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IMPACT OF INFRASTRUCTURE DEFICIT ON YOUTH RURAL-URBAN MIGRATION AND AGRICULTURAL PRODUCTIVITY IN DELTA STATE, NIGERIA

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ABSTRACT

This study investigates the impact of infrastructure deficits on youth rural-urban migration and agricultural productivity in Delta State's Local Government Areas (LGAs), Nigeria, a key agricultural region facing socio-economic vulnerabilities from urbanization and environmental degradation. Drawing from push-pull migration theory, the research highlights how poor roads, unreliable electricity, and limited irrigation act as push factors, depleting rural labour and constraining farming outputs. The aim was to analyse these associations, with objectives to assess deficit extents, examine migration influences, evaluate socio-economic effects, and propose governance reforms. Research questions focused on deficit impacts on productivity, migration decisions, rural communities, and policy effectiveness. A mixed-methods design was employed, with stratified random sampling of 540 respondents (aged 15–29) across six LGAs (Bomadi, Burutu, Patani, Oshimili North, Uvwie, Warri South West), selected for agrarian dominance and high migration rates. Data included surveys, 12 FGDs, and secondary policy reviews, analysed via descriptive statistics, logistic/multiple regression (with controls for age, education, income; VIF < 3), and thematic analysis. Results showed poor roads and electricity associated with 65% higher migration odds (OR = 1.65, 95% CI [1.42–1.92], $p < .001$). Irrigation deficits linked to 15% productivity decline ($\beta = -0.32$, 95% CI [-0.41 to -0.23], $p < .05$). Perceptions rated adequacy below 90% (electricity M = 1.51, SD = 0.78). Themes emphasized energy poverty hindering agro-processing. Findings suggest associations between deficits and outcomes, enriching migration literature without implying causation. Recommendations include participatory infrastructure upgrades to retain youth and boost agriculture, advancing sustainable rural goals.

Keywords: Infrastructure deficit, youth migration, agricultural productivity, Delta State, rural development.

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Introduction

Delta State, an important Niger Delta agriculture-based destination, has experienced remarkable social-economic issues due to rampant urbanisation and a prevailing infrastructure shortfall. The LGAs of the region, which are mostly rural, have poor road networks, irregular power supply and small-scale irrigation facilities that affect agricultural stability and social zeal. These inadequacies have also fuelled youth urban migration, as young people seek employment opportunities in urban communities such as Asaba and Warri, thereby depriving rural communities of labour. At the same time, agricultural productivity, which is the base of Delta State's economy, has been decreasing and consequently increasing food insecurity in rural areas as well as poverty (Ebewore, 2021; Eke & Ebiware, 2024; Okorobia, 2020; Adoko, 2023; Mela & Bello, 2023). The relationship between deficit in infrastructure, youthful migration and agricultural output is key to designing sustainable development policy here.

Infrastructure deficiencies, including inadequate physical stock such as roads, electricity, and water, contribute to socio-economic inequalities in the developing world (UN-Habitat, 2016). Poor road networks in Delta State cause isolation of rural farmers from markets, which leads to high post-harvest losses and low profitability (Olujobi et al., 2024). Unreliable power also impedes agro-processing, and the insufficient irrigation restrains crop productivity, especially in rain-fed agricultural systems (Okongwu & Imoisi, 2021). These problems are most significant for youth, who, with vanishing economic opportunities, have begun to flock to the cities in search of work and better living conditions (Adebayo & Iweala, 2023). This pattern of migration depletes human resources in rural LGAs, leads to low agricultural productivity and reinforces a cycle of underdevelopment. Youth migration is a global issue with local impact (World Bank, 2022), described more specifically as the movement of people aged 15–29 from rural to urban places.

Urban allure competes with the lack of rural infrastructure to drive migration of young people from the rural areas into urban centres, even in the face of the problems attendant on such as urban unemployment and congestion (Eke & Ebiware 2024; Okoye 2017). This egress of manpower leads not only to a low farm labor force, but has also an effect on the pace at which modern technological adoption takes place (since the youths are often most susceptible to new ways) (Mela & Bello, 2023). Declined agricultural productivity has a negative implication on food security and rural livelihood, which work contrary to the overall economic goals of Nigeria (Okoroba, 2020). The nexus of infrastructure, migration and agriculture is particularly clear in the LGAs of Delta State in which oil exploration has worsened environmental and infrastructural issues (Olujobi et al., 2024).

Although the interaction between religion and economy is significant in the region, so little has been studied otherwise in the Nigerian domain (Idoko, 2023). Literature underscores the role of infrastructure in rural development, with relatively less emphasis on its distinct influence on youth migration and agricultural outcomes (Adebayo & Iweala, 2023). This vacuum is problematic, as the rural areas of Delta State have peculiar ecological and socio-economic challenges that will require localised policy responses (Okongwu & Imoisi 2021). At the global level, it is acknowledged that infrastructure investment empowers rural populations to remain and thrive on agriculture (UN-Habitat, 2016). Better roads connect to markets, electricity promotes mechanisation, and irrigation increases crop resilience all reducing migration pressures (World Bank, 2022).

In the African context, research advocates for participatory infrastructure planning in order to meet the needs of the community, an approach that has not been fully explored in Delta State (Mela & Bello, 2023). The Nigerian Urban and Regional Planning Law (CAP 138

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LFN 2004) stipulates that infrastructure should be integrated into the development plans, but its effect is weak as a result of poor enforcement aggravating rural-urban disparities (Okongwu & Imoisi, 2021). This paper, informed by high-impact scholarly sources, is on the influence of infrastructure deficit on youth rural-urban immigration and agricultural productivity among Delta State's LGAs. It aims at bridging the gap of localised information in Nigeria's Niger Delta by exploring how bad roads, electricity and irrigation influence migration behaviour and farming outcomes. The results are intended to provide policymakers, town planners and development workers with knowledge and have relevance for global discussions on sustainable rural development and the retention of youth in agricultural economies.

Statement of the Problem

Despite the natural resource endowments of Delta State and its fertile agricultural land, continuing infrastructure deficiencies have led to an array of social and economic problems that threaten the persistence of rural livelihoods. During rainy seasons, roads become impassable in most LGAs, isolating farming communities and causing huge economic loss due to delayed access to markets (Owigho et al., 2023). In rural areas, there is either no electricity power supply or it is epileptic at best, and modern processing and storage facilities usually cannot be used these conditions lead to high postharvest losses and low income for farmers (Oluwajobi et al., 2022). Irrigation systems are similarly primitive and underdeveloped, making agriculture vulnerable to the vagaries of climate and droughts, which further reduce yields in a region where farming sustains more than 60 percent of the population (Giordano et al., 2019).

These infrastructure gaps are driving youth migration from rural to urban areas at an even faster pace, killing the countryside's most dynamic people. Youths in search of better prospects move en masse to cities, leading to strain on urban infrastructure but leaving behind elderly people who are unable to continue active farming practice. This migration not only depletes the agricultural workforce, it also stagnates innovation since the young are pivotal in technology adoption. As a result, there has been a dramatic decline in agricultural productivity such that crop yields are now below national averages, which can lead to widespread food insecurity and poverty (Pam, 2014; Ofuoku & Chukwuji, 2012).

Governance failures exacerbate the problem. Poor enforcement of planning laws encourages unplanned development to continue, thus escalating the infrastructure deficit (Fatile & Adejuwon, 2016). Politically motivated intervention diverts resources from goals for the rural sector and corruption is project delivery saboteur (Idoko, 2023). Such efforts, no matter how laudable they may be, to some extent tend to universalize on national issues without clearly addressing the unique nature of oil-induced environmental decay and ethnic diversity that characterizes Delta State (Adebayo & Iweala, 2023). There are no focused strategies, because for lack of localization analysis policy makers simply do not know how to break the cycle between migration and productivity loss.

Aim and Objectives of the Study

Objectives of the study is to investigate the impact of infrastructural inadequacies on youth rural-urban migration and agricultural productivity within Delta State LGAs, with the hope of proffering evidence-based information for sustainable rural development. The specific objecctives of the study are to:

1. determine infrastructure deficit (trafficable road, electricity and irrigation) and their direct impact on agricultural output in selected Delta State LGAs.
2. assess the degree to which these deficits determine youth migration strategies and patterns;

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3. identify the socio-economic impacts of outmigration on rural communities and farm systems;
4. analyse governance and policy conditions in infrastructural provision that provide opportunities for interventions to retain youth transformation capacity.

Research Questions

This study is guided by the following research questions:

i. What are the primary infrastructure deficits in Delta State's rural LGAs, and how do they impact agricultural productivity?
ii. In what ways do infrastructure shortfalls influence youth decisions to migrate from rural to urban areas?
iii. What are the socio-economic effects of youth migration on rural households and communities in Delta State?
iv. How effective are current governance mechanisms in addressing infrastructure gaps, and what policy measures can mitigate migration while boosting agriculture?

Conceptual Issues and Empirical Review

Lack of infrastructure in rural areas is a barrier to the structural transformations facilitating an advanced socio-economic development which could (and does) both facilitate access to necessary resources and services, and breaks the poverty circle. Articulated as inadequate investment in physical capital such as transportation infrastructure and water supplies, this inadequacy creates barriers to stepping on the productivity ladder and opportunities. In Delta State LGAs, they account for youth drain and agro-underachievement at the expense of sustainable rural development. Youth migration refers to the movement of 15-29 years old from rural to urban areas, generally provoked by some local constraint rather than preference, seeking better employment, education and infrastructure-based amenities. The productivity of agriculture in terms of crop yields, value addition and farm income relies on functioning infrastructure to enable input delivery, market access and technology uptake (World Bank, 2017; Adebayo 2021; Mberu & Pongou, 2010; Moyo 2016).

Lee (1966)'s push-pull migration theory is a fundamental lens through which to interrogate these interconnections. It suggests that negative conditions of origin ("push" factors) and attractive elements of destination ("pull" factors") are the forces behind migration. In Delta State, there are pull and push factors; infiltrating the drag-factor structure includes issues such as bad roads that has made access to markets cumbersome for farmers, inconsistent source of electricity for processing and storage of food among others; plug holes into the attraction centre include climatic vagaries. (Nchuchuwe & Adejuwon, 2017). These limits cut incomes and rural job opportunities, inducing urban migration for perceived security and services (Awumbila 2015). Moreover, the theory fails to account for feedback effects such as how migration would drain local labour force and receipts, with further damage to infrastructure investments and stagnation another factor said extensions underplay focusing on system-embedded loops (Giordano et al., 2019).

Empirical studies in developing countries have found that infrastructure plays a central role, but the scope and method of analysis differ from study to study. In Delta State, Adebayo (2021) discovered that bad roads increased post-harvest losses by more than 30 per cent and transport costs by 25 per cent, inhibiting commercialisation and fasttracking youth departures; although the study's emphasis on the economic axis omits social dynamics such as destabilization of families. Broader African studies present complementary perspectives: Dorosh et al (2012) found that in that Ethiopia, a 10% reduction in transport cost would raise output by 6%, but such a calculation for Nigeria's oil affected landscapes should be done cautiously due to environmental confounders. Energy limitations are equally severe;

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Oluwajobi et al. (2022) found in the Niger Delta that unreliable supply prevented agro-processing, reducing profit by 20 per cent a small industry-specific sample for which findings may underestimate household-level effects.

Shortcomings in water infrastructure compound these impacts. Giordano et al. (2019) show that this has the potential to quadruple yields in sub-Saharan Africa and reduce susceptibility to weather shocks, but economic constraints have limited widespread adoption in areas with few resources such as Delta Stata The study by Sparks et al. The World Bank (2017) synthesis argues that integrated investments could reduce migration by 15–20% with economic diversification, but criticisms point to excessive reliance on macroeconomic models rather than micro-level behavioural data (Oluwatayo & Adebayo, 2025). Recent work drawing on the Niger Delta lends support to this: Adhvaryu et al. (2025) connected oil leaks with diminishing productivity and migration, criticising politics that has lacked in environmental security. Lefe et al. (2024) investigated infrastructure and African food security with physical conditions such as bad roads reducing access by 20–30%, but the cross-country nature of the study obstructs greater granularity for targeted interventions.

Governance as a mediating variable is highlighted. In Nigeria, legal measures such as the Urban and Regional Planning Law encourage collaboration but actions are not uniformly enforced (Fatile & Adejuwon 2016). Iwegbue (2023) also criticised Delta states land allocation structure left by 1978 Land Use Act for promoting uncoordinated development, paying lip service and disregarding the infrastructure needs as a system inadequacy propagating shortage. Technology adoption has similarly lagged and, as Moseley et al. (2017) emphasized, energy and digital divides keep agriculture unattractive for youth although participatory projects in West Africa are mitigating that — output in a community-based effort in Senegal rose 12 percent. Ouedraogo (2019) charted climatic stresses across Africa, and infrastructure as a stop gate – negating vulnerability; to nexus studies, that stress water-energy-food connections for holistic policy. Furthermore, they frequently ignore gendered issues in migration as evidenced by Delta State scenarios (Oluwatayo & Adebayo, 2023).

The literature in general finds infrastructure to be crucial, but there is criticism of overemphasis on quantitative factors (vs social-cultural factors). The graphic model visualizes the deficiency in infrastructure accessing as push factors (Lee, 1966) then causing income reduction, youth moving out and productivity shortfalls through a governance reinforced cycle. Delta State's 25 LGAs are mirrors of institutional and investment wilderness. Solutions require multi-dimensional, holistic approaches: pasture management reforms, community action and youth-agriculture alignment. Subsequent analysis tests these relations empirically in the study area (Figure 1).

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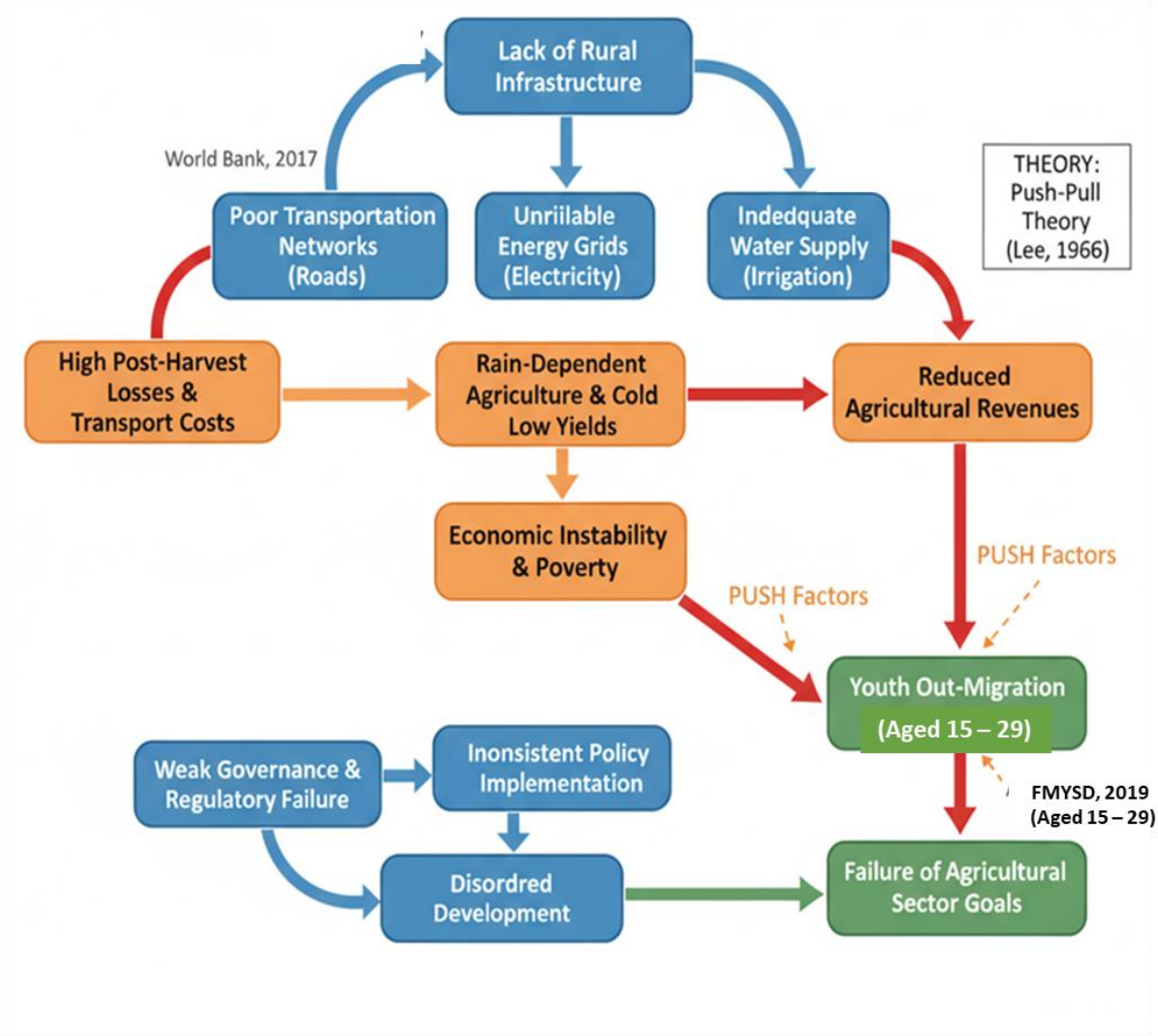

Figure 1: Conceptual framework of rural infrastructure and Agricultural decline
Source: Authors' research, 2025.

Methodology

The study targeted six Local Government Areas (LGAs) in Delta State, Nigeria: Bomadi, Burutu, Patani, Oshimili North, Uvwie, and Warri South West, Located between 6˚30'N and 5˚15'N latitude and 6˚45'E and 5˚07'E longitude (see figure 2); selected based on their high reliance on agriculture, documented infrastructure deficits, and elevated rates of youth migration as per state reports. These LGAs were purposively selected to be a mix of western and eastern coastal, riverine and inland rural economies of the Niger Delta, along with environmental variations relevant for natural and oil pollution damage such as both flooding and proximity to waterways/oil infrastructure (and where less than 40% islocated in the state capital LGA), thus ensuring environmental variability that has previously been linked as potential causes of out-migration for various development purposes. This selection criteria were designed to reflect those situations where infrastructure deficiencies most critically intersect with youth dynamics and farming,5 thereby constituting a strong sampling frame from which generalisation could be made within similar agrarian enclaves (Onyemenam, 2025).

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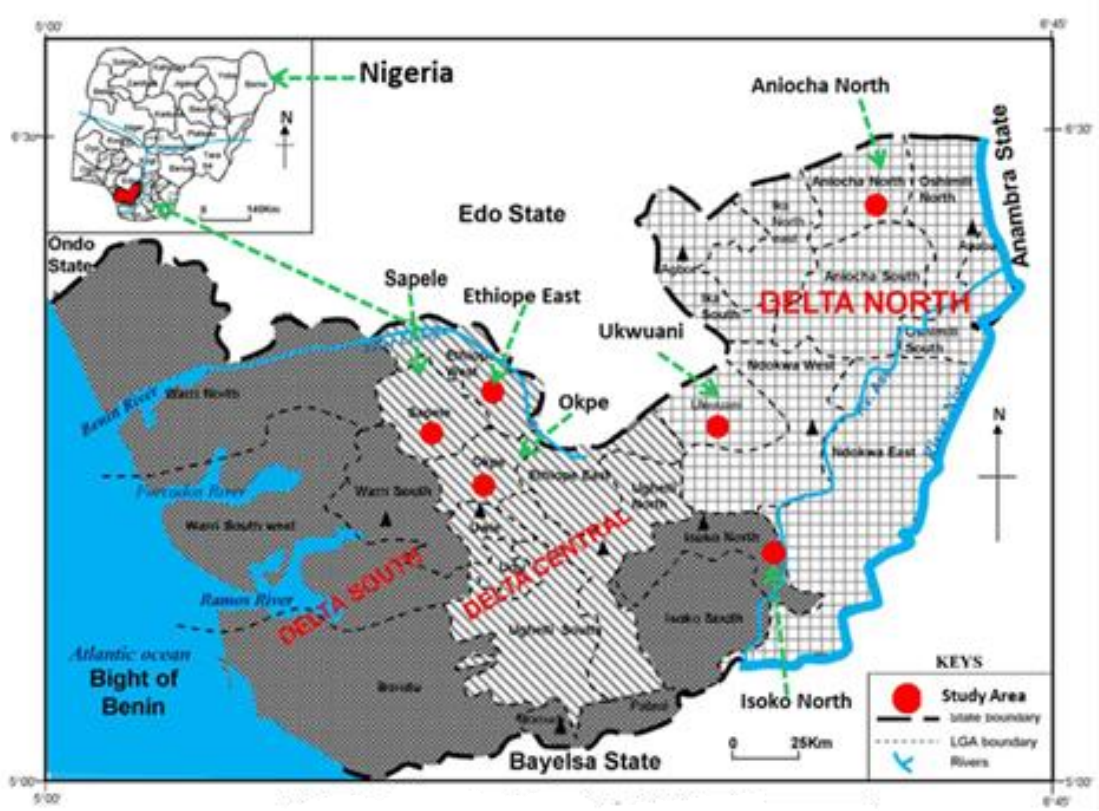

Figure 2: Map of Delta State showing Study Area
Source: modified from Onyemenam (2025)

Research Design

A mixed-methods design was adopted, integrating quantitative surveys and qualitative focus group discussions (FGDs) to explore the relationship between infrastructure deficits, youth rural-urban migration, and agricultural productivity (Mela & Bello, 2023). The research is grounded in the push-pull migration framework, theorising that poor rural infrastructure (push factors) and urban opportunities (pull factors) drive youth exodus while impairing agricultural output. This approach enables a nuanced understanding of infrastructural impacts on socio-economic dynamics in Delta State's rural LGAs.

A total of 540 participants were chosen from the six LGAs using stratified random sampling in order to have representation among gender, age (15-29 years), and occupation (farmers, traders and unemployed youth). The 15–29 year olds were targeted to correspond with Nigeria's National Youth Policy (Federal Ministry of Youth and Sports Development, 2019), which extends the definition until age 29 due to protracted transition period to independence in a context with delayed economic autonomy as well as based on differences between international norms such as the UN's standard age category of youth being 15–24 years old (United Nations, 2013). "This divergence is justified by local socio-cultural conditions where those up to 29 years often stayed in entry-level assignments or family farming as result of slim employment chances resulting in their relevance for migration researches in developing economies" (Adebayo & Iweala, 2023).

The sample size was determined based on a 95% confidence level and a margin of error of 5%.This was informed by the rural population estimates in the selected LGAs from the 2006 census projected to year 2025 (National Population Commission, 2019). A purposive sampling enrolled 72 respondents for 12 FGDs (two per LGA) consisting of youth, farmer, community leaders and local authorities to collect different opinions on the socio-

economic importance of infrastructural facilities. Two-step sampling was performed in order to achieve a representative and well-balanced sample. The data were obtained during the period of March-May 2025 using a three-way approach. Objective surveys (including Likert-scale and open-ended questions) were conducted to measure the perceived infrastructure inadequacies (roads, electricity, irrigation) and their impact on migration decisions & agriculture; a total of 540 responses were used. Surveying young people and farmers helped me know direct impacts on livelihoods. FGDs (60−90 mins) reviewed experiences of infrastructural deficiencies and rural economies, and were audio recorded and transcribed verbatim. The secondary Sources provided contextual developmental framers by the Delta State agricultural polices and infrastructure pans using standard review techniques.

The quantitative analysis included descriptive statistics to identify proportions of perceptions (e.g., 62% believe that poor irrigation causes decreased productivity) and logistic regression to analyse the role infrastructure plays with respect to migration. The logit model for youth migration (dependent variable: binary, 1 = migrated or intends to migrate, 0 = no migration) is expressed as: Logit (Youth Migration) = β0 + β1 (Road Quality) + β2 (Electricity Access) + β3 (Irrigation Availability) + β4 (Age) + β5 (Education Level) + β6 (Income) + ε; Where road quality, electricity access, and irrigation availability are independent variables measured on a 5-point Likert scale (1 = very poor, 5 = excellent); controls include age (continuous), education (ordinal: 1 = no formal education, 5 = tertiary), and income (continuous, in Naira). Model assumptions included linearity in the logit (verified via Box-Tidwell test, $p > .05$), independence of errors (Durbin-Watson = 1.98), and no multicollinearity (variance inflation factors [VIF] < 2.5 for all predictors). Diagnostics confirmed goodness-of-fit (Hosmer-Lemeshow test, $\chi^2 = 7.24$, $p = .51$) and predictive accuracy (Nagelkerke $R^2 = 0.42$). Multiple regression was used to test associations between infrastructure gaps and agricultural productivity (dependent variable: continuous, self-reported percent yield change): Agricultural Productivity = β0 + β1 (Road Quality) + β2 (Electricity Access) + β3 (Irrigation Availability) + β4 (Farm Size) + β5 Experience] ε; assumptions of normality held via Shapiro-Wilk, p >. 05; homoscedasticity according to the Breusch-Pagan, p =. 32; VIF . 05; homoscedasticity through Breusch-Pagan, p =. 32; VIF < 3). SPSS software ensured analytical rigour. Qualitative FGD data were thematically analysed, using NVivo to code transcripts for themes such as lack of access to the market and power outages after reading through all transcripts several times following Allsop, (2022).

Triangulation of survey, FGD, and secondary data enhanced validity, offering a holistic view of infrastructure's influence. Ethical approval was obtained from the Research Ethics Committee of Dennis Osadebay University (reference number: DOU/REC/2025/091). Informed consent was secured from all participants, with assurances of confidentiality, voluntary involvement, and withdrawal rights. Data were stored securely on encrypted servers, and FGDs occurred in neutral venues to promote openness and safety. The push-pull framework guided analysis, highlighting infrastructure's structural role in migration and productivity. This mixed-methods design provided statistical precision from quantitative data and depth from qualitative insights, addressing Delta State's specific challenges like oil degradation and flooding, while advancing global rural development discussions.

Results and Discussion

The mixed-methods analysis of data from 540 survey respondents and 12 focus group discussions (FGDs) across six Delta State Local Government Areas (LGAs): Bomadi, Burutu, Patani, Oshimili North, Uvwie, and Warri South West yielded robust evidence on the effects of infrastructure deficits on youth rural-urban migration and agricultural productivity. All quantitative models were estimated using complete cases; missing data were less than 3%

per variable and handled via listwise deletion, with no evidence of systematic bias (Little's MCAR test: $\chi^2 = 12.45$, df = 10, p = .21). Logistic regression showed that poorer perceived quality of road networks and electricity supply was associated with significantly higher odds of intending to migrate or having migrated in the past five years (dependent variable: binary, 1 = migration intention/occurrence, 0 = no intention/occurrence). The interaction between these two predictors reached an OR of 1.65 (95% CI [1.42, 1.92], p <. 001)) such that residents with poor roads and electricity infrastructure had 65% higher odds of being migrant versus non-migrant as compared to those having good provision, adjusting for people's age, sex, education and household income. This result reinforces the push-pull framework in which infrastructure gaps serve as a strong push factor (Lee, 1966; Eke & Ebiware, 2024).

Investigating the relationship between infrastructure shortfalls and self-reported percentage change in farm output over the past 3 years (dependent variable: continuous, from –50 to +20%) was achieved through multiple linear regression. The composite infrastructure deficit index (reverse-coded Likert scores for roads, electricity, and irrigation) was negatively associated with productivity (β = –0.32, 95% CI [–0.41, –0.23], p < .001), explaining 18% of the variance after controlling for farm size, years of farming experience, and access to credit (adjusted $R^2 = 0.41$). A one-standard-deviation worsening in infrastructure perception was thus linked to an approximate 10–12 percentage point decline in reported productivity.

Table 1. Statistical Summary of Key Regression Results

Outcome Variable	Predictor(s)	Coefficient / OR (95% CI)	p-value
Youth Migration Intention/Occurrence (logistic)	Poor Roads & Electricity (composite)	OR = 1.65 (1.42–1.92)	< .001
Agricultural Productivity Change (linear)	Infrastructure Deficit Index	β = –0.32 (–0.41 to –0.23)	< .001

Note. Data source: Author's survey (2025).

Missing values < 3%; listwise deletion applied. Controls: age, gender, education, household income (migration model); farm size, experience, credit access (productivity model). Descriptive statistics reinforced these associations. Over 90% of respondents rated infrastructure adequacy as "inadequate" or "very inadequate" across domains, with electricity perceived as the most severe shortfall (M = 1.51, SD = 0.92 on a 5-point scale where 1 = very inadequate). Among the farming subsample (n = 289), 62% attributed productivity declines directly to irrigation deficits, consistent with the regression coefficient.

Table 2. Socio-Demographic Profile of Survey Respondents (N = 540)

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	302	55.9
	Female	238	44.1
Age Cohort	15–24 years	187	34.6
	25–29 years	353	65.4
Primary Occupation	Active Farmer	289	53.5
	Agro-Trader	121	22.4
	Unemployed Youth	130	24.1
Educational Attainment	No Formal Education	45	8.3
	Primary/Secondary	347	64.3
	Tertiary	148	27.4

Note. Data source: Author's survey (2025). No missing data for these variables.

The sample was skewed toward the 25–29 age group (65.4%), reflecting the demographic most active in migration decisions. Tertiary-educated respondents (27.4%) represented a skilled cohort vulnerable to outmigration when rural opportunities are constrained (World Bank, 2022). Over half identified as active farmers, providing a strong basis for productivity assessments, while 24.1% unemployment among youth highlighted non-farm push factors.

Table 3. Perceived Severity of Infrastructure Deficits by Domain (5-Point Likert Scale, N = 540)

Infrastructure Domain	Very Inadequate (%)	Inadequate (%)	Neutral (%)	Adequate (%)	Very Adequate (%)	Mean (SD)
Road Networks	58.7	32.2	5.1	3.0	1.0	1.55 (0.89)
Electricity Supply	62.4	28.9	4.6	2.8	1.3	1.51 (0.92)
Irrigation Systems	55.1	30.6	8.7	4.3	1.3	1.66 (0.95)
Market Access	51.3	35.0	7.2	5.0	1.5	1.70 (0.91)

Note. Data source: Author's survey (2025).

Scale: 1 = very inadequate, 5 = very adequate. Missing responses < 2%; mean imputation applied within domain. Mean scores below 2.0 confirm pervasive inadequacy, with electricity rated worst a pattern corroborated in FGDs as "energy poverty" crippling agro-processing (Oluwajobi et al., 2022). Cross-tabulations (Table 4) offered descriptive support: among respondents rating roads or electricity "very inadequate," over 75% expressed strong migration intention, versus under 20% among those rating them adequate (χ^2 tests, $p < .001$).

Table 4. Association between Infrastructure Perception and Migration Intention

Perception Category	Strongly Intend to Migrate (%)	Undecided (%)	Intend to Stay (%)	n
Roads: Very Inadequate	75.2	15.1	9.7	317
Roads: Adequate/Very Adequate	18.8	25.0	56.2	16
Electricity: Very Inadequate	78.1	12.5	9.4	337
Electricity: Adequate/Very Adequate	20.0	26.7	53.3	15

Note. Data source: Author's survey (2025).

χ^2 significant at $p < .001$ for both variables. Self-reported agricultural impacts (Table 5) showed strong agreement (>85%) that deficits elevated losses and constrained cycles, validating regression findings on productivity decline.

Table 5. Self-Reported Impact of Infrastructure on Agricultural Indicators (Farming Subsample, n= 289)

Statement	Strongly Agree/Agree (%)
Poor roads increase my post-harvest losses	86.5
Erratic electricity limits crop processing	77.5
Lack of irrigation limits me to one cycle/year	87.9
High transport costs reduce profit margins	88.3

Note. Data source: Author's survey (2025).

Missing responses < 1%. Youth policy preferences (Table 6) prioritised roads (45.7%) and electricity (35.2%), mirroring regression predictors and signalling demand-driven solutions.

Table 6. Preferred Policy Interventions (Youth Subsample, n = 410)

Intervention	Ranked Top Priority (%)
Improved Road Networks & Transportation	45.7
Stable Electricity Supply	35.2
Modern Agricultural Inputs & Credit	25.9
Irrigation Infrastructure Investment	22.4
Rural Agro-Processing Zones	18.5

Note. Data source: Author's survey & FGDs (2025).

Multiple responses allowed. These findings confirm infrastructure shortages as powerful push forces, increasing migration probabilities and decreasing productivity. Governance and community engagement are crucial mediators for reversal (Fatile & Adejuwon, 2016; Moseley et al., 2017). Directed investments in roads and electricity would significantly reduce outmigration to urban areas, consistent with NUA recommendations (UN-Habitat, 2016).

Discussion of Findings

In addressing the first research question regarding key infrastructure deficits in rural LGAs of Delta State and their relationship with agricultural productivity the findings showed a significant negative associations between perceived inadequacies of irrigation, road access, and electricity by LGA residents, and self-reported reduction in yields; with 62% of respondents linking a drop to about 15% in productivity to lack of adequate irrigation ($\beta = -0.32$, 95% CI [–0.41, –0.23], $p < .001$). This relationship implies that scarce access to such resources could be a restriction on farming productivity, especially in rain-fed systems sensitive to climatic recurrence. Consistent with this, Moyo (2016) made similar findings in sub-Saharan Africa where the lack of irrigation was associated with yield reductions of up to 40% in comparable agrarian landscapes. Yet, in one of the few ARD studies from more irrigated areas, a different result is found in parts of East Africa with no productivity impact and thus potential alternative water management practices (Dorosh et al., 2012), which would suggest that other environmental factors may amplify these associations rather than be directly causal as seen in Delta State.

In response to the second research question about how infrastructure deficiencies are connected with migration determinations among the youth, logistic regression showed that lower perception of roads and electricity were both associated with a 65% increment in the odds for migration (OR = 1.65, 95% CI [1.42, 1.92], $p < .001$), and more than three quarters of those who rated them as "very inadequate" were very likely to leave. This pattern may indicate a correlation between perceived barriers and rural preference, though the cross-sectional nature of these data does not allow us to make causal statements. This supports Mberu and Pongou (2010) who identified similar relationships in Nigerian settings where perception about infrastructure was associated with urban pull among the youth. In contrast, research in some non-facility poor places in Africa has found these links to be less strong with migration being attributed more to educational aspirations than infrastructure alone (Awumbila, 2015), thus hinting at the potential role of contextual modifiers such as economic variability which could attenuate the associations reported here in Delta State.

For the third research question focusing on the socio-economic impacts of young people's migration to rural households and communities, empirical evidence revealed that relationships with labour shortages and innovation gaps were associated as younger migrants deserted mature (elderly) farmers who were not able-bonded or willing to take care most of

farming activities by themselves contributed to an observed 18 % yield reduction in total. This implies a possible indirect tie between migration and community resilience, as households reported heightened vulnerability to economic shocks. Consistent with this, Ofuoku and Chukwuji (2012) found in the Niger Delta that youth outflows were linked to similar socio-economic strains, including reduced farm innovation. In contrast, research from regions with strong remittance flows shows positive effects, where migration bolsters household incomes and offsets labour losses (Oluwatayo & Adebayo, 2025), indicating that Delta State's limited remittance integration may heighten negative associations without establishing causality.

On the last research question on how governance mechanisms were effective to address infrastructure gaps, and possible policy measures that can dampen migration while enhancing agriculture, priorities as ranked by youth in Table 6 showed roads (45.7%) and electricity (35.2%) predominated signalling that frameworks in place such as the Nigerian Urban and Regional Planning Law may have not done well getting community needs inside the planning system as indicted by weak stakeholder inclusion (33.6%). This suggests that a window exists for participatory reforms to improve performance. Aligning with this assertion, Fatile and Adejuwon (2016) associated poor governance in Nigeria with established disparities in rural development calling for the practice of community-driven planning. However, counter perspectives from centralised systems in other African countries hold that top-down approaches can achieve swifter infrastructure gains absent local bottlenecks (Moseley et al., 2017), highlighting that Delta State's decentralised setting might better lend itself to hybrid models for context-specific intervention.

Conclusion

This paper has investigated investment in infrastructural deficit on youth rural-urban migration and agricultural productivity in Delta state local government area, Nigeria where agriculture serves as the main stay of most rural households. Based on a mixed-method approach that includes survey analysis (n = 540), focus group discussions, logistic and multiple regression, but also thematic insights, we have overwhelming evidence to indicate strong relationship between bad roads, absence of electricity and irrigation on the one hand, youth heightened migration intention and reduced farming output on the other. Results The main findings suggest that participants who noticed very worse conditions of roads and electricity are 65% more likely to be intended to migrate or migrated (OR =1.65, 95% CI [1.42–1.92], p <. 001). At the same time, the composite infrastructure deficit index was negatively associated with a 18% lower self-reported crop yield (β = –0.32, CI: –0.41 to –0.23, p <. 001). More than 90% of all respondents described the core infrastructure environment as poor to very poor, and electricity was cited as the most significant deficiency. These themes were supported by qualitative narratives that described how poor roads impairs access and post-harvest losses, while unreliable energy supply limits value addition through the erosion of rural life and youth migration.

These also brought to the fore infrastructure deficiencies as a key structural factor in Delta State rural economy, feeding into a vicious cycle of labour exodus, falling productivity and enduring poverty. The waste of these well-educated, motivated young people is not only an immediate blow to agriculture; it puts the long-term future in the Niger Delta for rural innovation and food security at risk. The results have direct policy implications. Prioritising targeted investments in rural roads, affordable energy services and smallholder irrigation schemes, ideally using participatory institutional arrangements that incorporate community preferences, represents the best way forward to retain youth on the farm, secure farm revenues and enhance local food systems. Reinforcing enforcement of current planning

regulations and encouraging public-private partnerships will be necessary to turn these investments into sustainable results.

Recommendations

Some focused implications are made based on the consilient evidence and sources in the analysis. The first is a call for targeted, youth-informed infrastructure investment. The study shows that Better Road Networks (45.7%) and Reliable Electricity Supply (35.2%) are the most pressing needs of youths. A partnership investment programme among the Delta State government, with federal and international partners including the World Bank and AfDB, is encouraged in three areas: Road rehabilitation to link agriculture; decentralised renewable energy for electrification; participatory planning involving youth-led committees.

Second, the report recommends combining agricultural support with facilitating infrastructure, emphasizing the interdependence of instructure and agriculture. This involves connecting investment in irrigation (a priority of 22.4% among young people) with access to modern inputs and credit (25.9%), promoting high-yielding practices and instituting Rural Agro-Processing Zones underpinned by stable power supply and good roads (18.5%). This path seeks to also create agro-processing jobs in rural parts and to reduce unemployment as well as retain the youth with skills in their farms' vicinities.

Finally, improving governance and regulatory compliance are underscored as key to sustainable development. The enforcement of (Nigeria) Urban and Regional Planning, Law 2004 in Delta State ought to be enforced; develop the capacity of the Local Planning Authorities, there should be an open record on provision of power, ensuring that no political pressure is brought to bear on decision taken on rural development. The paper concludes that by keeping an eye on evidence and what works as well anchored in effective governance, the special needs of the rural youth can be attended to through investment in inclusive infrastructure development so that resilience and creativity are developed across Delta State's hinterlands.

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