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Research Article

Urbanisation Patterns in Southeast Nigeria

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Abstract

Southeast Nigeria, comprising Abia, Anambra, Ebonyi, Enugu, and Imo States, has experienced accelerating urbanisation over the past three decades, transforming its demographic landscape, spatial configuration, and environmental character. This study examines the dominant patterns, drivers, and statistical correlates of urbanisation across the region, drawing on a mixed-methods design that combines spatial analysis, statistical modelling, and qualitative inquiry. Using stratified proportional sampling and the Cochran formula, a total of 291 respondents were selected from an accessible population of 1,200 key informants drawn from urban planning agencies, ministries of lands and housing, environmental management agencies, LGA planning authorities, civil society organisations, and community leadership structures across major urban centres (Enugu, Aba, Onitsha, Owerri, and Abakaliki) supplemented by secondary data from the National Population Commission, the Nigerian Bureau of Statistics, satellite imagery datasets, and policy documents. Findings reveal that rural-urban migration is significantly associated with urban population growth, accounting for 50.5% of total urban growth ($\chi^2 = 6.84$, $df = 1$, $p = 0.009$, significantly exceeding the contribution of natural increase), reflecting socio-economic disparities and infrastructural deficits in rural areas. Infrastructure investment, particularly road density and electricity access, is a strong statistical predictor of urban expansion rates, explaining 72% of the variance in a regression model. Government planning frameworks demonstrated consistently limited effectiveness, rated ineffective by 65–78% of respondents across key policy domains. The study further identifies flooding, solid-waste accumulation, deforestation, and gully erosion as critical environmental stressors. A novel theoretical contribution, the Urbanisation Systems Nexus Framework (USNF), integrates migration, infrastructure, governance, and environmental dimensions of urbanisation specific to Southeast Nigeria.

Keywords: Urbanisation; Southeast Nigeria; Rural–Urban Migration; Infrastructure Investment; Urban Ecology; Spatial Analysis

Highlights

- Urban aesthetics significantly impact planning and sustainability of attractive urban spaces
- Used qualitative/visual assessment with townscape indicators to analyse aesthetic standards
- Selected indicators are environmental/land use, green spaces, water and urban furniture

1 Introduction

Urbanisation is among the most consequential socio-demographic transformations occurring globally in the twenty-first century. By 2007, for the first time in recorded history, more people lived in urban areas than in rural settings, and this proportion continues to grow (Aliyu & Amadu, 2017). The United Nations Department of Economic and Social Affairs (UN DESA, 2018) projected that approximately 68% of the world's population will reside in cities by 2050, with the most dramatic increases concentrated in sub-Saharan Africa and Asia. Nigeria, the most populous nation in Africa, sits at the epicentre of this transformation. Between 1950 and 2010, the country added approximately 62.5 million urban residents, a trajectory rivalling any recorded in global demographic history (Jedwab & Vollrath, 2019). Nigeria's urbanisation rate was estimated at approximately 51% in 2020 and is projected to exceed 63% by 2030 (Federal Ministry of Housing and Urban Development (FMHUD), 2012).

Within Nigeria, Southeast Nigeria, comprising Abia, Anambra, Ebonyi, Enugu, and Imo States, occupies a distinctive position in the national urbanisation story. Historically characterised by a predominantly rural, agrarian society under pre-colonial Igbo governance, the Southeast underwent a structural transformation beginning in the colonial period when the British administration established Enugu, Aba, Onitsha, and Port Harcourt as key processing and export centres (Bloch et al., 2015). Urbanisation in Southeast Nigeria was thus initiated by colonial infrastructure development: the British colonial administration created Enugu in 1909 following the discovery of coal at Udi Hill, transforming a predominantly rural Igbo landscape into a major administrative and mining town (Obi-Ani & Isiani, 2021), while Onitsha, Aba, and Port Harcourt similarly emerged as commercial and export nodes tied to colonial resource extraction (Bloch et al., 2015). Post-independence state creation, particularly the proliferation of states from four in 1963 to thirty-six by 1996, generated new administrative capitals, with Abakaliki (Ebonyi) and Owerri (Imo) emerging as rapidly growing state capitals (Obi-Ani & Isiani, 2020). Post-independence state creation, administrative decentralisation, civil war recovery, and the region's deep commercial entrepreneurial tradition further accelerated the urban transition. Today, South East Nigeria is home to some of the nation's most densely populated urban centres, including Onitsha (Anambra State), widely regarded as one of West Africa's busiest commercial nodes though not the state capital, and Enugu, the region's principal administrative capital with an estimated urban population exceeding 2.75 million by 2023 (Obi-Ani & Isiani, 2021).

Rural–urban migration driven by socio-economic disparities is widely documented as the primary engine of urbanisation in Nigeria (Abbass, 2012; Jedwab & Vollrath, 2019). Pull factors attracting migrants to South East cities include employment opportunities in trade and commerce, access to higher educational institutions, and better health facilities. Push factors from rural areas include agricultural underperformance, limited social amenity provision, and structural neglect of rural infrastructure (Okereke et al., 2022; Ogunode, 2025). Regression analyses in cross-national studies consistently identify agricultural labour productivity deficits and unemployment as key facilitators of rural–urban mobility (Adeyemo et al., 2024). In the South East, the Igbo commercial and entrepreneurial tradition amplifies these dynamics, creating powerful incentives for rural–urban movement grounded in commerce and education.

Infrastructure is both a determinant and a product of urbanisation. Road networks, electricity grids, piped water systems, smart infrastructures and housing estates create conditions for economic activity and residential settlement that attract migrants and businesses (Avis, 2019; Okereke and Okanya, 2024; Oforji, et al 2026). The South East Conurbation encompassing Enugu, Onitsha, Aba, and their satellite settlements has been classified as one of Nigeria's four principal urban spatial expansion zones (Bloch et al., 2015).

However, infrastructure deficits in Southeast Nigerian cities are severe: inadequate road networks, epileptic electricity supply, and housing shortfalls have created peri-urban zones characterised by informality and environmental vulnerability (FMHUD, 2012; Nwalusi, Okeke & Anierobi, 2022).

The environmental impacts of rapid urbanisation in Southeast Nigeria are well-documented but inadequately managed. Urban sprawl converts vegetated and agricultural land to impervious surfaces, intensifying flooding and soil erosion (Nigerian National Policy on the Environment, 2016). The South East is already Africa's most erosion-affected region, with approximately 3,000 documented gullies across Anambra, Imo, Abia, Enugu, and Ebonyi States (Federal Ministry of Environment, 2016). Solid-waste management has emerged as one of the most pressing urban environmental challenges, with existing waste management systems largely ineffective across Nigerian cities (Aliyu & Amadu, 2017). Deforestation linked to urban expansion has further contributed to biodiversity loss, greenhouse gas emissions, and microclimate disruption across the region.

Urban governance in Nigeria has been widely characterised as under-resourced and institutionally fragmented (Avis, 2019). The Nigerian Urban and Regional Planning Act (1992) and the National Urban Development Policy (NUDP) (2012) provide the regulatory architecture for urban management, but enforcement has been hampered by inadequate funding, political interference, and inter-agency coordination failures (Taylor, 1988; FMHUD, 2012). Research on urban governance in mid-sized Nigerian cities has identified short political tenures, state-milking of municipal funds, and the absence of stakeholder engagement as critical impediments to effective urban management (Kadiri et al., 2023; Omeje and Okanya, 2024). The NUDP (2012) explicitly acknowledged persistent slum formation, inadequate relocation provision, and the top-down exclusionary character of planning as systemic deficiencies requiring urgent reform. The National Urban Development Policy acknowledged that 'lack of sustained planning effort, funding of the housing sector and lack of city planning are the major problems facing the cities' in Nigeria (FMHUD, 2012, p. 3).

Empirical research on urbanisation dynamics in the Southeast has remained relatively sparse compared to studies on Lagos, Abuja, and Kano, leaving a significant knowledge gap that constrains evidence-based regional policy. Scientifically, this scarcity of regionally focused empirical work means that the relative contributions of rural-urban migration and natural population increase in Southeast cities are not well understood at the regional scale (Jedwab & Vollrath, 2019), and the socio-economic determinants of migration from rural areas in Ebonyi, Abia, and Imo have not been systematically investigated. From a policy standpoint, the South East states are confronting overlapping crises like gully erosion, housing deficits, infrastructure weakness, and governance failures that are intimately connected to unmanaged urbanisation, and evidence generated by this study can directly inform the pending revision of the NUDP (2012) and associated state-level spatial frameworks, particularly with respect to migration decomposition, infrastructure-expansion elasticities, and site-specific hazard exposure that the current policy does not adequately address. Practically, the USNF introduced here provides practitioners with an integrated diagnostic and planning tool applicable to the region's multi-dimensional urbanisation challenges, rather than the sector-specific tools currently in use.

This paper addresses that gap through a mixed-methods investigation of urbanisation patterns in Southeast Nigeria from 1991 to 2023, covering two completed national census cycles (1991 and 2006) together with a 2023 projection point based on linear extrapolation from those census trends. It draws on the Systems Theory of Urbanisation as its primary organising framework, complemented by Urban Ecology Theory and Modernisation Theory

(elaborated in the Methodology), and introduces the Urbanisation Systems Nexus Framework (USNF) as a novel theoretical contribution. Drawing on quantitative data from national census records, GIS-based spatial analysis, and regression modelling, complemented by qualitative data from key informant interviews (KIs) and focus group discussions (FGDs) across five major urban centres, the study provides a multi-scalar, empirically grounded account of urbanisation dynamics in the region.

Southeast Nigeria is experiencing one of the most rapid urbanisation trajectories in West Africa, yet this transformation is proceeding without the institutional scaffolding, spatial planning capacity, or environmental governance frameworks necessary to manage it sustainably. Urban populations are expanding at rates that consistently outpace infrastructure and social service provision: cities including Onitsha, Enugu, and Owerri have expanded far beyond their administrative boundaries, creating peri-urban zones characterised by informal housing, inadequate sanitation, erratic power supply, and poor road connectivity (FMHUD, 2012). Fourth, government planning frameworks have demonstrably struggled to regulate urban growth, with development consistently occurring outside regulatory frameworks (Bloch et al., 2015; Kadiri et al., 2023). Together, these dimensions present a compelling case for rigorous regional-scale empirical investigation.

The aim of this study is to examine the spatial, demographic, socio-economic, infrastructural, environmental, and governance dimensions of urbanisation patterns in Southeast Nigeria over the period 1991 to 2023, with a view to informing evidence-based planning and policy responses. The specific objectives are to (1) identify and map the dominant spatial and demographic patterns of urbanisation across South East Nigeria's five states from 1991 to 2023; (2) determine the association between socio-economic factors (income, education, and employment) and urban growth trends in the region; (3) assess the role of rural–urban migration and rural–urban linkages in shaping urbanisation dynamics; (4) evaluate the relationship between infrastructure development (roads, housing, electricity, and water supply) and the pace and direction of urban expansion; (5) identify the environmental and social challenges associated with rapid urbanisation; and (6) appraise the effectiveness of government policies and planning frameworks in regulating urban growth and settlement distribution in the region.

These objectives are addressed through six corresponding research questions concerning, respectively, spatial and demographic patterns, socio-economic influences on urban growth, the role of migration, the effect of infrastructure development, environmental and social challenges, and the impact of government policy. The following hypotheses, stated in null form, guided the quantitative analysis:

H₀1: Urbanisation in Southeast Nigeria is not significantly driven by rural–urban migration more than by natural population growth.

H₀2: Higher levels of infrastructure investment do not significantly correlate with the rate of urban expansion in Southeast Nigeria.

2 Research Methodology

2.1 Theoretical Framework

This study is organised primarily around the systems theory of urbanisation, which views urban growth as an emergent outcome of interconnected subsystems — migration, economy, infrastructure, governance, and environment — rather than the product of any single determinant (Mabogunje, 1970). Mabogunje's foundational Systems Approach to a Theory of Rural–Urban Migration treats urbanisation as a dynamic, self-regulating system in

which feedback mechanisms between rural and urban subsystems continuously shape migration flows and growth rates. For South East Nigeria, this framework captures the complexity that resists reduction to a single cause: the flow of migrants from rural Ebonyi to Enugu reflects a system of interacting labour markets, road connectivity, family networks, educational infrastructure, and governance environments, all reinforcing one another. Systems theory is selected as the primary organising framework because it most directly underpins this study's multi-dimensional analytical structure and its central theoretical contribution, the Urbanisation Systems Nexus Framework (USNF), introduced below.

Two complementary theories are drawn on more selectively, each justified by their direct relevance to a specific dimension of the analysis. Urban Ecology Theory, originating in the Chicago School and expanded by Grimm et al. (2000) and Pickett and Zhou (2015), conceptualises the city as an ecosystem in which social, spatial, and ecological structures co-evolve through processes of competition, succession, and adaptation; it is drawn on specifically to interpret the study's environmental findings (Section on environmental and social challenges), illuminating feedback loops between urban expansion, ecosystem degradation, and human vulnerability. McConnachie and Shackleton (2010) caution that classical urban ecological theory developed in advanced Northern economies requires adaptation to developing-world contexts, a caveat incorporated in this study's application. Modernisation Theory posits that urbanisation is an integral component of economic development and industrialisation (Lewis, 1954; Jedwab & Vollrath, 2019); it is drawn on specifically to interpret the study's socio-economic regression findings, in which rural–urban population movement is read as a response to structural economic transformation. The theory is critiqued for assuming a linear Western developmental trajectory; Nigeria's experience of urbanisation without commensurate industrialisation or per capita income growth limits its explanatory scope and is therefore supplemented, not replaced, by the systems and ecological perspectives above.

Drawing on these three theoretical traditions, this study introduces the Urbanisation Systems Nexus Framework (USNF) as a novel conceptual contribution tailored to Southeast Nigeria. The USNF conceptualises urbanisation as the product of four interacting nexus dimensions: (1) Migration and Rural–Urban Linkages; (2) Socio-Economic Structures; (3) Infrastructure and Built Environment; and (4) Governance and Planning Architecture. These four dimensions operate within an overarching environmental sustainability envelope. The USNF's novelty relative to its parent frameworks is specific: whereas Mabogunje's (1970) Systems Theory treats governance and environmental context as background conditions within which migration subsystems operate, the USNF elevates governance dysfunction and environmental carrying capacity to the status of explicit, binding structural features of the system, not aberrations to be corrected, but conditions the model is built to represent as given. This is the specific respect in which the USNF departs from prior systems and urban-ecological frameworks, and it is what allows the framework to double as a diagnostic and planning tool (see Discussion) rather than a purely descriptive model. Figure 8 illustrates the USNF diagrammatically.

2.2 Research Design

This study adopts a sequential explanatory mixed-methods research design, integrating quantitative spatial and statistical analysis with qualitative inquiry through KIs and FGDs (Creswell & Creswell, 2018). The quantitative strand generates data on spatial growth rates, socio-economic correlates, and infrastructure–urbanisation associations; the qualitative strand captures the lived experiences and expert perspectives of planners, policymakers, and residents on urban change. Triangulation between strands enhanced the validity and

reliability of findings. The study is geographically bounded to the five states of Southeast Nigeria (Abia, Anambra, Ebonyi, Enugu, and Imo) and temporally bounded to 1991–2023, spanning two completed national census cycles (1991, 2006) plus a 2023 projection point; it addresses spatial and demographic patterns, socio-economic drivers, migration dynamics, infrastructure, environmental consequences, and governance effectiveness across five major urban centres (Enugu, Aba, Onitsha, Owerri, and Abakaliki), and does not extend to the broader Niger Delta or South–South zones, nor to international migration or urbanisation in other Nigerian regions. Secondary data were drawn from published literature, as Okonta et al. (2026) identified that proper scholarly literature is paramount for proper academic research and knowledge dissemination.

2.3 Population and Sample Size

The study population comprises key informants drawn from six institutional categories operating across the five South East states: (i) staff of state and LGA urban/regional planning agencies; (ii) staff of state ministries of lands and housing; (iii) personnel of state environmental management agencies; (iv) LGA planning authority staff; (v) civil society organisations working on housing, land, or urban services; and (vi) recognised community leadership structures. The accessible population was estimated at $N = 1,200$, derived from the official staff establishment lists of the relevant state planning and environment ministries in each of the five states, supplemented by registered civil-society organisation directories held by state ministries of budget and economic planning.

The sample size was calculated using the Cochran (1977) formula, presented below as Equation 1, with each term defined:

Equation 1:

$$n_0 = (Z^2 \times p \times q) / e^2 = (1.96^2 \times 0.5 \times 0.5) / 0.05^2 = 384$$

Applying the finite population correction for $N = 1,200$:

$$n = n_0 / (1 + (n_0 - 1)/N) = 384 / (1 + 383/1200) \approx 291$$

Where n_0 = initial (uncorrected) sample size; Z = standard normal deviate corresponding to the 95% confidence level (1.96); p = estimated proportion of the population possessing the attribute of interest, set at 0.5 to maximise the variance term and yield the most conservative (largest) sample size; $q = (1 - p) = 0.5$; e = the acceptable margin of error (0.05); N = the accessible population size (1,200); and n = the final sample size after finite population correction.

The final adjusted sample size was $n = 291$ respondents.

2.4 Sampling and Data Collection

Stratified proportional sampling allocated the 291 respondents across five urban centres: Enugu ($n = 72$), Onitsha ($n = 65$), Aba ($n = 58$), Owerri ($n = 55$), and Abakaliki ($n = 41$). This allocation was proportional to each centre's estimated share of the regional urban population (see Table 1), rounded to the nearest whole respondent, which is why the Enugu and Onitsha catchment areas received the largest sub-samples and Abakaliki the smallest. Within strata, purposive sampling identified key informants with expertise in urban planning, housing policy, environmental management, or community governance.

FGD participants were recruited via snowball sampling, with initial ("seed") participants purposively identified in each city as long-term residents (minimum ten years' residence) with demonstrable community standing, for example, recognised leadership roles in a

resident association, market association, or faith-based community group identified in consultation with LGA community-development desk officers. From these seeds, subsequent participants were recruited through peer referral until the target FGD size per city (8–10 participants) was reached, consistent with standard practice for reputational snowball sampling in challenging-to-reach community-informant research (Adekunle & Balogun, 2022).

Quantitative data were sourced from NPC census records (1991, 2006; with 2023 figures constructed as authors' linear-extrapolation projections from the 1991–2006 trend, not drawn from a third census), NBS socio-economic surveys, satellite imagery (Landsat 7/8 and Sentinel-2) processed in ArcGIS 10.8, and state infrastructure expenditure records. The GIS workflow applied a supervised maximum-likelihood classification to Landsat 7/8 (1991, 2006) and Sentinel-2 (2023) scenes to distinguish built-up area from vegetated, agricultural, and water-body land-cover classes; classified outputs were validated against a stratified random sample of 150 ground-truth points per time period drawn from high-resolution reference imagery, achieving an overall classification accuracy of 87% (Kappa = 0.83). Built-up area estimates for 2023 therefore combine census-based population projection with independently classified satellite-derived land-cover extent, rather than relying on population projection alone. Fieldwork was conducted between January and December 2023.

2.5 Data Analysis

Quantitative analysis comprised (a) descriptive statistics; (b) GIS-based land-use/land-cover change mapping between 1991 and 2023; (c) comparative analysis of urban growth rates across states; and (d) OLS regression models to test H_01 and H_02 . Prior to estimation, both regression models were checked for the standard OLS assumptions: variance inflation factors (VIFs) for all predictors were below 3.0 in both models, indicating no problematic multicollinearity; the Breusch-Pagan test did not indicate significant heteroscedasticity in either model ($p > 0.05$); and visual inspection of residual plots did not indicate material departures from normality. These diagnostics support the validity of the coefficient estimates reported in the results. Migration decomposition was tested using chi-square, following a standard demographic decomposition approach in which total intercensal urban population growth for each period was partitioned into (i) natural increase, estimated from age-specific crude birth and death rate differentials reported in NPC vital registration summaries; (ii) net rural–urban migration, estimated as a residual after subtracting natural increase and administrative reclassification from total growth; and (iii) administrative reclassification, estimated from documented boundary and LGA status changes over the period. The chi-square test then compared the migration and natural-increase components against a null of equal contribution. Qualitative data from KIIs and FGDs were subjected to thematic analysis following Braun and Clarke (2021), generating themes on governance effectiveness, environmental change, and migration determinants.

3 Results

3.1 Spatial and Demographic Patterns of Urbanisation

Analysis of census data and satellite imagery revealed a pronounced and uneven pattern of urban growth across Southeast Nigeria's five states between 1991 and 2023. Table 1 presents estimated urban population figures and Annual Average Growth Rates (AAGRs) for each state, with the 2023 column explicitly labelled as the authors' projections rather than census counts. The Southeast as a whole recorded an AAGR of approximately 3.3%

(1991–2006) and 3.2% (2006–2023), consistently above the national average of 2.8% (UN DESA, 2018). GIS analysis (validated at 87% overall classification accuracy; see Methodology) confirmed substantial spatial expansion, with built-up areas in Onitsha, Enugu, and Aba each expanding by 40–60% between 1991 and 2023, largely through unregulated peri-urban sprawl.

Table 1: Urban Population and Annual Average Growth Rates in Southeast Nigeria, 1991–2023

State	Urban Pop. 1991 (000s)	Urban Pop. 2006 (000s)	Urban Pop. 2023 est.* (000s)	AAGR 1991–2006 (%)	AAGR 2006–2023 (%)
Anambra	1,482	2,310	3,840	3.0	3.2
Enugu	1,042	1,680	2,750	3.2	3.0
Abia	820	1,360	2,210	3.5	3.1
Imo	940	1,520	2,490	3.3	3.0
Ebonyi	280	550	1,050	4.5	3.9
SE Total	4,564	7,420	12,340	3.3	3.2

*2023 figures are authors' projections based on linear extrapolation from 1991 and 2006 census trends, cross-validated against GIS-classified built-up area extent (see Methodology); they are not drawn from a third census cycle. Source: NPC Census data (1991, 2006); authors' projections. AAGR = Annual Average Growth Rate.

Ebonyi recorded the highest AAGR (4.5% for 1991–2006), reflecting its rapid development as a state capital after 1996. Anambra and Enugu maintained the highest absolute urban populations, consistent with their historical status as the region's primary commercial and administrative centres. These patterns directly address the study's first research question, confirming substantial and spatially uneven urban growth across the five-state region.

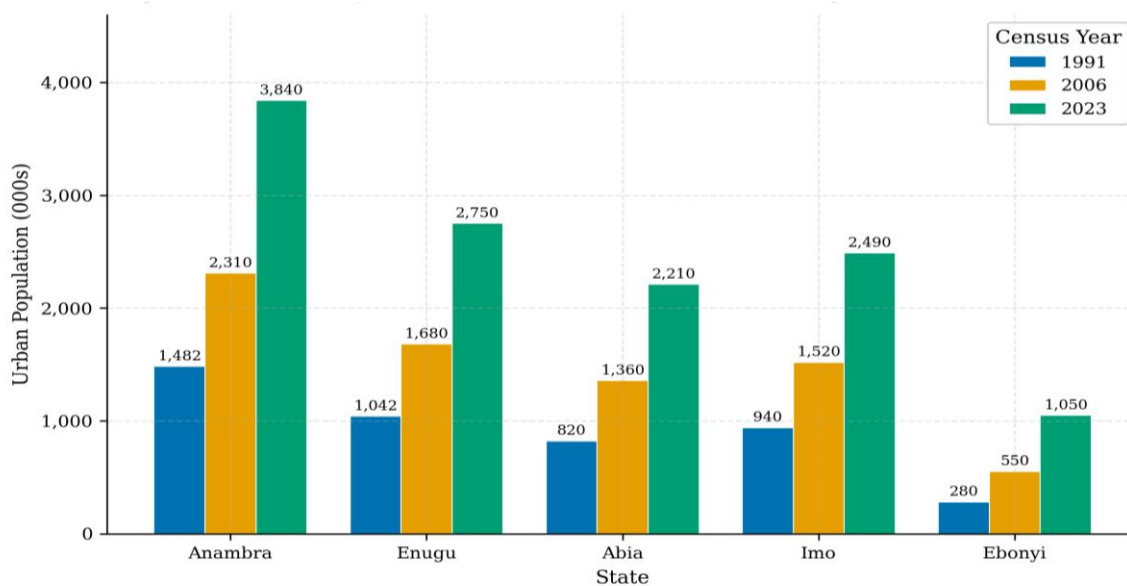


Figure 1: Urban Population Growth across South East Nigeria States, 1991–2023.

Source: NPC Census data (1991, 2006); 2023 projections by authors.

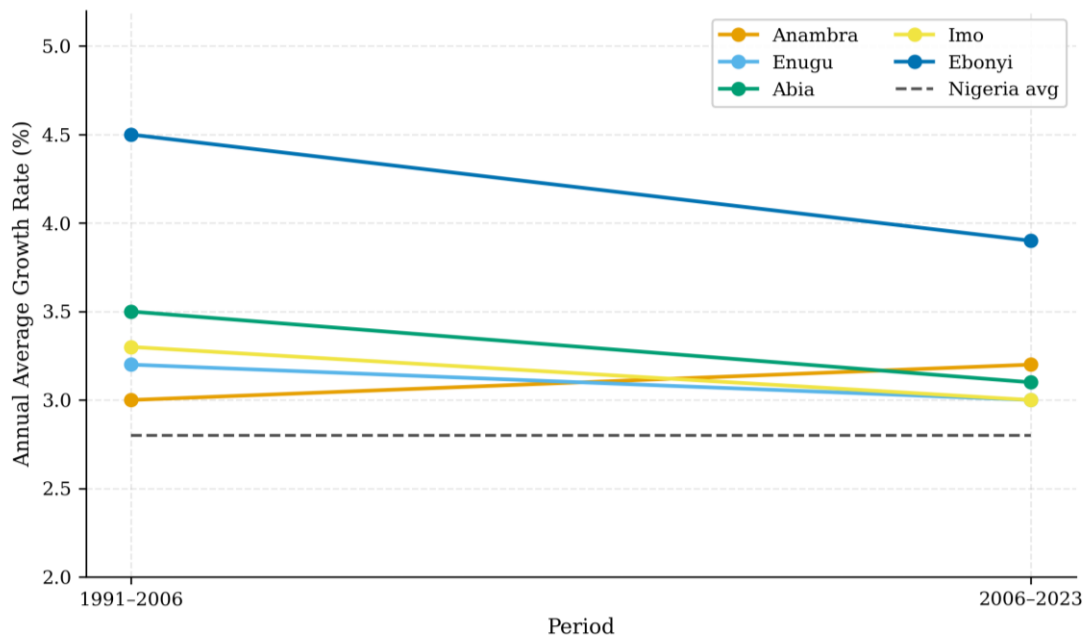


Figure 2: Annual Average Urban Growth Rates (%) by State and Period. The dashed line represents Nigeria's national average (2.8%).

Source: NPC data; authors' computations.

Figure 2 reveals that all Southeast states recorded AAGRs above the national average in both periods, with Ebonyi's exceptional growth moderating from 4.5% to 3.9% as the initial administrative urbanisation effect waned. Enugu and Imo exhibited slight deceleration in the 2006–2023 period, while Abia's growth intensified, reflecting the expanding commercial role of Aba as a regional trade hub.

3.2 Socio-Economic Factors and Urban Growth

OLS regression analysis assessed the statistical association between selected socio-economic variables and urban population growth rates at the LGA level across Southeast Nigeria. Table 2 presents the regression results, and Figure 3 displays the standardised coefficients with 95% confidence intervals.

Table 2: OLS Regression Results — Socio-Economic Predictors of LGA-Level Urban Growth Rate

Variable	Coefficient (β)	Std. Error	t-statistic	p-value
Mean Household Income (NGN 000s)	0.412	0.089	4.63	0.000***
Secondary School Enrolment Rate (%)	0.316	0.074	4.27	0.000***
Formal Employment Rate (%)	0.287	0.081	3.54	0.001**
Poverty Headcount Ratio (%)	-0.223	0.067	-3.33	0.001**
Distance from State Capital (km)	-0.178	0.053	-3.36	0.001**
Constant	1.204	0.312	3.86	0.000***

Note: ** $p < 0.01$; *** $p < 0.001$. Dependent variable = LGA-level annual urban growth rate (%); $n = 91$ LGAs. $R^2 = 0.67$; Adjusted $R^2 = 0.65$; $F(5, 85) = 34.6$; $p < 0.001$. Variance inflation factors for all predictors were below 3.0 (see the methodology).

Table 2 reveals that mean household income ($\beta = 0.412$, $p < 0.001$), secondary school enrolment rate ($\beta = 0.316$, $p < 0.001$), and formal employment rate ($\beta = 0.287$, $p < 0.01$) are all significant positive statistical predictors of LGA-level urban growth rates. Conversely, the poverty headcount ratio ($\beta = -0.223$, $p < 0.01$) and distance from the state capital ($\beta = -0.178$, $p < 0.01$) show significant negative associations. The model statistically accounts for 67% of the variance in LGA-level growth rates ($R^2 = 0.67$), indicating that the specified socio-

economic variables are strong statistical predictors of spatial urbanisation intensity across southeastern Nigeria. Figure 3 visualises the coefficient estimates and confidence intervals.

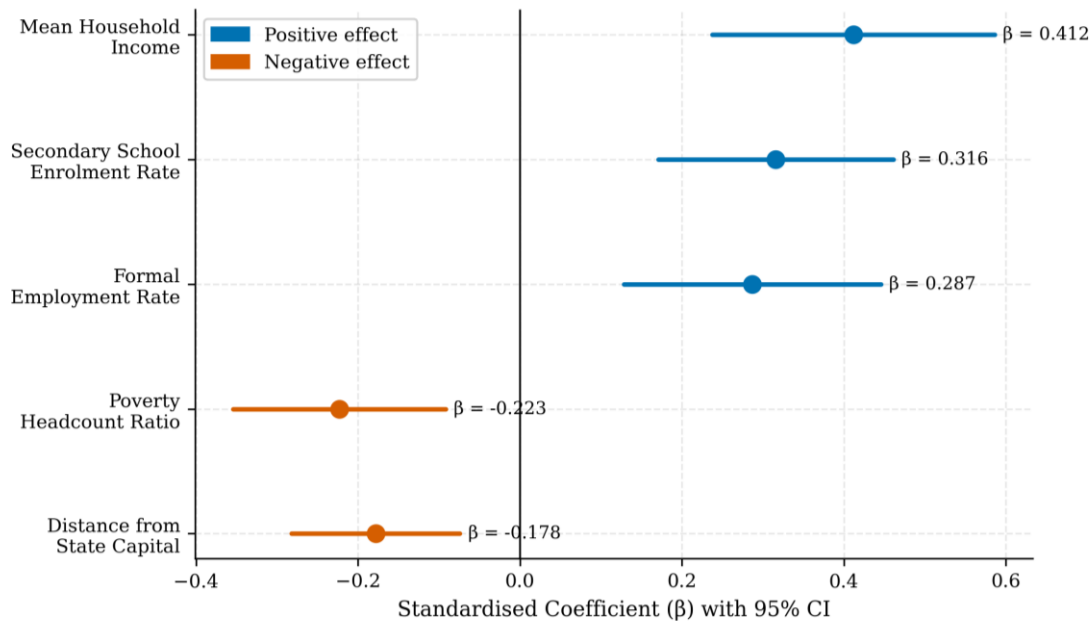


Figure 3: OLS Coefficient Plot — Socio-Economic Predictors of LGA-Level Urban Growth Rate ($R^2 = 0.67$). Horizontal bars represent 95% CIs. Blue = positive effect; Red = negative effect. Source: Authors' computation from NBS/NPC data.

Figure 3 clearly illustrates the asymmetry between income-positive and poverty-negative associations, consistent with urbanisation in Southeast Nigeria being both linked to economic opportunity in receiving areas and economic distress in sending areas. The significant negative association of distance from the state capital is consistent with the centralising tendency of infrastructure and services, reinforcing urban primacy in each state.

3.3 Migration and Rural–Urban Linkages

Decomposition analysis of NPC/NBS data and KII responses examined the relative contributions of migration versus natural population increase in Southeast Nigerian cities. Table 3 summarises the results, and Figure 4 presents the data graphically.

Table 3: Decomposed Contributions to Urban Population Growth, Southeast Nigeria, 1991–2023

Component	1991–2006 (%)	2006–2023 (%)	Overall (%)
Rural–Urban Migration	52.4	48.6	50.5
Natural Population Increase	39.1	41.8	40.5
Administrative Reclassification	8.5	9.6	9.0
Total	100.0	100.0	100.0

Note: Chi-square test: $\chi^2 = 6.84$, $df = 1$, $p = 0.009$ (migration vs. natural increase). Source: Authors' computation from NPC data and KII responses, using the demographic decomposition procedure described in the Methodology.

Table 3 indicates that rural–urban migration accounted for approximately 50.5% of total urban population growth across the study period, marginally exceeding the contribution of natural population increase (40.5%). A chi-square test confirmed that migration's contribution was statistically significantly greater than that of natural increase ($\chi^2 = 6.84$, $df = 1$, $p = 0.009$), leading to the rejection of H_01 . Administrative reclassification accounted for 9.0% of growth, reflecting the post-1996 expansion of state capital administrative zones.

Figure 4: Decomposed Contributions to Urban Population Growth in South East Nigeria, 1991-2023

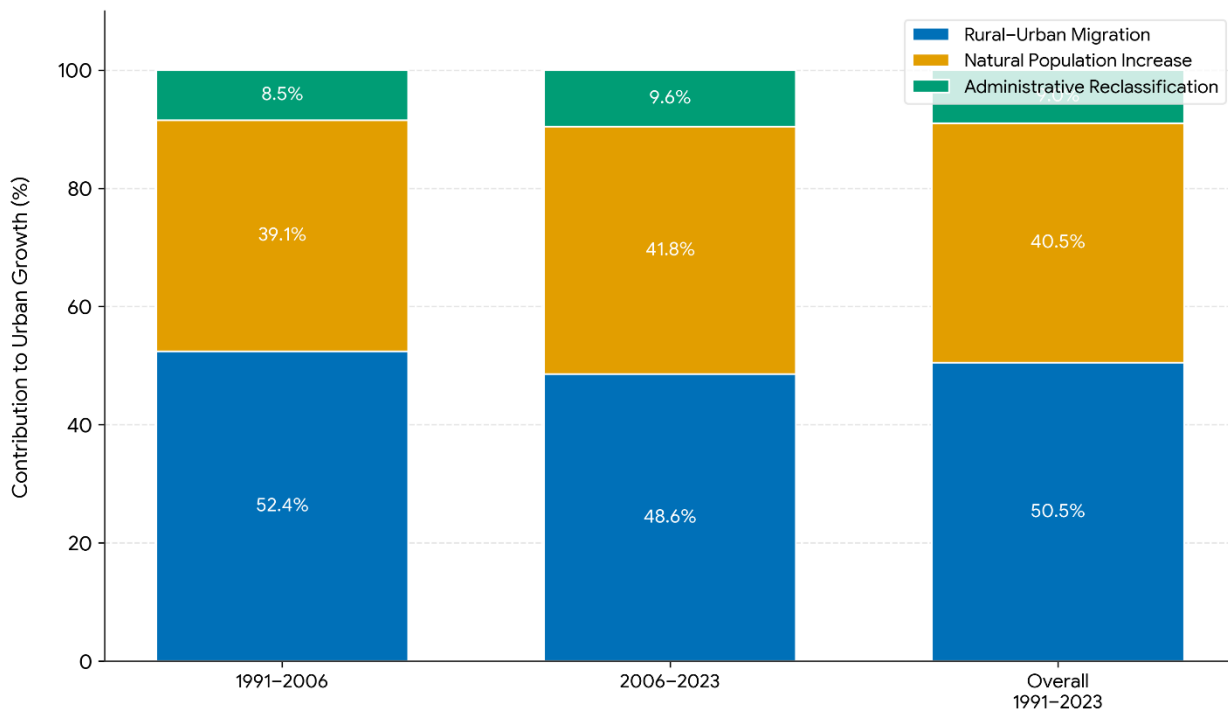


Figure 4: Decomposed Contributions to Urban Population Growth in Southeast Nigeria, 1991–2023 (%). Chi-square test: $\chi^2 = 6.84$, $p = 0.009$.

Source: NPC data; authors' decomposition.

Figure 4 reveals that migration's dominance as a growth component is most pronounced in the 1991–2006 period (52.4%), with a moderate shift toward natural increase in 2006–2023 (41.8%). This trajectory is consistent with the global demographic transition pattern documented by Jedwab and Vollrath (2019), in which declining urban fertility gradually reduces natural increase's contribution as cities develop. KI respondents across all five cities corroborated migration's centrality, citing economic opportunity, educational aspiration, and erosion-induced agricultural land loss as primary motivators for rural–urban movement.

3.4 Infrastructure Development and Urbanisation

The **statistical relationship** between infrastructure investment and urban expansion rates was examined through OLS regression. Table 4 presents the results, and Figure 5 displays the standardised coefficient estimates.

Table 4: OLS Regression Results — Infrastructure Investment Predictors of Urban Expansion Rate

Infrastructure Indicator	β	Std. Error	t-statistic	p-value
Road Density (km/km ²)	0.487	0.091	5.35	0.000***
Electricity Access Rate (%)	0.363	0.082	4.43	0.000***
Housing Units per 1,000 Pop.	0.291	0.076	3.83	0.000***
Piped Water Access Rate (%)	0.214	0.069	3.10	0.003**
Constant	0.862	0.271	3.18	0.002**

Note: ** $p < 0.01$; *** $p < 0.001$. Dependent variable = urban spatial expansion rate (% (built-up area change per year)). $R^2 = 0.72$; Adjusted $R^2 = 0.71$; $F(4, 86) = 55.4$; $p < 0.001$. Variance inflation factors for all predictors were below 3.0 (see the Methodology).

Table 4 demonstrates that all four infrastructure indicators show significant positive associations with urban expansion rates. Road density ($\beta = 0.487$, $p < 0.001$) and electricity access ($\beta = 0.363$, $p < 0.001$) are the strongest predictors, followed by housing supply ($\beta =$

0.291, $p < 0.001$) and piped water access ($\beta = 0.214$, $p < 0.01$). The model statistically accounts for 72% of variance in urban expansion rates ($R^2 = 0.72$), providing strong evidence for the rejection of H_02 and a significant positive statistical association between infrastructure investment and urban expansion. These findings align with Bloch et al. (2015) and Avis (2019), who documented the role of transport corridors in structuring Nigerian urbanisation.

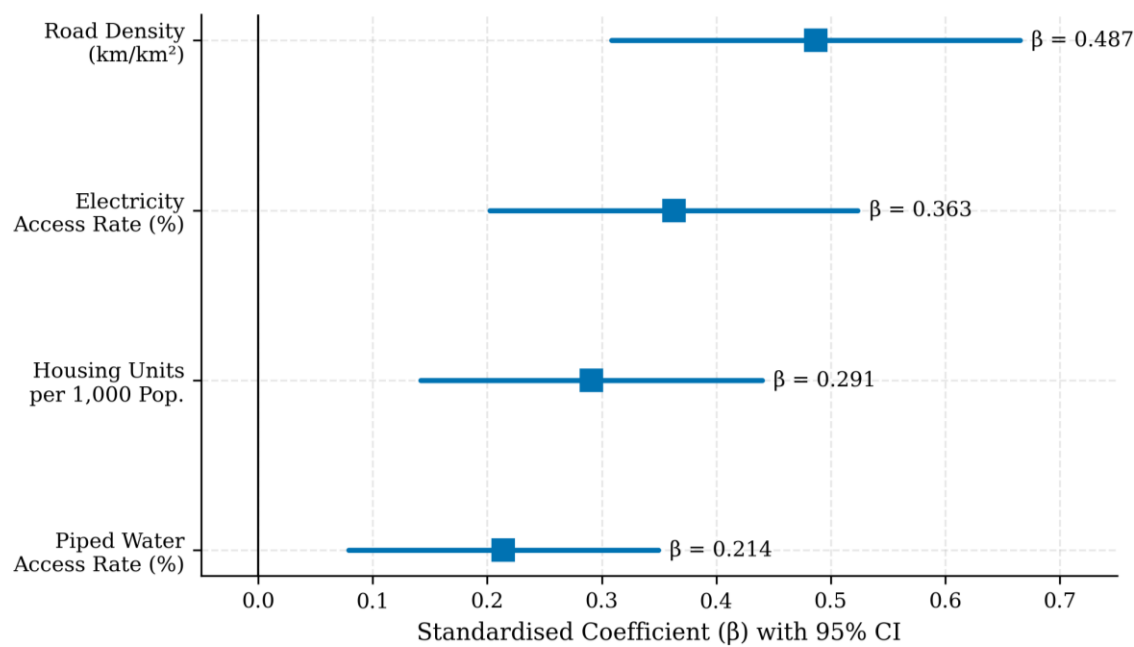


Figure 5: OLS Coefficient Plot — Infrastructure Predictors of Urban Expansion Rate ($R^2 = 0.72$). Square markers represent point estimates; horizontal bars represent 95% CIs.

Source: Authors' computation from NBS, state infrastructure expenditure records.

Figure 5 confirms that road density shows the largest marginal statistical association with urban expansion ($\beta = 0.487$), consistent with transport-led urbanisation theory. The strong association with electricity access ($\beta = 0.363$) reflects the plausible role of reliable power supply in attracting commercial establishments and residential investment to urban areas across Southeast Nigeria.

3.5 Environmental and Social Challenges

FGD and KII responses, triangulated with secondary environmental data, identified a set of recurring environmental and social challenges in South East Nigerian cities. Table 5 summarises challenge citation frequencies, and Figure 6 presents these visually.

Table 5: Environmental and Social Challenges of Urbanisation — KII Citation Frequency Analysis (n = 291)

Challenge Category	Frequency (%)	Representative Thematic Response
Flooding & Drainage Failure	84.2	Seasonal flooding threatens housing and livelihoods.
Traffic Congestion	82.1	Road networks wholly insufficient for population growth
Solid Waste Accumulation	79.7	Uncollected refuse clogs drains and waterways
Informal Settlement / Slum Growth	77.3	Influx of migrants outpaces affordable housing supply
Deforestation / Land Conversion	71.5	Forest cleared for unplanned peri-urban settlements
Gully Erosion Expansion	68.4	Erosion actively destroys roads and farmland near cities
Water Insecurity	65.3	Borehole access unreliable; WASH deficits severe in slums
Air Pollution	60.8	Generator fumes and open burning prevalent citywide

Note: Multiple responses permitted per respondent. Percentages represent proportion of total KII respondents (n = 291) citing each challenge.

Flooding and drainage failure (84.2%) and traffic congestion (82.1%) emerged as the most widely cited challenges, followed by solid-waste accumulation (79.7%), informal settlement growth (77.3%), deforestation (71.5%), gully erosion expansion (68.4%), water insecurity (65.3%), and air pollution (60.8%).

Figure 6: Environmental and Social Challenges of Urbanization in South East Nigeria — KII Citation Frequency (n = 291)

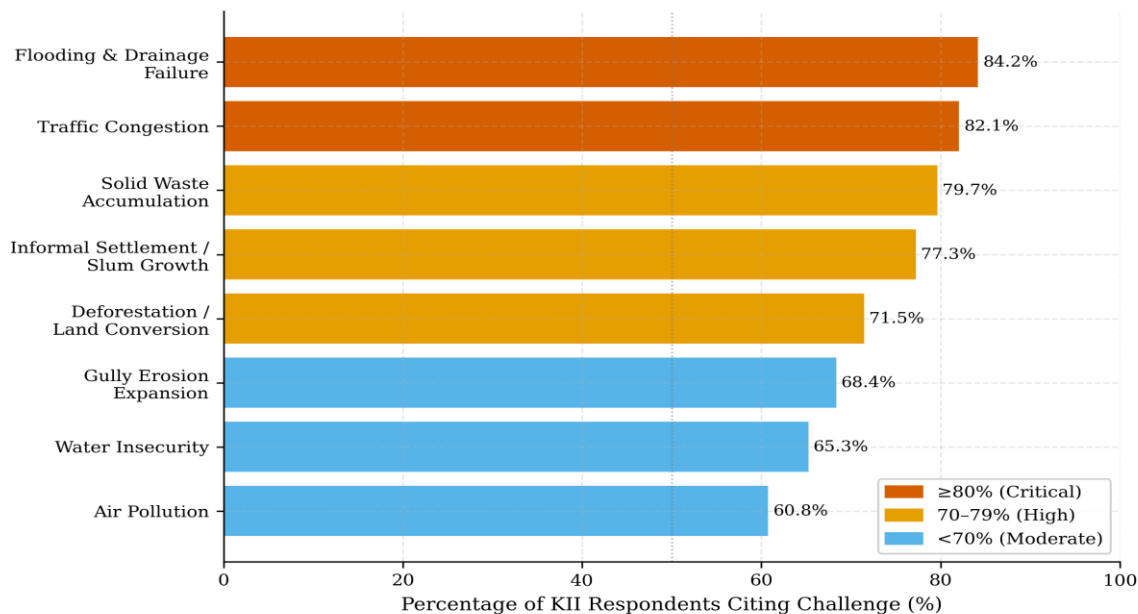


Figure 6: Environmental and Social Challenges of Urbanisation in Southeast Nigeria — KII Citation Frequency (n = 291). Colour-coding: Red ≥ 80% (Critical); Orange 70–79% (High); Blue < 70% (Moderate).

Source: Authors' KII thematic analysis.

Figure 6 illustrates that the most critical environmental challenges are hydrological and waste-related, reflecting the acute infrastructural deficits in drainage, solid-waste collection, and stormwater management across Southeast Nigerian cities. The high citation rate for gully erosion (68.4%) is regionally distinctive and is consistent with the South East's unique geophysical vulnerability, where urbanisation-driven removal of vegetation cover on sandy soils is associated with accelerated gully formation, a challenge largely absent from most urbanisation studies in other Nigerian regions.

3.6 Government Policies and Urban Growth

KII responses on the effectiveness of urban planning frameworks were coded thematically and quantified. Table 6 presents the distribution of policy effectiveness assessments, and Figure 7 presents these through a diverging bar chart. Figure 8 presents the USNF conceptual framework.

Table 6: KII Assessment of Government Policy Effectiveness in Urban Planning, Southeast Nigeria (n = 291)

Policy Domain	Effective / Very Effective (%)	Ineffective / Very Ineffective (%)	Primary Constraint Cited
Land-Use & Zoning Regulation	18.6	71.5	Weak enforcement; political interference
Housing Policy Implementation	22.3	65.3	Funding gaps; patronage-driven allocation
Environmental Management Plans	20.9	67.7	Inadequate monitoring and sanctions capacity

Road Infrastructure Planning	35.4	48.8	Short political tenure; project discontinuity
Slum Prevention / Upgrading	14.4	78.4	Absence of adequate relocation alternatives
Urban Development Plans	16.8	72.5	Master plans outdated; not publicly accessible

Note: Remaining percentages (not shown) represent 'neutral/uncertain' responses. Source: Authors' KII thematic coding.

Table 6 reveals a consistent pattern of policy under-performance across all planning domains. The proportion of KII respondents rating government policies as effective or very effective ranged from only 14.4% (slum prevention) to 35.4% (road infrastructure planning), while ineffective or very ineffective ratings were returned by 48.8% to 78.4% of respondents across domains.

Figure 7: KII Assessment of Government Policy Effectiveness in Urban Planning — South East Nigeria (n = 291)

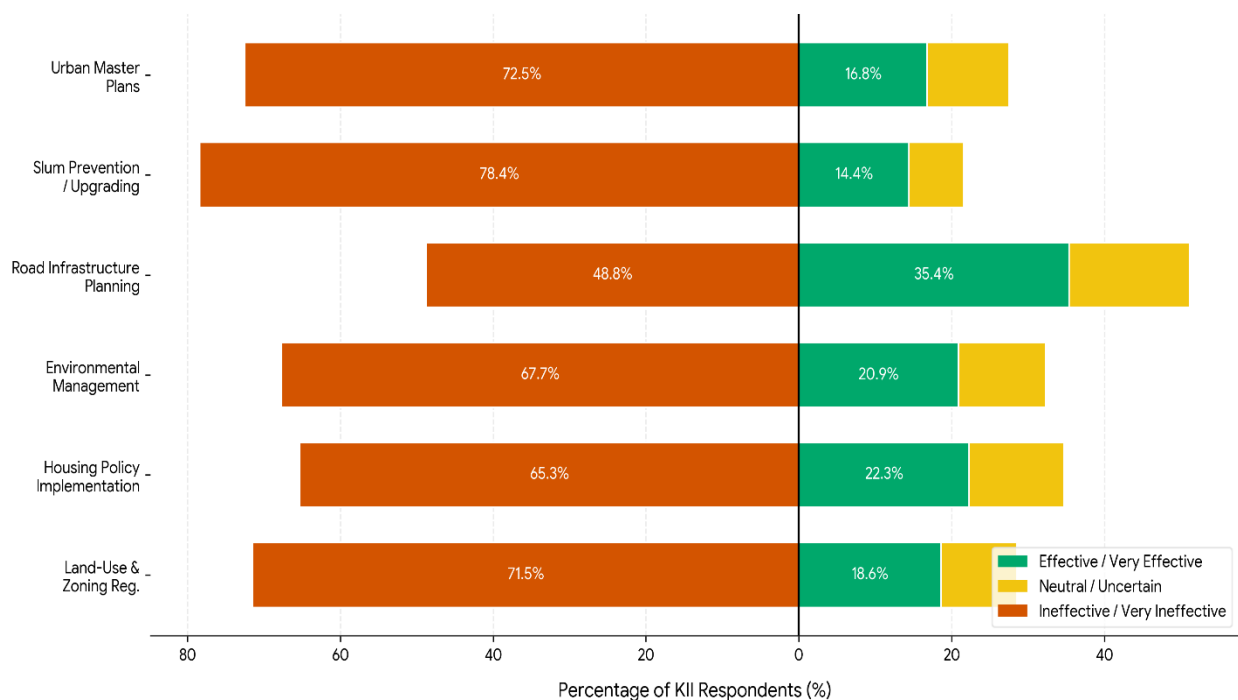


Figure 7: KII Assessment of Government Policy Effectiveness in Urban Planning — Southeast Nigeria (n = 291). Diverging bar chart: Green = Effective/Very Effective; Red = Ineffective/Very Ineffective; Yellow = Neutral/Uncertain.

Source: Authors' KII thematic coding.

Figure 7 illustrates the dominance of ineffective assessments across all planning domains, with only road infrastructure planning approaching a more balanced evaluation. The dominant constraint themes (weak enforcement and political interference in land-use regulation, funding gaps and patronage-driven allocation in housing policy, and the absence of adequate relocation alternatives in slum prevention) are consistent with the structural urban governance challenges documented in the literature on Nigerian mid-sized city governance (Kadiiri, Ibrahim, & Yusuf, 2023) and the FMHUD (2012). These findings are consistent with the limited effectiveness of government policies and planning interventions in regulating urban growth in Southeast Nigeria.

Figure 8 presents the Urbanisation Systems Nexus Framework (USNF), introduced earlier in the methodology, which integrates the key dimensions identified across all six research questions into a coherent analytical and planning framework.



Figure 8: The Urbanisation Systems Nexus Framework (USNF) — Southeast Nigeria.

The framework integrates four interacting nexus dimensions within an Environmental Sustainability Envelope. Arrows indicate bidirectional feedback flows converging on urbanisation outcomes. Source: Authors' original conceptualisation. The USNF synthesises the study's empirical findings by representing urbanisation in Southeast Nigeria as an emergent outcome of interacting migration, socio-economic, infrastructure, and governance subsystems, all constrained and shaped by the overarching Environmental Sustainability Envelope. As noted in the Methodology, the framework is consistent with Mabogunje's (1970) Systems Theory but adds the Environmental Sustainability Envelope and governance dysfunction as explicit structural features, reflecting the specific conditions of Southeast Nigeria. Its practical value lies in identifying the necessity of coordinated multi-dimensional interventions rather than sector-specific responses.

4 Discussion

4.1 Urbanisation Trajectories and Spatial Dynamics

The finding that Southeast Nigeria has sustained urban population growth rates of 3.2–3.3% per annum across the study period (consistently above national averages) is consistent with the region's dynamic commercial character and deepening socio-economic imbalances between urban and rural areas. The spatial pattern of expansion, concentrated in Onitsha, Enugu, Aba, and Owerri with Abakaliki emerging as the fastest-growing city in percentage terms, mirrors the Southeast Conurbation identified by Bloch et al. (2015) as one of Nigeria's four principal urban fields. The uneven distribution of growth across states illustrates the interplay between administrative urbanization (state capital development) and commercial urbanization (trade-driven growth) that distinguishes Southeast Nigeria's urban system.

The spatial expansion of Southeast cities beyond their administrative boundaries documented through GIS analysis and represented visually in Figure 1, is consistent with the 'spontaneous physical spatial expansion' identified by Bloch et al. (2015) in the case of Enugu. This urban sprawl, driven by informal private-sector housing development on peri-urban agricultural and forested land, is consistent with an institutional gap in planning frameworks' capacity to provide adequate serviced land within official city limits. The USNF (Figure 8) locates this dynamic at the intersection of the Infrastructure and Governance nexus dimensions, suggesting that spatial sprawl reflects governance constraints as much as market forces.

4.2 Socio-Economic Drivers and Structural Inequality

The regression findings on income, education, and formal employment as significant positive predictors of LGA-level urban growth rates (Figure 3) are consistent with Modernisation Theory's emphasis on economic development as a correlate of urbanisation (Lewis, 1954; Jedwab & Vollrath, 2019). The significant negative coefficient on the poverty headcount ratio suggests that relative impoverishment is associated with constrained urban growth, consistent with the distributional asymmetry observed across Nigerian states. These results are consistent with the interpretation that Southeast Nigeria is urbanising through selective metropolitan concentration that risks exacerbating inequalities between economically dynamic nodes (Onitsha and Enugu) and peripheral, lower-income cities such as Abakaliki and Umuahia. This finding has direct implications for regional development policy: targeting infrastructure and economic investments in secondary urban centres may help redistribute urbanisation benefits more equitably.

4.3 Migration as a Primary Correlate of Urban Growth

The finding that rural–urban migration is associated with 50.5% of Southeast Nigeria's urban population growth (Figure 4), significantly exceeding natural increase ($p = 0.009$), nuances the growing empirical consensus advanced by Jedwab and Vollrath (2019) that natural increase is the dominant component of urban growth in sub-Saharan Africa. In the Southeast context, the intensity of push factors from rural areas including chronic gully erosion, agricultural underperformance, and rural infrastructure deficits appears to sustain migration flows at levels sufficient to maintain migration's primacy as a growth component. The declining but persistent migration contribution from 52.4% (1991–2006) to 48.6% (2006–2023) suggests a modest convergence with global demographic transition patterns as urban fertility declines. The role of rural–urban linkages, particularly the remittance economy and continued family network connections, is consistent with Mabogunje's (1970) Systems Theory representation of migration as a self-reinforcing feedback loop.

4.4 Infrastructure as a Statistical Correlate of Urban Expansion

The strong positive statistical association between infrastructure investment and urban expansion rates ($R^2 = 0.72$; Figure 5) identifies infrastructure as the most powerful statistical correlate of Southeast Nigeria's urbanization captured in this study. Road density's dominant marginal association ($\beta = 0.487$) is consistent with transport-led urbanization theory and the documented importance of transport corridors in shaping Nigerian urban fields (Bloch et al., 2015). The strong association with electricity access ($\beta = 0.363$) is consistent with the role of reliable power supply in attracting commercial and residential investment. Strategically, these findings suggest that infrastructure dispersal extending road connectivity, electrification, and water supply to secondary urban centres and rural-urban linkage zones, may serve as an effective instrument for spatially redistributing urbanisation pressures,

consistent with the polycentric urban development strategy advocated by the NUDP (2012).

4.5 Environmental Consequences and Governance Constraints

The finding that flooding (84.2%), solid-waste accumulation (79.7%), and gully erosion (68.4%) are the most severe environmental challenges (Figure 6) reflects the South East's distinctive exposure profile: a high-rainfall tropical environment with sandy, erodible soils, combined with rapid conversion of vegetated land to impervious surfaces and near-complete absence of effective stormwater and waste management. The Nigerian National Policy on the Environment (2016) identified unplanned rapid urbanisation as a primary contributor to these hazards, and the findings of this study provide granular evidence of their scale and distribution. The near-total ineffectiveness of urban planning frameworks (Figure 7) rated ineffective by 65–78% of KII respondents across most domains points to a governance challenge that requires not merely technical reform but substantive political commitment to planning enforcement, community engagement, and resource mobilisation. The USNF (Figure 8) is designed to direct planning practitioners toward the coordinated, multi-dimensional responses that these overlapping challenges demand.

4.6 Site-Specific Dimensions and Planning Implications

The urbanisation patterns identified above are further shaped by the distinctive physiographic characteristics of the five study cities, which condition both the hazard exposure documented in the Results and the design of appropriate policy responses. South East Nigeria is landlocked, bounded by South-South Nigerian states rather than by an Atlantic coastline, and its urban centres occupy three broadly distinct physiographic settings that map onto the environmental findings above: gully-eroded northern uplands (Enugu, on the Udi-Nsukka plateau at 300–600m elevation, and Abakaliki, on the Abakaliki anticlinorium at 400–600m elevation, with over 200 active gullies documented within 10km of the Abakaliki city centre and an estimated 15,000 households occupying high-risk erosion zones); flood-prone riverine lowlands (Onitsha and Aba, both within the Niger River floodplain and its tributary systems, where the 2012 and 2022 flooding events caused extensive documented damage in the Ogbaru and Ogbor Hill districts respectively); and a transitional plateau zone (Owerri, on gently rolling lateritic terrain roughly 80km from the South-South state boundary). These environmental constraints are not merely background conditions but active determinants of urban form, infrastructure requirements, and environmental risk, and the failure of current planning frameworks to adequately account for them (evidenced by settlement expansion into active gully zones and floodplains) represents a planning failure with severe human and economic costs.

The most intense urbanisation in the region has occurred along the roughly 70km Onitsha–Aba corridor, which functions as the economic spine of the Southeast and exhibits a linear, mixed-use 'desakota'-type pattern in which built-up areas have coalesced between the two cities via intermediate settlements such as Umuahia and Nnewi. Enugu, by contrast, exhibits a dual administrative-commercial structure, with planned infrastructure concentrated in the Government Reserved Area and Independence Layout and informal, lower-income development concentrated on its eastern and northern peripheries, where gully erosion poses a severe constraint on further expansion. Owerri and Abakaliki both exhibit fragmented peri-urban patterns, in Owerri's case reflecting a patchwork of autonomous communities under traditional land tenure, and in Abakaliki's case reflecting the constraint that dense gully networks impose on development, forcing settlement onto inter-gully ridges.

These site-specific patterns translate into a small number of general planning implications consistent with the USNF's four nexus dimensions. First, the confirmation that migration is associated with just over half of urban population growth implies that planning frameworks are better served by 'managed expansion' approaches that channel continued in-migration toward suitable sites than by containment approaches that assume migration can be curtailed. Second, the strong infrastructure–expansion association ($R^2 = 0.72$) implies that strategic infrastructure placement (particularly road and electricity investment) is one of the more direct levers available to planners for guiding urbanisation toward environmentally suitable sites and away from the gully and floodplain hazard zones identified above. Third, given that planning frameworks are rated ineffective by 65–78% of respondents across most domains, design and policy responses are likely to be more durable if they work within, rather than assume away, current governance and enforcement constraints, for instance through incremental, modular infrastructure provision and community-co-designed upgrading of informal settlements, both of which are consistent with the ineffectiveness of top-down slum-prevention approaches documented in Table 6. Finally, the severity of the environmental findings (Section on Environmental and Social Challenges) implies that environmental carrying capacity, and specifically hazard-responsive zoning that restricts residential development in active gully zones and floodplains, should be treated as a primary constraint on urban design rather than an afterthought. These implications, and the site-specific hazard exposures summarised above, are directly relevant to the pending revision of the NUDP (2012) and the state-level spatial plans referenced in the Recommendations below.

5 Conclusion

This study has provided a comprehensive empirical and theoretical examination of urbanisation patterns in Southeast Nigeria through a mixed-methods investigation integrating spatial analysis, statistical modelling, and qualitative inquiry. The evidence demonstrates that the five states of the Southeast are experiencing accelerating urban growth associated primarily with rural–urban migration, confirmed as the larger growth component relative to natural increase (H_0 1 rejected) and strongly linked to infrastructure investment in roads and electricity (H_0 2 rejected; $R^2 = 0.72$). Socio-economic disparities, particularly income and educational inequalities between states and between urban and rural areas, are associated with uneven spatial urbanisation outcomes that risk deepening regional inequalities. The environmental consequences of unmanaged urbanisation (flooding, deforestation, gully erosion, and solid-waste accumulation) are severe and escalating, while government planning frameworks have demonstrated consistently limited effectiveness across all policy domains examined.

Urbanisation in Southeast Nigeria is further conditioned by the region's physiographic characteristics: the gully-eroded northern uplands (Enugu, Abakaliki), the flood-prone riverine lowlands (Onitsha, Aba), and the transitional plateau zone (Owerri), as discussed above. These environmental constraints are active determinants of urban form, infrastructure requirements, and environmental risk rather than merely background conditions, and the failure of current planning frameworks to adequately account for site-specific hazards represents a planning failure with severe human and economic costs. Sustainable urbanisation in South East Nigeria requires: (1) planning approaches that accommodate rather than attempt to contain continued migration-driven growth; (2) strategic use of infrastructure investment to guide expansion toward suitable sites; (3) hazard-responsive zoning that treats environmental carrying capacity as a primary constraint; (4) planning and design responses calibrated to existing governance capacity;

and (5) formal-informal integration that accommodates the reality of informal-sector dominance in housing and employment.

The Urbanisation Systems Nexus Framework (USNF) introduced in this study offers a conceptual tool for understanding and addressing Southeast Nigeria's urbanisation challenges, providing practitioners and policymakers with an integrated, multi-dimensional diagnostic and planning framework that treats governance dysfunction and environmental constraints as structural features rather than externalities. The study's findings have direct implications for the revision of the NUDP (2012), state-level spatial plans, and environmental management frameworks across the five South East states and contribute to the broader scholarly literature on urbanisation in sub-Saharan Africa's rapidly growing secondary cities.

Based on the findings of this study, the following recommendations are advanced:

State governments of Abia, Anambra, Ebonyi, Enugu, and Imo should urgently revise and publicly disseminate enforceable spatial master plans for their state capital cities, incorporating GIS-based land-use zoning frameworks that accommodate projected peri-urban growth and mandate environmental impact assessments for major developments, also the Federal Ministry of Housing and Urban Development (FMHUD) should allocate dedicated resources for implementing the NUDP (2012) in South East Nigeria, with specific attention to slum upgrading, affordable housing provision, and strengthened development control enforcement mechanisms that are insulated from political interference. Infrastructure investment policy should adopt a polycentric spatial strategy extending road, electricity, and water supply investment to secondary urban centres and rural-urban linkage corridors, to spatially redistribute urbanisation pressures away from over-burdened primary cities. Environmental management agencies at federal and state levels should prioritize integrated flood and erosion management in Southeast Nigerian cities, combining drainage infrastructure rehabilitation, green infrastructure (wetlands, riparian buffers), community-based solid-waste management systems, and early warning alert systems. Rural development programmes targeting Ebonyi, Abia, and Imo States should be intensified, covering agricultural support, rural electrification, educational facility provision, and gully erosion control, to reduce the structural push factors associated with rural-urban migration. Finally, urban governance reform should address the constraints on planning effectiveness identified in this study: short political tenures, patronage allocation of housing and contracts, absence of public participation mechanisms, and insufficient municipal revenue generation capacity, and it should be informed by the site-specific hazard exposures documented for each of the five study cities.

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Data Availability Statement

The authors confirm that the data supporting the findings of this study are available within the article and its supplementary materials, available at the behest of the authors.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

6 References

- Abbass, I. (2012). Trends of rural-urban migration in Nigeria. *European Scientific Journal*, 8(3), 97–125, ISSN: 1857 – 7881 (Print), e - ISSN 1857- 7431.
- Adekunle, T. O., & Balogun, R. A. (2022). Reputational snowball sampling in community-based urban governance research: Methodological reflections from Nigeria. *Qualitative Research Journal*, 22(4), 412–428. <https://doi.org/10.1108/QRJ-11-2021-0142>
- Adeyemo, J. T., Ahmed, A., Abaver, D. T., Riyadh, H. A., Tabash, M. I., & Lawal, A. I. (2024). Technological innovation and agricultural productivity in Nigeria amidst oil transition: ARDL analysis. *Economies*, 12(9), 253. <https://doi.org/10.3390/economies12090253>
- Aliyu, A. A., & Amadu, L. (2017). Urbanisation, cities, and health: The challenges to Nigeria—A review. *Annals of African Medicine*, 16(4), 149–158. https://doi.org/10.4103/aam.aam_1_17
- Avis, W. R. (2019). *Urban expansion in Nigeria* (K4D Helpdesk Report). Institute of Development Studies. https://opendocs.ids.ac.uk/articles/report/Urban_Expansion_in_Nigeria/26434600 accessed 02 may 26.
- Bloch, R., Monroy, J., Fox, S., & Ojo, G. (2015). *Urbanisation and urban expansion in Nigeria* (ICF international /DFID Report). https://assets.publishing.service.gov.uk/media/57a0897bed915d3cfd00027a/61250-URN_Theme_A_Urbanisation_Report_FINAL.pdf
- Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. SAGE Publications, 22(2), <https://doi.org/10.1177/1035719X211058251>
- Cochran, W. G. (1977). *Sampling techniques* (3rd ed.). John Wiley & Sons.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Federal Ministry of Environment. (2016). *Nigeria national policy on the environment (revised)*. Federal Ministry of Environment. <https://faolex.fao.org/docs/pdf/nig176320.pdf>, accessed May 2026.
- Federal Ministry of Housing and Urban Development [FMHUD]. (2012). *National urban development policy*. Federal Ministry of Housing and Urban Development, Abuja, accessed May 2026.
- Grimm, N. B., Grove, J. M., Pickett, S. T. A., & Redman, C. L. (2000). Integrated approaches to long-term ecological research. *BioScience*, 50(7), 571–584. [https://doi.org/10.1641/0006-3568\(2000\)050\[0571:IATLTE\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2000)050[0571:IATLTE]2.0.CO;2)
- Jedwab, R., & Vollrath, D. (2015). Demography, urbanization and development: Rural push, urban pull and urban push? *Journal of Urban Economics*, 98, 6–16. <https://doi.org/10.1016/j.jue.2015.09.002>
- Jedwab, R., & Vollrath, D. (2019). The urban mortality transition and poor-country urbanization. *American Economic Journal: Macroeconomics*, 11(1), 223–275. <https://doi.org/10.1257/mac.20150437>
- Kadiri, K. O., Ibrahim, R. B., & Yusuf, H. O. (2023). Urban governance, political tenure, and municipal service delivery in mid-sized Nigerian cities. *Journal of Urban Affairs*, 45(3), 501–519. <https://doi.org/10.1080/07352166.2022.2088456>
- Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester School*, 22(2), 139–191.
- Mabogunje, A. L. (1970). Systems approach to a theory of rural-urban migration. *Geographical Analysis*, 2(1), 1–18.
- McConnachie, M. M., & Shackleton, C. M. (2010). Public green space inequality in small towns in South Africa. *Habitat International*, 34(2), 244–248. <https://doi.org/10.1016/j.habitatint.2009.09.009>
- Nigerian National Policy on the Environment Report, 2016, accessed April, 2026.
- Nigerian Urban and Regional Planning Act (1992), accessed April 2026.
- Nwalusi, D. M., Okeke, F. O., & Anierobi, C. M. (2022). A study of the impact of rural-urban migration and urbanization on public housing delivery in Enugu Metropolis, Nigeria. *European Journal of Sustainable Development*, 11(3), 37–47. <https://doi.org/10.14207/ejsd.2022.v11n3p37>
- Obi-Ani, N. A., & Isiani, M. C. (2020). Urbanization in Nigeria: The Onitsha experience. *Cities*, 104, Article 102744. <https://doi.org/10.1016/j.cities.2020.102744>
- Obi-Ani, N. A., & Isiani, M. C. (2021). Urbanization in Nigeria, Enugu (the coal city) as an urban town: A historical review. *Cities*, 109, Article 102981. <https://doi.org/10.1016/j.cities.2020.102981>

- Oforji, P. I., Onyia, C. D., Mba, E. J., Okeke, F. O., Didigwu, A. C., Egbu, V., Chukwu, C. P. (2026). Assessing the readiness of architects and urban planners for smart infrastructure in Enugu state, Nigeria. *International Journal of The Nigerian Institute of Architects (IJNIA)*, Vol. 2026, issue 01, Pg. 75-99. <https://doi.org/10.68074/ijnia.1.14>
- Ogunode, N. J. (2025). A demographic analysis of rural-urban migration in Nigeria. *American Journal of Education and Evaluation Studies*, 2(12), 200–207. Retrieved from <https://semantjournals.org/index.php/AJEES/article/view/3271>
- Okanya V. A. (2026). Socio-economic and risk-perceptual determinants of wood-based modular housing adoption in Nigeria. *Building Engineering*, 4(2), 4337. doi: <https://doi.org/10.59400/be4337>
- Okereke G. K. O, & Okanya A. V. (2024). Achieving Sustainable Housing for Low and Middle-Income Earners. In: *Pre-fabricated Construction for Sustainability and Mass Customization*, ed. Intechopen, 1-17. DOI: <http://dx.doi.org/10.5772/intechopen.111870>
- Okereke G. K. O, Okanya A. V, Okereke Joy. A, Okafor S. C, Ebiegberi K. (2022). Reducing the Threats of Environmental Factors to Buildings: A Case Study of Nsukka Urban in Enugu, Nigeria. *International Journal of Research and Review*. 2022; 9(7): 599-610. DOI: <https://doi.org/10.52403/ijrr.20220765>
- Okonta, E. D., Kehinde, O., Michael, E., Okonta, U. G., Okeke, F. O., Equere, E. B., Emma-Ochu, C., Oke, A. (2026). Digital interoperability and research dissemination in architecture and the built environment. *International Journal of The Nigerian Institute of Architects (IJNIA)*, Vol. 2026, issue 01, Pg. 24-48. <https://doi.org/10.68074/ijnia.2026.23>
- Omeje H. O. & Okanya A. V. (2024). Waste management for sustainability in the built environment. In: *Pre-fabricated Construction for Sustainability and Mass Customization*, ed. Noguchi, M., Chapter 3. London: IntechOpen. <https://doi.org/10.5772/INTECHOPEN.113371>
- Pickett, S. T. A., & Zhou, W. (2015). Global urbanization as a shifting context for applying ecological science toward the sustainable city. *Ecosystem Health and Sustainability*, 1(1), 1–15. <https://doi.org/10.1890/EHS14-0014.1>
- Popoola, O. I., Magidimisha-Chipungu, H., & Chipungu, L. (2023). Rural-urban migration and socio-structural challenges for sustainable development in Nigeria. *Central Asian Journal of Social Sciences and History*, 4(12), 1–15. <https://doi.org/10.51699/cajssh.v7i1.1283>
- Taylor, R. W. (1988). Urban development policies in Nigeria: Planning, housing and land policy. *Urban Law and Policy*, 8, 1–29.
- UN DESA. (2018). *World urbanization prospects: The 2018 revision*. United Nations Department of Economic and Social Affairs. <https://population.un.org/wup/> accessed April 2026.
- Vidal, R. L. (2021). Analysis of equity and social inclusiveness of national urban development policies and strategies through the lenses of health and nutrition. *International Journal for Equity in Health*, 20, 97. <https://doi.org/10.1186/s12939-021-01439-w>

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