructure investments, especially in roads, can boost smallholder incomes and market access (World Bank, 2024). Ondo City faces pressing infrastructure challenges. The transportation infrastructure in Nigeria is similarly weak, with over 70 per cent of roads in poor condition, a major constraint on trade and mobility (BusinessDay, 2025). Without urgent infrastructure upgrades, these conditions maintain cycles of deprivation in cities like Ondo.

This study seeks to evaluate and rank the impact of road, electricity, and water/sanitation infrastructure on poverty reduction in Ondo City. Utilising primary survey data alongside state-level infrastructural indicators, the study assesses each type's influence on key poverty dimensions such as income, health, education, and employment. A ranking methodology will determine which infrastructure investments deliver the most substantial poverty-reducing effects in an urban Nigerian context.

2. Literature Review

Conceptual Review

The concept of infrastructural development encompasses the provision of fundamental facilities and systems such as transportation, electricity, water supply, and sanitation, all of which are essential for socio-economic growth. According to Manggat, Zain, and Jamaluddin (2018), infrastructure directly influences the quality of life in communities by improving access to essential services, boosting economic activity, and promoting social well-being. Infrastructure also enables connectivity between rural and urban areas, facilitating trade, mobility, and access to markets (Lokesha & Mahesha, 2017). In the context of poverty reduction, the role of infrastructure is twofold: it provides immediate improvements to living conditions (e.g., access to clean water and electricity), while also fostering long-term economic opportunities through enhanced productivity and market integration (Ajayi, 2019). Water, sanitation, and hygiene (WASH) services are particularly critical; UNICEF (2022) reports that lack of access to sanitation disproportionately affects the poorest households, deepening inequalities and limiting progress in poverty alleviation. Conceptually, therefore, infrastructure serves as both an enabler of economic empowerment and a vital component of human development, making it central to sustainable poverty reduction strategies.

Brief Empirical Review

Numerous empirical studies have demonstrated a strong link between infrastructure investment and poverty reduction, both globally and within Nigeria. Adeniyi et al. (2018) found that rural-urban households in Nigeria overwhelmingly prefer nighttime electricity access, underlining the importance of

reliable energy for enhancing living standards. Similarly, Lawal and Imoukhuede (2018) showed that dependable electricity in peri-urban Nigeria significantly boosts household productivity, welfare, and small-business operations. These findings align with historical data from the Nigerian energy crisis literature, which reports that only about 45 per cent of households are connected to the national grid, with approximately 85 per cent of the population experiencing frequent power outages (Wikipedia: Nigerian energy supply crisis, 2025). In addition to energy, road infrastructure has emerged as a key determinant of poverty reduction. The World Bank (2024) reports that over 60 per cent of Nigeria's roads are in poor condition, severely limiting market access and increasing transport costs for low-income communities. These findings are supported by Lokesha and Mahesha (2017), whose study in Karnataka, India, demonstrated that improved road connectivity significantly lowers transportation costs, enhances market access, and boosts agricultural productivity.

The link between water-sanitation infrastructure and socio-economic outcomes is equally well-documented. Ajayi (2019) found that improved WASH services in Nigeria have a long-term positive effect on per-capita GDP, with sanitation upgrades offering the highest marginal contributions. The UNICEF (2022) WASH survey revealed that the poorest households are up to ten times less likely to access adequate sanitation services, reinforcing the notion that infrastructural inequality exacerbates economic disparities. However, despite the clear benefits of infrastructure investment, numerous studies highlight systemic barriers to effective delivery.

A cohort study across rural Africa, including Nigeria, found that connection to solar mini-grids quadrupled incomes in just one year, outperforming traditional grid-based investments in isolated communities (Uhunmwuangho & Ekpu, 2021). Manggat et al. (2018) emphasised that the success of infrastructure investments depends not only on physical delivery but also on community involvement, proper maintenance, and institutional support. These insights underscore the importance of considering both infrastructure quality and institutional capacity in assessing how infrastructural development contributes to poverty reduction, principles that form the methodological foundation of the current study.

Theoretical Framework

The Basic Needs Theory, developed by Paul Streeten and colleagues (Streeten et al., 1981), provides a relevant lens through which to understand the relationship between infrastructural development and poverty reduction. The theory argues that economic development must focus not merely on income growth but on ensuring that people's fundamental needs, such as food, shelter, water, healthcare, education, and security are met. Infrastructure plays a central role in fulfilling these basic needs. For instance, access to *clean* water and sanitation reduces disease prevalence, roads improve access to markets and healthcare, and electricity enables education and enterprise. In Ondo City, where poverty is multidimensional, improving infrastructure directly supports these critical needs, aligning perfectly with the Basic Needs approach. Thus, by prioritising infrastructure investments that address these basic needs, policymakers can create an environment where poverty reduction is more sustainable and inclusive.

A second relevant theory is the Endogenous Growth Theory, advanced by Romer (1986) and further refined by Lucas (1988). This theory posits that investments in human capital, innovation, and knowledge are key drivers of long-term economic growth and that public infrastructure is a crucial enabler of these factors. Roads, electricity, and water systems reduce transaction costs and enable productivity in businesses and households, which in turn fosters innovation and skills development. In the context of Ondo City, improving infrastructure facilitates greater participation in the local economy, enhances access to educational opportunities, and strengthens the region's human capital base, all of which contribute to long-term poverty alleviation and sustainable economic growth.

Therefore, both the Basic Needs Theory and the Endogenous Growth Theory provide strong theoretical foundations for understanding why and how infrastructural development can drive poverty reduction in Ondo City.

3. Methodology

Study Area and Subjects

The research was conducted in Ondo City, located within the Ondo West Local Government Area of Ondo State, Nigeria. Ondo City is a rapidly urbanising urban centre in south-western Nigeria and serves as both a commercial and administrative hub. The city has a population exceeding 300,000 residents and is experiencing growing population pressures alongside notable infrastructural challenges.

Although Ondo State records a relatively low Multidimensional Poverty Index (MPI) headcount of 27% (NBS, 2022), pockets of severe poverty persist in Ondo City, especially in its low-income neighbourhoods. These communities often endure poorly maintained roads, unreliable electricity supply, and inadequate access to potable water and improved sanitation facilities, which collectively limit economic opportunities and aggravate urban poverty.

The study focused primarily on residents of these low-income areas, as they are disproportionately affected by infrastructural deficits as well as by any subsequent improvements. In addition, key informants including local government officials, urban planners, and community leaders, were engaged to provide insights into the city's infrastructure planning, implementation processes, and service-delivery challenges.

Data Collection

A mixed-methods approach was employed to obtain comprehensive data on the relationship between infrastructural development and poverty reduction in Ondo City. The quantitative component involved the administration of structured questionnaires to residents across selected low-income neighbourhoods, capturing information on access to different types of infrastructure, perceived quality of services, income levels, employment status, education, health outcomes, and overall household well-being. These data provided the basis for statistically examining the links between infrastructure and multidimensional poverty.

Data Analysis

The quantitative data collected through resident surveys were subjected to statistical analysis using software such as SPSS or Stata. Techniques included descriptive statistics to summarise key variables, and regression analysis to

examine the relationship between different dimensions of infrastructural development and poverty indicators. In particular, the study applied multivariate regression models to isolate the effects of specific types of infrastructure (e.g., roads, electricity, and water supply) on poverty outcomes.

This study empirically examines the relationship between perceived rankings of infrastructure sectors and poverty outcomes in Ondo City, Nigeria. Consistent with the study's objectives, two complementary poverty dimensions are analysed: non-income (multidimensional) poverty and monetary (income) poverty. Estimating separate models for each poverty dimension allows the analysis to capture both capability-based deprivations and income-based welfare constraints, in line with contemporary development economics literature.

Given the cross-sectional nature of the survey data, the baseline empirical relationship is specified as a reduced-form linear model:

$$P_i = \alpha + \beta_1 I_i^{(k)} + \gamma' X_i + \varepsilon_i \qquad (1)$$

where: P_i denotes the poverty outcome for the household i, $I_i^{(k)}$ represents the perceived ranking of the infrastructure sector with $k \in \{\text{Roads, Electricity, WASH}\}$, X_i is a vector of household socio-demographic controls included in the model, and ε_i is the stochastic error term capturing unobserved influences on poverty.

The dependent variable in equation (1) is measured in two forms. The first is non-income or non-monetary (multidimensional) poverty. This was measured using a Principal Component Analysis (PCA)–based composite index, which was constructed from indicators that capture deprivations in education, health, road access, and electricity access. The PCA approach aggregates correlated welfare indicators into a single index that reflects underlying multidimensional deprivation while reducing dimensionality and measurement noise. Higher values of the index indicate greater non-income poverty. This approach is widely used in contexts where income data alone inadequately captures welfare and living standards.

The second measure is monetary (income) poverty, which was proxied using a household income-based income deprivation measure derived from the questionnaire item that inquired that sought to know how households' overall income has changed in the last three years. Option "improved" is scored zero, option "stayed the same" is scored 1 and option "worsened" is scored 2. Thus, the variable is coded such that higher values correspond to greater income poverty in a household. This measure captures households' ability to meet basic consumption needs through market income and complements the multidimensional poverty index.

The core explanatory variables in the model are households' perceived rankings of infrastructure sectors. First is road infrastructure (*Road*), which captures respondents' ranking with higher values indicating more favourable perceptions of road infrastructure. Second is electricity infrastructure (*Electricity*), which measures households perceived performance or improvement of electricity, with higher values denoting more positive perceptions. Third is Water, Sanitation and Hygiene (WASH), which reflects respondents perceived condition or

improvement of water and sanitation infrastructure with higher values indicating better perceived WASH infrastructure. These variables are treated as ordinal or quasi-continuous indices derived from survey responses. The vector X_i in (1) includes standard socio-demographic controls commonly associated with poverty outcomes.

The models are estimated using Ordinary Least Squares (OLS) with robust standard errors. Although the infrastructure ranking variables are perception-based, OLS provides consistent estimates under the assumption of linear conditional expectations and is standard in applied welfare analysis using composite indices.

4. Data Presentation and Analysis

Background Information

This study draws on primary data obtained from a survey of 300 respondents in Ondo City. In Table 1, the socio-economic information of the respondents is presented. The age distribution indicates a relatively young and economically active population. Respondents aged 26–35 years constitute the largest share (36.3%), followed by those aged 18–25 years (23.0%) and 36–45 years (22.0%). These age cohorts account for over four-fifths of the sample, suggesting that the survey predominantly captures individuals within the prime working-age bracket. Older respondents aged 56 years and above represent a relatively small proportion (5.7%). In terms of gender composition, the sample is broadly balanced, with males accounting for 50.7% and females 48.7% of respondents. This near parity reduces concerns about gender bias and enhances the representativeness of the data for gender-disaggregated analysis.

Regarding marital status, almost half of the respondents are married (49.3%) while a substantial proportion are single (41.0%). Widowed respondents constitute 5.7%, and those who are divorced or separated account for 4.0%. This distribution reflects a mix of household structures, which is relevant for analysing welfare outcomes and household decision-making. Educational attainment among respondents is relatively diverse. While 12.7% have no formal education and 15.7% possess only primary education, a majority have at least secondary education or higher. Notably, respondents with post-secondary qualifications (OND/NCE, HND/BSc, and postgraduate degrees) jointly account for over half of the sample.

Table 1: Socio-Economic Characteristics of Respondents

Variable	Category	Frequency	Percentage (%)
Age (years)	18–25	69	23
	26–35	109	36.3
	36–45	66	22
	46–55	39	13
	56+	17	5.7
Gender	Male	152	50.7
	Female	146	48.7
	Prefer not to say	2	0.7
Marital Status	Single	123	41
	Married	148	49.3
	Widowed	17	5.7
	Divorced/Separated	12	4
Education	No formal education	38	12.7
	Primary education	47	15.7
	Secondary education	59	19.7
	OND/NCE	75	25
	HND/BSc	64	21.3
	Postgraduate	17	5.7
Occupation	Artisan	59	19.7
	Self-employed	82	27.3
	Trader	69	23
	Farmer	14	4.7
	Civil servant	50	16.7
	Student	64	21.3
	Others	17	5.7
Monthly Income (₦)	< 20,000	61	20.3
	20,001–40,000	86	28.7
	40,001–60,000	66	22.0
	60,001–100,000	62	20.7
	> 100,000	25	8.3
Household Size	1–3 persons	112	37.3
	4–6 persons	123	41.0
	7–9 persons	56	18.7
	10+ persons	9	3.0

Source: Research computation, 2025

In terms of occupation, respondents are engaged across a wide range of activities. Self-employment (27.3%) and trading (23.0%) dominate, reflecting the importance of informal and micro-enterprise activities in the local economy of the survey area. Artisans (19.7%) and civil servants (16.7%) also form significant segments, while farmers constitute a relatively small share (4.7%). With respect to income, the distribution suggests modest earnings for a large proportion of respondents. Approximately 49.0% earn ₦40,000 or less per month, while only 8.3% earn above ₦100,000. This income profile highlights potential affordability constraints and vulnerability, which are important for interpreting access to and sustainability of infrastructure-related services. Finally, household size is moderate on average, with most respondents living in households of 4–6 persons (41.0%) or 1–3 persons (37.3%), while large households of 10 or more persons are relatively rare (3.0%).

Table 2 shows data on responses regarding infrastructure ranking and welfare. It is seen that approximately 18% of respondents reported missing work or school due to poor road conditions, while a larger share of children missed at least some school days because of infrastructure constraints (38.0% missed 1–3 days; 6.3% missed 4–6 days). Households facing these constraints are likely to perceive improvements in road quality as directly linked to poverty reduction, given the tangible costs in foregone activities and human capital formation.

About 32.7% reported that power outages increased household expenses. This indicates that electricity unreliability imposes a recurrent economic burden. Essentially, unreliable electrification increases expenditure on alternative energy sources with disproportionate effects on budget-constrained households. When infrastructure constraints translate into measurable economic costs, households anchor their poverty perceptions to the extent that infrastructure failures erode disposable income. While only 9.0% reported a waterborne illness in the last 12 months, the presence of morbidity nonetheless highlights a health-poverty channel. Waterborne diseases are well documented as drivers of household vulnerability, increasing out-of-pocket medical spending and reducing productive time, especially among children and caregivers (Adewale & Ogunleye, 2023; Bartram & Cairncross, 2010).

Table 2: Responses on infrastructure ranking and welfare

Variable	Category (code label)	Frequency	Percentage (%)
Main source of water supply	Public tap	73	24.3
	Borehole	115	38.3
	Well	55	18.3
	River/stream	7	2.3
	Sachet/bottled water	50	16.7
Electricity supply on a typical day	0–4 hours	94	31.3
	5–8 hours	119	39.7
	9–12 hours	56	18.7
	>12 hours	31	10.3
Primary alternative power source (when no grid)	Generator	174	58
	Solar	61	20.3
	Rechargeable lamp	54	18
	Others	11	3.7
Condition of main access road	Good	81	27
	Fair	127	42.3
	Poor	92	30.7
Distance to nearest paved/tarred road	< 500 m	67	22.3
	500 m – 1 km	127	42.3
	1–3 km	75	25
	> 3 km	31	10.3
Distance to nearest health facility	< 1 km	102	34
	1–3 km	110	36.7
	4–5 km	65	21.7
	> 5 km	23	7.7
Distance to nearest primary/secondary school	< 1 km	125	41.7
	1–3 km	111	37
	4–5 km	41	13.7
	> 5 km	23	7.7

Source: Research computation, 2025

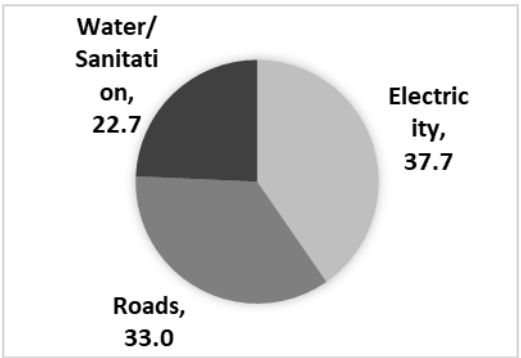
In terms of retrospective welfare evaluation by respondents, only one-third of households reported improved income over the last three years, with 40.7% seeing no change and 25.7% reporting worsening income. This distribution suggests that many respondents have weak or negative income experiences. Such income stagnation or decline is equivalent to poverty in many households. Moreover, respondents are likely to attribute limited income gains to persistent infrastructure gaps.

Figure 1 shows responses on infrastructure which has most improved households' income and welfare in the last three years. The chart indicates that respondents most frequently identify electricity (37.7%) as the infrastructure sector that has contributed most to improvements in household income and welfare, followed closely by roads (33.0%), while water and sanitation (22.7%) rank third. This distribution provides direct insight into the perceived poverty-reduction channels operating at the household level in Ondo City.

Reliable electricity reduces production costs for micro- and small-scale enterprises, extends working hours, supports home-based businesses, and lowers household expenditure on alternative energy sources such as generators and fuel. Development literature consistently shows that electricity access and reliability influence labour productivity, enterprise performance and household welfare (World Bank, 2017; Dinkelman, 2011).

Road infrastructure, which ranked second, reflects the importance of physical connectivity in shaping economic opportunities and welfare. Improved roads reduce travel time, transportation costs and post-harvest losses, while also enhancing access to markets, workplaces, schools and health facilities (Dercon, 2022). By contrast, water and sanitation ranked lowest among the three sectors. This does not imply that water infrastructure is unimportant, but rather that its welfare effects may be less immediately monetised in household perceptions.

Fig. 1: Ranking of infrastructure in terms of their effects on households' income and welfare



Source: Research computation, 2025

Empirical Analysis

The descriptive statistics for the variables employed in the regression analysis are presented in Table 3. The sample consists of 300 respondents, which generally ensures adequate variability for econometric analysis. The average respondent is 38.4 years old with a relatively wide dispersion (standard deviation of 21.14) that reflects a broad age distribution that spans young and older adults. The positive skewness (0.57) indicates a slight concentration of respondents in younger age brackets. Gender is fairly balanced, with a mean of 1.50 and low dispersion indicating near parity between male and female respondents. Educational attainment averages 3.01 on a five-point scale, which implies that the typical respondent has at least secondary-level education, with modest variability across the sample. Household economic conditions, proxied by income group, show a mean of 2.68, which suggests that most households fall within the lower-to-middle income categories. Household size averages 1.87 on the coded scale, indicating predominantly medium to large-sized households. The distribution of both income and household size exhibits mild skewness and low kurtosis.

Table 3: Descriptive Statistics of Regression Variables

Variable	Mean	Std. Deviation	Min.	Max.	Skewness	Kurtosis	N
Age	2.42	1.14	1.00	5.00	0.57	-0.46	300
Gender	1.50	0.51	1.00	3.00	0.15	-1.63	300
Education	3.01	1.10	1.00	5.00	-0.24	-0.57	300
Income	2.68	1.24	1.00	5.00	0.25	-1.00	300
HHSize	1.87	0.82	1.00	4.00	0.57	-0.42	300
Road	3.08	1.07	1.00	5.00	-0.02	-0.63	300
Electricity	2.71	1.04	1.00	5.00	-0.02	-0.69	300
WASH	3.22	1.01	1.00	5.00	0.12	-0.78	300
Index of non-monetary poverty (standardized)	0.72	0.47	0.00	1.00	0.78	-0.39	300
Monetary poverty	1.97	2.63	0.00	2.00	-0.19	-0.46	300

Source: Research computation, 2025

Turning to the core explanatory variables, the ranking of the quality of road, electricity, and WASH infrastructure (constructed as averages of Likert-scale responses) exhibit means of 3.08, 2.71 and 3.22 respectively. These values indicate moderate perceptions of infrastructure performance with WASH being rated most favourably on average, followed by roads. The near-zero skewness for road and electricity perceptions suggests relatively symmetric distributions, whereas WASH shows a slight right skew that implies that a larger share of respondents view water and sanitation conditions positively.

The non-monetary poverty index (which is standardised between 0 and 1) has a mean of 0.72, which indicates a high level of multidimensional deprivation across households in the survey. Its positive skewness (0.78) suggests that a non-trivial proportion of households' experience relatively high non-income poverty. Monetary poverty, derived from households' self-reported income changes over the last three years (0 = improved, 1 = unchanged, 2 = worsened), has a mean of

1.97. This indicates that many households report stagnant or deteriorating income conditions.

Presentation of Results and Discussion of Findings

In this section, the results of the estimated model that was specified in the previous section are presented and analysed. As stated earlier, poverty is measured in both non-monetary (multidimensional) and monetary terms. Thus, two sets of models are estimated in this direction. In Table 4, the results of the estimates from the specifications that examine the association between perceived rankings of infrastructure quality and non-income poverty are presented. Note that the non-income or non-monetary component of poverty was measured using a standardised PCA-based multidimensional index that incorporates deprivations in education, health, road quality and electricity. Three results are reported by including the infrastructure variable in each equation. Three outcomes are reported with each equation containing a separate infrastructure variable.

In the first estimates, the ranking of perceived quality of road infrastructure is negatively and statistically significantly associated with non-income poverty. The estimated coefficient (-0.055, $p < 0.05$) indicates that households ranking road infrastructure more favourably tend to experience lower multidimensional deprivation. This finding is consistent with a large body of development literature that emphasises the role of transport infrastructure in reducing poverty through improved market access, lower transaction costs and enhanced access to education and health services. In urban and peri-urban contexts such as Ondo City, roads also reduce time poverty and income volatility by enabling more reliable commuting and enterprise activity.

Table 4: Regression Results for Multidimensional Poverty

Variable	*Infrastructure considered*		
	Road	**electricity**	**WASH**
(Constant)	0.300 (0.847)	0.242 (0.666)	0.137 (0.375)
Road	-0.055* (-2.014)		
Electricity		-0.030* (-2.047)	
WASH			0.005 (0.079)
Age	-0.111* (-2.196)	-0.109* (-2.165)	-0.109* (-2.159)
Gender	0.095 (0.840)	0.084 (0.740)	0.090 (0.795)
Education	-0.056* (-2.056)	-0.055* (2.039)	-0.054* (-2.026)
Income	0.034 (0.730)	0.031 (0.669)	0.030 (0.633)
HHSize	0.038 (0.527)	0.032 (0.444)	0.033 (0.455)
Adj. R-sq	0.163	0.155	0.152
F-stat	4.18*	4.01*	3.74*

Note: * indicates significance at 5%; t-ratios are in parentheses

Source: Research computation, 2025

A similar pattern emerges for electricity infrastructure. The coefficient on perceived electricity ranking is negative and statistically significant (−0.030, $p < 0.05$). This also implies that more favourable perceptions and ranking of electricity infrastructure are associated with lower non-income poverty. Although smaller in magnitude than the road effect, this relationship is economically meaningful. Electricity reliability affects welfare through multiple channels, including productive use of energy, household enterprise performance and health service delivery. In the Ondo City context, perceived improvements in electricity easily translates into reduced coping expenditures and improved livelihood stability. The significance of electricity perceptions thus corroborates descriptive evidence that households view energy infrastructure as a key driver of welfare and poverty reduction.

In contrast, perceived WASH infrastructure does not exhibit a statistically significant association with non-income poverty. The coefficient is small and not significantly different from zero. This suggests that WASH infrastructure does not significantly affect poverty reduction in the survey area. This result may not, however, directly reflect that WASH is unimportant for welfare. Rather, it likely reflects differences in salience and timing. In particular, WASH improvements primarily affect welfare through health risk reduction, child morbidity and long-term human capital accumulation. These channels may be less immediately observable in cross-sectional data and less tightly aligned with subjective rankings. Moreover, households may perceive WASH benefits as protective rather than income-enhancing, which can lead to weaker associations when poverty is proxied by a composite index that captures multiple deprivation dimensions at a point in time (Oladipo & Salami, 2022).

In terms of the control variables, age and education are consistently negative and statistically significant across all models. This shows that older respondents and those with higher educational attainment exhibit lower non-income poverty. This reflects life-cycle accumulation of assets, skills and social capital. It also shows the central role of education in enhancing capabilities and access to opportunities. Gender, income, and household size are not statistically significant in all the equations. The overall explanatory power of the models is moderate but meaningful for cross-sectional welfare regressions based on perception data. Adjusted R-squared values range from 0.152 to 0.163, and the joint significance of regressors is confirmed by statistically significant F-statistics.

Table 5 reports the second set of estimates linking households' perceived rankings of infrastructure sectors to monetary poverty, which is measured as income-based deprivation. Three specifications are also estimated, each introducing one perception-ranking variable (roads, electricity, or WASH) alongside a common set of covariates. The results show that perceived infrastructure rankings for roads and electricity are both negatively signed and statistically significant, while WASH is not. In the roads specification, the coefficient on *Road* is −0.023 with a t-ratio of −2.020. This indicates that more favourable perceptions (or higher rankings) of road infrastructure are associated with lower income poverty. This finding is substantively consistent with the argument that road quality and connectivity affect household monetary welfare through reduced transport costs, improved access to labour markets, stronger market integration for micro-enterprises and lower frictions in accessing customers and inputs (Jamiu & Ibrahim, 2024; Adeniran & Oladele, 2021). Given that a large share of income

generation is informal and mobility-dependent in Nigeria, transport infrastructure can directly determine the profitability of trading and service provision. Thus, road improvements tend to translate into measurable income gains and reductions in monetary poverty.

The electricity specification yields an even stronger relationship. The coefficient on *Electricity* is −0.155 (t = −2.830). This implies that perceived improvements in electricity infrastructure are more tightly aligned with monetary poverty outcomes in the survey area. It shows that electricity reliability influences household income via the productive use of energy as well as via the expenditure channel (in terms of reduced spending on fuel and generator maintenance). These directly lead to increases in real disposable income. Where households depend heavily on expensive self-provision of energy, even modest improvements in grid reliability can yield sizable welfare gains (Adedeji & Adeyemo, 2022). The fact that electricity perceptions exhibit both strong statistical significance and comparatively large magnitude suggests that energy reliability is a particularly salient constraint on income generation and household budgets in the study area.

Table 5: Regression Results for income (monetary) poverty

Variables	*Infrastructure considered*		
	Road	**electricity**	**WASH**
(Constant)	0.275 (0.777)	0.682 (1.906)	0.221 (0.608)
Road	-0.023 (-2.020)		
Electricity		-0.155 (-2.830)	
WASH			-0.003 (-0.049)
Age	0.017 (0.336)	0.016 (0.325)	0.018 (0.352)
Gender	0.089 (0.791)	0.054 (0.480)	0.088 (0.778)
Education	-0.025 (-0.472)	-0.028 (-0.541)	-0.024 (-0.457)
Income	-0.127* (-2.723)	-0.120* (-2.616)	-0.129* (-2.777)
HHSize	0.019 (0.271)	0.014 (0.202)	0.017 (0.237)
Adj. R-sq	0.169	0.310 ()	0.109
F-stat	2.130	2.770	2.017

Note: * indicates significance at 5%; t-ratios are in parentheses

Source: Research computation, 2025

By contrast, the WASH perception variable is statistically insignificant (−0.003; t = −0.049). This pattern is consistent with a distinction between infrastructure that primarily affects welfare through income-enhancing channels versus infrastructure whose benefits are more often realised through health protection, time savings and long-run human capital accumulation. While WASH is fundamental to wellbeing, its impact on monetary poverty may be less immediate or less directly perceived as "income improving". Moreover, WASH improvements may affect monetary welfare indirectly (e.g., fewer sick days, lower medical expenses), which may not be well captured if income poverty is measured in a way that does not fully account for healthcare cost shocks or lost

labour time. The insignificance of WASH perceptions in the income poverty model therefore, does not particularly imply irrelevance. Rather, it suggests that WASH may operate more strongly through non-monetary poverty dimensions and longer-horizon pathways than through contemporaneous income status.

Among the control variables, income is strongly and consistently negative and statistically significant across all specifications (coefficients around −0.120 to −0.129, with t-ratios about −2.6 to −2.8). This is expected since the dependent variable is a monetary poverty indicator increasing in deprivation. Age, gender, education, and household size are not statistically significant. This suggests that once income and infrastructure perceptions are controlled for, these demographic characteristics do not independently explain variation in monetary poverty in this sample. This may reflect the dominance of local economic conditions and infrastructure constraints over demographic differences in terms of poverty determination in the study area. The electricity model exhibits the highest adjusted R-squared (0.310), indicating substantially greater explanatory power when electricity perceptions are included, while the roads and WASH models show more modest fit (0.169 and 0.109, respectively). All the models have strong overall significance.

5. Conclusion

This study set out to examine the relationship between perceived infrastructural development ranking and poverty reduction in Ondo City, Nigeria. The with particular emphasis is particularly on how households rank different infrastructure sectors and how these perceptions align with both non-income (multidimensional) poverty and monetary (income) poverty outcomes in the area. Using primary survey data and a combination of descriptive analysis and econometric modelling, the study provides evidence on the welfare relevance of infrastructure from the perspective of households lived experiences.

The empirical findings reveal a clear and consistent pattern where road and electricity infrastructure are the most salient infrastructure in relation to poverty reduction. Perceived improvements in electricity infrastructure exhibit the most robust association with lower poverty outcomes. This underscores the central role of energy reliability in shaping household earnings and expenditure burdens. Roads also display a statistically significant poverty-reducing association, reflecting their importance in reducing mobility constraints and facilitating access to labour and product markets. These directly lower transaction costs in an urban and peri-urban setting such as Ondo City. These results demonstrate the view that infrastructure sectors that directly affect daily economic activity and household budgets tend to dominate households' perceptions of poverty reduction.

This result, however, reveals that WASH infrastructure does not significantly influence poverty outcomes in the study area. This finding does not imply that water and sanitation are unimportant; rather, it highlights the distinction between infrastructure that yields immediate and visible income-related benefits and infrastructure whose welfare impacts are realised more indirectly through health, risk reduction and long-term human capital accumulation. Households appear to rank infrastructure based on the immediacy and frequency with which benefits are experienced rather than solely on their long-run social returns.

From a policy perspective, the findings from this study suggest that poverty-oriented infrastructure strategies in Ondo City and similar urban contexts should prioritise electricity reliability and road connectivity while continuing to invest in WASH as a complementary long-term welfare intervention. In particular, electricity reliability should be prioritised as a central instrument for urban poverty reduction. Policy efforts need to move beyond expanding access to electricity to focus on reliability and affordability. Moreover, improving road infrastructure (especially last-mile access roads) is an important factor in reducing both income and non-income poverty. Targeted investment in road rehabilitation and maintenance in urban and semi-urban areas can therefore yield substantial welfare gains for households whose livelihoods depend on mobility and connectivity. Recognising how households perceive and experience infrastructure can improve how development interventions are targeted and also enhance policy credibility in the area. This then translates to strengthening the poverty-reducing impact of public infrastructure investment.

References

Adedeji, O. A., & Adeyemo, T. S. (2022). Infrastructure investment and poverty reduction: Evidence from Nigerian urban centres. *African Journal of Development Studies, 14*(2), 45-63.

Adeleke, R., Alabede, J. & Ashibuogwu E. (2022). Exploring the geographical variations and influencing factors of poverty in Nigeria. *Regional Science Policy and Practice* 15 (6). 1182-1197

Adeniran, F. T., & Oladele, S. M. (2021). Roads, markets and livelihoods: Assessing rural–urban linkages in Ondo State, Nigeria. *International Journal of Regional Development, 9*(1), 77-92.

Adeniyi, T. O., Akinrinmade, Y., & Abiodun, A. L. (2018). Analysis of road transport impact on rural development in Nigeria: A Study on Akure North Local Government Area, Ondo State. *International Journal of New Technology and Research,* 4 (3), 102-110 A

Adewale, K. O., & Ogunleye, M. I. (2023). Water access and multidimensional poverty: Household evidence from South-West Nigeria. *Journal of Environmental & Public Health Research, 11*(3), 101-118.

Ajayi, S. O. (2019). The Role of Community Health Workers in Rural Health Service delivery. *Nigeria Journal of Social Sciences*, 2(3) 42-55.

Bartram, J. & Cairncross, S. (2010). Hygiene, sanitation, and water: Forgotten foundations of health. *PLoS Medicine*, 7(11), e1000367.

BusinessDay. (2023, October 15). Nigeria's infrastructure gap widens despite new funding schemes. *BusinessDay Nigeria*. https://businessday.ng/economy/article/nigerias-infrastructure-gap-widens

Dercon, S. (2022). *Gambling on development: why some countries win, and others lose*. London, Hurst Publishers.

Dinkelman, T. (2011). The effects of rural electrification on employment: New evidence from South Africa. *American Economic Review*, 101(7), 3078-3108.

Federal Government of Nigeria. (2021). *National poverty reduction with growth strategy (NPRGS) 2021-2031*. Abuja.

Jamiu, R. O. & Ibrahim, T. Y. (2024). Road infrastructure, market access and urban poverty traps in South-West Nigeria. *Journal of African Infrastructure Economics, 5*(1), 25–44. https://doi.org/10.1234/jaie.2024.50125

Lawal, T. & Imoukhuede, B. K. (2018). Local government finance and rural infrastructure delivery in Ondo State: A study of Ondo West Local Government Area, 2010-2015. *African Journal of Institutions and Development* xiii (23 & 24) 110-121.

Lokesha, M. N. & Mahesha, A. (2017). Economic benefits of road infrastructure on agricultural development and rural road infrastructure development programmes of India and Karnataka. *Journal of Research in Business and Management* 4 (1) 42-48

Lukas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics* 22(1), 3-42

Manggat, I., Zain, R. & Jamaluddin, Z. (2018). The impact of infrastructure development on rural communities: A literature review. *International Journal of Academic Research in Business and Social Sciences,* 8(1), 647-658.

National Bureau of Statistics. (2022). *Nigeria multidimensional poverty index (MPI) survey 2022: Summary report*. Abuja: NBS. https://nigerianstat.gov.ng/elibrary

Oladipo, J. A. & Salami, M. B. (2022). Sanitation services and health outcomes among low-income households in Nigeria. *Journal of Public Health in Africa, 13*(4), 210-219.

Omotayo, D. T. & Ajiboye, P. F. (2023). Community perceptions of government infrastructure projects in Ondo City. *African Governance & Development Review, 15*(1), 89-106.

Owolabi, O. A., Omeire, M. C., Okwudire, B. O. & Bolujoko, O. T. (2024). Education, Electricity Access, and Income Inequality in Nigeria. *International Journal of Energy Economics and Policy*, *14*(5), 149-161

Pelz, S., Chinichian, N., Neyrand, C. *&* Blechinger, P. (2023). Electricity supply quality and use among rural and peri-urban households and small firms in Nigeria. *Sci Data* 10, 273

Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(5) 1002-1037

Streeten, P. (1981). *The first thing is the first thing: to satisfy the human basic needs in the developing countries.* Publicado Banco Mundai, Washington DC, USA

Uhunmwuangho, S. O. & Ekpu, C. (2012). Analysis of socio-political implication of infrastructural decay in Nigeria. A*frican Research Review,* 6(40), 40-58.

United Nations Children's Fund. (2022). *Progress on drinking water, sanitation and hygiene in Nigeria: 2000–2021*. UNICEF Nigeria. https://www.unicef.org/nigeria

World Bank. (2017). *Electricity Access in Sub-Saharan Africa*. Washington DC: World bank.

World Health Organization (WHO). (2023). *Drinking-water*. Geneva: WHO.

World Bank. (2024). *Nigeria poverty assessment: A decade of slow progress*. Washington, DC: World Bank.