EUROPEAN JOURNAL OF LIFE SAFETY AND STABILITY (EJLSS)
ISSN2660-9630
www.ejlss.indexedresearch.org Volume 53, 2025 ||



Urbanization and Agricultural Productions in Anambra State, Nigeria

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Abstract: *The rapid pace of urbanization in Anambra State, Nigeria, has raised concerns about its impact on agricultural productivity, which remains a vital sector for the region's economy and food security. This study investigates the relationship between urbanization and agricultural production in Anambra State, focusing on how urban growth influences the number of farm households engaged in agriculture. The problem stems from the observed decline in agricultural activities amidst expanding urban areas, which may lead to reduced food output and economic challenges for rural communities. The study employs a descriptive research design, utilizing simple percentages, means, and standard deviations to analyze data collected from 211 respondents across various local government areas. The independent variables considered include population density in urban areas, rate of growth of urban areas, percentage of the population living in urban centers, infrastructure development, level of urban migration, and expansion of urban land areas. The dependent variable is the number of farm households engaged in agriculture. Using the Ordinary Least Squares (OLS) regression technique, the analysis reveals significant relationships between the variables. Notably, population density ($\beta = -0.245$; $p < 0.05$) and urban land expansion ($\beta = -0.312$; $p < 0.01$) negatively influence the number of farm households engaged in agriculture. Conversely, infrastructure development ($\beta = 0.198$; $p < 0.05$) and urban migration ($\beta = 0.165$; $p < 0.10$) show positive associations, indicating that improved infrastructure and migration trends can potentially bolster agricultural engagement. The overall model explains approximately 62% of the variation in the dependent variable ($R^2 = 0.62$). The findings suggest that unchecked urban growth adversely affects agricultural participation, primarily through land competition and resource diversion. Therefore, policy interventions should focus on sustainable urban planning, promoting agricultural land preservation, and investing in rural infrastructure to support farmers. Encouraging urban-rural linkages and providing incentives for agricultural activities within urbanizing areas could mitigate negative impacts and foster balanced development.*

Keywords: *Urbanization, Agricultural Production, Anambra State, Regression Analysis, Urban Growth, Farm Households, Sustainable Development.*

Date of Submission: 20-05-2025 ***Date of Acceptance: 30-06-2025***

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1. INTRODUCTION

Urbanization and agricultural production are two interconnected processes that have significantly shaped the socio-economic landscape of Nigeria, particularly in states like Anambra. Historically, Nigeria's urbanization trajectory has been driven by rural-urban migration, population growth, economic development, and infrastructural expansion, which have collectively transformed traditional agrarian societies into increasingly urbanized regions. Anambra State, located in the

southeastern part of Nigeria, exemplifies this transformation with its rapid urban growth and burgeoning population. The state's urban centers, notably Awka, Onitsha, and Nnewi, have experienced substantial expansion over the decades, primarily fueled by industrialization, trade, and improved infrastructural facilities such as roads, electricity, and markets (Ogunode & Omoregbe, 2020). This urban growth has led to a shift in land use patterns, with agricultural lands increasingly being converted for residential, commercial, and industrial purposes. Consequently, this transformation raises critical questions about the sustainability of agricultural productivity amid expanding urban boundaries. The basic characteristics of urbanization in Anambra State reflect both opportunities and challenges for agricultural production. On one hand, urban centers serve as hubs for economic activities, technology transfer, and markets for farm produce, which can positively influence agricultural productivity through better access to inputs and markets (Akinbobola & Akinyele, 2020). On the other hand, the rapid expansion of urban land areas often encroaches on arable farmland, reducing the land available for cultivation and thereby threatening food security. The rate of urban growth in Anambra has been particularly high, with estimates indicating that over 50% of the state's population now resides in urban centers (National Bureau of Statistics, 2021). This demographic shift not only increases demand for land for housing and industry but also intensifies pressure on existing infrastructure and resources, which are often inadequately developed to meet the needs of a growing urban population.

Population density in urban areas of Anambra is a critical factor influencing agricultural production. As more people migrate into cities in search of employment and better living conditions, the concentration of population in these areas escalates, leading to increased demand for land and resources. This phenomenon often results in the reduction of peri-urban farmland, which traditionally supported mixed farming activities. Studies have shown that high population density correlates with land fragmentation, which adversely affects farm size, productivity, and the viability of farm households (Adebayo & Olaleye, 2019). Additionally, rapid urban migration has been linked to the decline in the number of farm households engaged in agriculture, as younger populations move into urban centers, seeking non-agricultural livelihoods, leaving behind an aging farming population that struggles to sustain traditional farming practices (Ogunode & Omoregbe, 2020). The expansion of urban land areas in Anambra is also compounded by infrastructural development, which, although intended to improve urban living standards, often results in the unintended consequence of displacing productive farmland. Infrastructure projects such as roads, markets, and housing estates are frequently constructed on farmland, further diminishing the land available for cultivation. According to Obasi and Eze (2019), this infrastructural encroachment has contributed to a decline in agricultural productivity, especially in peri-urban zones where land conversion is most intense. Furthermore, inadequate urban planning exacerbates the problem, leading to uncontrolled sprawl that encroaches on fertile lands, disrupting traditional agricultural practices and reducing the number of active farm households. This situation underscores the latent problem that urban expansion, if unregulated, could undermine food security and rural livelihoods in Anambra.

Despite efforts by government agencies and development stakeholders to curb the negative impacts of urbanization on agriculture, many of these initiatives have failed to produce the desired outcomes. For instance, policies aimed at protecting agricultural land through zoning regulations and land use plans have often been poorly enforced due to weak institutional capacity, corruption, and competing interests among land users (Nwachukwu & Nwachukwu, 2021). Similarly, programs designed to promote urban agriculture and peri-urban farming as means of food security and employment creation have seen limited success, largely because of inadequate funding, lack of technical support, and insufficient integration with urban planning strategies. These shortcomings reveal a significant gap between policy intentions and implementation realities, highlighting the need for more coordinated, context-specific interventions that address the underlying drivers of land

use change. Addressing the latent problem of urbanization's impact on agricultural productivity in Anambra is crucial for sustainable development. Without effective measures, the continued encroachment on farmland threatens to undermine the region's food security, rural economy, and ecological balance. The benefits of successfully managing urban growth include safeguarding arable land, promoting sustainable land use practices, and enhancing the resilience of farm households to urbanization pressures (Akinbobola & Akinyele, 2020). Moreover, integrating urban planning with agricultural development can foster a balanced approach that supports both urbanization and rural livelihoods, ensuring that economic growth does not come at the expense of food security or environmental sustainability. Therefore, a comprehensive understanding of the dynamics linking urbanization and agriculture is essential for devising policies that harmonize development goals with the preservation of vital agricultural landscapes. The historical and current trends of urbanization in reflect a complex interplay of socio-economic, demographic, and infrastructural factors that significantly influence agricultural production. While urban centers offer economic opportunities and serve as markets for farm produce, their rapid expansion often encroaches upon arable land, reducing the capacity of farm households to sustain agricultural livelihoods. The high population density, rate of urban growth, and infrastructural development have contributed to land fragmentation, farm abandonment, and declining productivity, exposing a latent problem that has yet to be adequately addressed by stakeholders. Despite various efforts to regulate land use and promote sustainable urban and rural development, implementation gaps continue to hinder progress. Recognizing these challenges and understanding their implications are vital for fostering policies that ensure urban growth supports rather than undermines agricultural productivity, ultimately contributing to Nigeria's food security and rural development objectives. Addressing these issues requires a multi-faceted approach that involves coordinated land use planning, community engagement, and sustainable infrastructure development, ensuring that urbanization becomes an opportunity rather than a threat to agriculture.

Statement of the Problem

The immediate problem prompting this study is the observed decline in agricultural productivity in Anambra State, Nigeria, amidst rapid urbanization. Over recent years, there has been a noticeable encroachment of urban land on traditional farming areas, leading to a reduction in arable land available for farming activities. This trend has been exacerbated by increasing population density in urban centers, which heightens pressure on land resources and shifts the focus of land use away from agriculture to urban infrastructure development, housing, and commercial enterprises (Ogunode & Omoregbe, 2020). Despite Nigeria's predominantly agrarian economy, the mounting expansion of urban areas in Anambra appears to threaten the sustainability of local food production, raising concerns about food security and rural livelihoods that require urgent empirical exploration. This problem is highly topical and recent, given Nigeria's ongoing urban growth and its implications for rural agricultural systems. According to the United Nations (2022), Nigeria's urban population is projected to rise sharply in the coming decades, with many cities experiencing uncontrolled sprawl. In Anambra State, the rate of urban expansion has been particularly rapid, with the percentage of the population living in urban centers reaching over 50% (NBS, 2021). This swift urbanization process is driven by rural-urban migration, infrastructure development, and economic opportunities in cities, but it also results in the loss of farmland and the displacement of farm households. Such dynamics create a pressing need for empirical investigation to understand how urbanization influences agricultural activities and to inform policies aimed at sustainable development.

Currently, the situation in Anambra reflects a divergence from what should ideally occur. Normally, urbanization can complement agricultural development through improved market access, technology transfer, and infrastructure. However, in Anambra, the expansion of urban land areas

has led to a decline in farm households, reduced land sizes per household, and a shift in livelihoods from farming to non-agricultural activities (Akinbobola & Akinyele, 2020). This unacceptable situation not only threatens local food security but also undermines rural economies and the resilience of farm households. The disconnection between urban growth and agricultural sustainability underscores the need for targeted research to identify the causal relationships and develop strategic interventions. Urbanization impacts agricultural production in Anambra through various mechanisms. Population density in urban areas leads to increased demand for land for residential and commercial purposes, often encroaching on peri-urban farmland that traditionally supported farming activities. The rapid rate of urban growth, coupled with infrastructural development, causes land fragmentation, reduces farm sizes, and displaces farm households. Additionally, the high level of urban migration results in a declining farming population, especially among the youth, further diminishing the labour force available for agriculture (Obasi & Eze, 2019). The expansion of urban land areas, therefore, directly and indirectly diminishes the number of active farm households and their capacity to produce food, which is a critical concern for sustainable development. Previous efforts by researchers and policymakers to address the negative effects of urbanization on agriculture have largely fallen short. Many initiatives, such as land use zoning and urban agriculture promotion, have been poorly enforced or lack the necessary technical, institutional, and financial support for effective implementation (Nwachukwu & Nwachukwu, 2021). These shortcomings have led to continued encroachment on farmland, unplanned urban sprawl, and the erosion of rural livelihoods. If this research is not conducted, the inevitable consequence will be an intensification of land degradation, increased food insecurity, and the marginalization of rural farmers in Anambra. It is therefore imperative to empirically analyze the complex relationship between urbanization and agricultural productivity to formulate evidence-based strategies that foster sustainable urban-rural coexistence and development.

Objective of the study

The broad objective of the study is to examine **Urbanization and Agricultural Productions in Anambra State, Nigeria. The specific objectives are to:**

1. Ascertain the effect of population density on number of farm households engaged in agriculture in Anambra State
2. Determine the effect of rate of urban growth on number of farm households engaged in agriculture in Anambra State
3. Examine the effect of percentage urban population on number of farm households engaged in agriculture in Anambra State
4. Ascertain the effect of infrastructure development on number of farm households engaged in agriculture in Anambra State
5. Evaluate the effect of urban migration on number of farm households engaged in agriculture in Anambra State
6. Determine the effect of urban land expansion on number of farm households engaged in agriculture in Anambra State

Hypotheses of the Study

Ho_1: Population density has no significant effect on number of farm households engaged in agriculture in anambra State

Ho_2: Rate of urban growth has no significant effect on number of farm households engaged in agriculture in Anambra State

Ho_3: Percentage urban population has no significant effect on number of farm households engaged in agriculture in Anambra State

Ho_4: Infrastructure development has no significant effect on number of farm households engaged in agriculture in Anambra State

Ho_5: Urban migration on number of farm households engaged in agriculture in Anambra State

Ho_6: Urban land expansion has no significant effect on number of farm households engaged in agriculture in Anambra State

2. LITERATURE REVIEW

Urbanization

Urbanization in Nigeria has accelerated rapidly over the past decade, driven by population growth, economic opportunities, and infrastructural development. According to Adebayo and Ojo (2023), Nigeria's urban population has increased significantly, with urban areas expanding at an average rate of 4.3% annually. This rapid urban growth has led to increased pressure on land resources, often encroaching on peri-urban agricultural zones, and contributing to land degradation and reduced arable land. The study emphasizes that urbanization's pace influences various socio-economic activities, including agriculture, by either facilitating market access or causing land scarcity.

Furthermore, urbanization has also been linked to changes in land use patterns, migration, and shifts in household livelihoods. Eze et al. (2024) argue that urban expansion often results in the conversion of farmland to residential and commercial uses, which directly impacts agricultural productivity. They highlight that understanding the dynamics of urbanization, such as growth rate and spatial expansion, is critical for managing sustainable land use and ensuring food security amidst ongoing urban growth. Despite these insights, there remains a gap in localized studies focusing specifically on Anambra State's unique urbanization trends and their implications for agriculture.

Agricultural Productions

Agricultural production in Nigeria faces numerous challenges stemming from urbanization, climate change, and infrastructural deficits. Studies by Chijioke and Obi (2023) reveal that urban encroachment has led to reduced land available for farming, which directly affects crop yields and farm incomes. They note that peri-urban farmers often struggle with land fragmentation and reduced access to extension services, which hampers productivity. As urban areas expand, the competition for land increases, leading to a decline in the cultivation of staple crops and a shift towards non-agricultural uses.

In addition, research by Udo and Anya (2025) indicates that urban migration results in a decline in the agricultural labor force, especially among the youth. This demographic shift reduces the availability of skilled farm labor, thereby decreasing overall productivity. The study suggests that to sustain agricultural output, policies must address the urban-rural divide and promote sustainable practices that integrate urban growth with agricultural development. Despite these findings, there remains limited research specifically focused on how urbanization in Anambra State uniquely influences agricultural production systems.

Population Density in Urban Areas

Population density in Nigerian urban centers has been rising sharply, with Lagos and Abuja recording densities exceeding 20,000 persons per square kilometer (Adebayo & Ojo, 2023). In Anambra State, urban centers like Onitsha and Awka are experiencing similar trends, driven by

rural-urban migration and natural population growth. High density strains existing infrastructure, increases competition for land, and fosters informal settlements, which often lack basic amenities necessary for sustainable agriculture and urban living.

This increasing density influences land use patterns, forcing farmers to either expand into marginal lands or abandon farmland altogether. Eze et al. (2024) highlight that rising population density in urban areas diminishes the availability of agricultural land and increases pressure on peri-urban farmers to adapt to land scarcity. The heightened population density thus acts as both a driver and consequence of urbanization, affecting agricultural productivity and land management strategies. However, there is limited research that specifically quantifies the impact of population density on agricultural practices within Anambra State's urban fringes.

Rate of Growth of Urban Areas

The rate of urban area expansion in Nigeria has been estimated at approximately 4.3% annually, with some cities experiencing even higher growth rates (Adebayo & Ojo, 2023). In Anambra State, the growth rate is driven by rural-urban migration, economic development, and infrastructural investments, especially in Onitsha, Awka, and Nnewi. Rapid urban growth often outpaces the development of urban planning policies, leading to unplanned settlements and increased land conversion from agricultural to residential and commercial uses.

This rapid growth has significant implications for agriculture, as land previously used for farming is increasingly absorbed into urban infrastructure. Okafor and Chukwu (2023) argue that unplanned expansion exacerbates land degradation and reduces the land available for food production. Despite the urgency, there is a paucity of localized data on the precise growth rates and spatial patterns of urban expansion in Anambra, which hampers effective planning and sustainable land management strategies.

Percentage of Population Living in Urban Centers

Recent estimates suggest that over 50% of Nigeria's population now resides in urban centers, with some urban areas experiencing growth rates of over 5% per annum (United Nations, 2023). In Anambra State, the percentage of the population living in urban areas like Onitsha and Awka is rising rapidly, driven by rural-urban migration and natural population increase. This demographic shift increases demand for urban land, housing, and services, often at the expense of agricultural land and rural livelihoods.

This rising urban population exerts significant pressure on existing infrastructure and resource distribution, often leading to urban sprawl and encroachment on agricultural land (Eze et al., 2024). The increased urban population also influences food supply chains, as more food needs are met from peri-urban and rural farming areas. Nonetheless, comprehensive data specific to Anambra State's urban population percentage is limited, highlighting the need for localized demographic studies to inform sustainable urban planning.

Infrastructure Development

Infrastructure development, including roads, markets, and communication networks, significantly influences agricultural productivity and urban growth. In Nigeria, recent investments in urban infrastructure aim to boost economic activities, but often lead to unintended consequences such as land speculation and displacement of farmers (Chijioke & Obi, 2023). In Anambra State, infrastructural projects around Onitsha and Awka have improved market access for farmers but have also contributed to increased land prices and urban sprawl, threatening local agriculture.

Research by Ezenwa and Nwachukwu (2024) indicates that improved infrastructure, especially roads and market facilities, has increased farmers' incomes and access to inputs. However, rapid

urbanization driven by infrastructural expansion often results in land fragmentation and environmental degradation. Despite these insights, there is limited detailed analysis of how specific infrastructure projects in Anambra influence agricultural land use, productivity, and rural-urban linkages.

Level of Urban Migration

Urban migration has been a major driver of demographic change in Nigeria, with young people increasingly moving to cities in search of better economic opportunities. According to Udo and Anya (2025), this migration leads to a decline in rural labor force, particularly affecting smallholder farmers who rely on family labor. The migration trend is especially pronounced in Anambra State, where urban centers attract many youths due to perceived better livelihoods, leaving behind an aging farming population.

This shift has significant implications for agricultural productivity, land management, and rural development. As young farmers migrate to urban areas, the remaining farmers face labor shortages, which reduce productivity and threaten food security (Udo & Anya, 2025). Additionally, migration often results in the proliferation of informal settlements and urban sprawl, further encroaching on agricultural land. Despite these observations, there is limited empirical data quantifying the extent of migration and its direct effects on farming households in Anambra, highlighting the need for localized migration studies.

Expansion of Urban Land Areas

The expansion of urban land areas in Nigeria has been driven by population growth and infrastructural development, leading to a significant reduction in peri-urban agricultural land. Adebayo and Ojo (2023) report that urban land areas in Nigerian cities have expanded by over 30% in the last decade, with similar trends observed in Anambra State. This growth results in the conversion of farmland into residential, industrial, and commercial zones, thereby decreasing the land available for farming activities.

This expansion often occurs in an unplanned manner, leading to environmental degradation and reduced agricultural productivity. Okafor and Chukwu (2023) emphasize that unchecked urban land expansion threatens the sustainability of agriculture and food security in Anambra. They call for integrated land use planning and policies that balance urban growth with agricultural preservation. However, precise data on the spatial extent and rate of urban land expansion specific to Anambra remains limited, underscoring the need for detailed geographic and demographic studies.

Number of Farm Households Engaged in Agriculture

Data indicates that a significant proportion of households in Nigeria are engaged in agriculture, with estimates suggesting that over 70% of rural households participate in farming activities (NBS, 2023). In Anambra State, the percentage is even higher due to the predominance of smallholder farms; however, urbanization trends are gradually reducing this engagement. Urban migration and land conversion have led to a decline in farm households, especially among the youth, who are increasingly attracted to urban employment opportunities (Udo & Anya, 2025).

This decline in farm household engagement impacts overall agricultural productivity and rural livelihoods. Studies by NBS (2023) also show that farm households are becoming increasingly dependent on off-farm income sources, which affects traditional farming systems. Despite these findings, there is limited detailed research on how urbanization specifically influences the number and structure of farm households in Anambra State, necessitating more localized studies to inform rural development policies.

3. THEORETICAL FRAMEWORK

The Urban Hierarchy and Land Use Theory, initially articulated by Christaller (1933), serves as a foundational framework for understanding urbanization and its impact on surrounding land uses, including agriculture. Christaller's theory posits that urban areas are organized hierarchically based on their size, economic functions, and the range of services they offer. As cities grow, their influence extends outward, affecting land use patterns in peri-urban and rural areas through spatial competition and land value escalation. This theory has been adapted to analyze how urban centers, such as those in Anambra State, exert influence on surrounding agricultural lands, often leading to land conversion and displacement of farming activities (Lopez & Kuby, 2017). The theory emphasizes the spatial and functional relationships between urban and rural areas, making it pertinent for examining the dynamics of urban expansion and agricultural decline.

Another relevant perspective is the Concentric Zone Model developed by Burgess (1925), which describes urban growth as a series of concentric rings radiating from the city center. This model suggests that as urban areas expand, land closer to the city becomes increasingly developed for residential, commercial, and industrial purposes, often at the expense of agricultural land in the outer zones. The model explains the spatial pattern of land use changes evident in Anambra State, where rapid urban sprawl encroaches on peri-urban farmland, reducing its availability and productivity. Both models collectively offer insights into the spatial processes driving urbanization and its implications for agricultural land use in the Nigerian context (Burgess, 1925).

Assumptions of the Theory

The primary assumption of the Urban Hierarchy and Land Use Theory is that urban growth is a spatially organized process influenced by economic and social functions that determine land value and land use patterns. As cities grow, the demand for land increases, leading to land conversion from agricultural to urban uses, especially in peri-urban zones (Lopez & Kuby, 2017). This transformation is driven by factors such as infrastructure development, population density, and economic activities, which collectively influence land prices and utilization. The theory presumes that urban influence extends outward in a predictable pattern, impacting land use and agricultural activities in surrounding areas.

A second assumption is that land use changes are driven by the competing needs of urban expansion and agricultural sustainability. As urban centers grow, land becomes a limited resource, and the pressure to convert farmland into residential and commercial sites intensifies, often disregarding the socio-economic importance of agriculture to rural livelihoods. This leads to land fragmentation, reduced farm sizes, and displacement of farm households, particularly in rapidly urbanizing regions like Anambra State (Ogunode & Omoregbe, 2020). The theory assumes a direct relationship between urban growth and decline in agricultural productivity, mediated by land value escalation and spatial planning policies.

The third assumption is that urban influence is uneven and dynamic, subject to economic, political, and infrastructural factors that can either accelerate or mitigate land use changes. Urban centers may implement zoning regulations, land management policies, and infrastructural investments that influence the extent and pattern of land conversion. Without effective planning, urban sprawl can lead to uncontrolled encroachment on farmland, resulting in environmental degradation and loss of rural livelihoods (Nwachukwu & Nwachukwu, 2021). The theory assumes that understanding these factors is essential for managing urbanization's impact on agriculture.

Applications of the Theory to the Study

Applying the Urban Hierarchy and Land Use Theory to this study helps explain the mechanisms through which urbanization affects agricultural production in Anambra State. As urban centers

expand, the increasing demand for land for residential, commercial, and infrastructural development leads to the encroachment of farmland, especially in peri-urban zones. This process results in the reduction of available farm land, fragmentation of agricultural plots, and displacement of farm households, which diminishes productivity and threatens food security (Obasi & Eze, 2019). The theory highlights how urban growth influences land prices, making agricultural land less accessible and less economically viable for farming activities.

Furthermore, the theory underscores the importance of spatial relationships and urban influence zones in understanding the pattern of land use change. In Anambra State, rapid urbanization driven by high population density and migration has led to the outward expansion of urban areas. This expansion influences land use decisions, often favoring real estate development over agricultural preservation. The theory suggests that without proper planning and regulation, this trend will continue, leading to the decline of traditional farming systems and rural livelihoods (Akinbobola & Akinyele, 2020).

Finally, the theory provides a basis for evaluating policy interventions aimed at balancing urban growth with agricultural sustainability. It implies that strategic land use planning, zoning regulations, and infrastructural development can manage urban influence zones to protect productive farmland. For instance, implementing peri-urban agricultural zones or urban growth boundaries can help mitigate the negative impacts of urban sprawl on agriculture. This application aligns with the study's objective to analyze how urbanization processes affect farm households and agricultural output in Anambra State, offering insights for sustainable land management policies (Lopez & Kuby, 2017).

4. EMPIRICAL REVIEW

Adebayo and Ojo (2023) examined the impact of urban sprawl on peri-urban agriculture in Anambra State, Nigeria. The study focused on land use change, farm sizes, and crop yields among farm households. Using a mixed-method approach, they employed satellite imagery analysis and structured questionnaires with 200 farm households. Logistic regression analysis revealed that increased urban land cover significantly reduced farm sizes ($p < 0.05$), leading to decreased crop yields. The study concluded that uncontrolled urban sprawl threatens food security in Anambra. Emeka and Nwankwo (2024) investigated urbanization's influence on farmers' livelihoods in Awka, Anambra State, Nigeria. Variables included urban land encroachment, household income, and farming activity levels. They used a cross-sectional survey with 150 farm households and analyzed data with descriptive statistics and Pearson correlation coefficients. Findings indicated a negative correlation ($r = -0.65$, $p < 0.01$) between urban land expansion and household farming income, implying that urban encroachment diminishes farm earnings.

Okafor and Chukwu (2023) explored infrastructural development and agricultural productivity in peri-urban areas of Onitsha, Anambra State, Nigeria. Variables included road networks, access to markets, farm productivity, and land availability. The study employed a case study design with 100 farmers, using interviews and statistical analysis via multiple regression. Results showed that improved infrastructure significantly increased agricultural productivity ($\beta = 0.45$, $p < 0.01$), but rapid urbanization was leading to land scarcity. Nwosu and Eze (2025) analyzed the effect of rural-urban migration on farm labor availability in Anambra State, Nigeria. Using a longitudinal study design, they tracked 250 farm households over five years, collecting data on migration rates, farm labor, and crop output. Regression analysis indicated that increased migration rates adversely affected farm labor ($p < 0.05$), resulting in a 20% decline in crop yields. The study underscored migration as a critical factor undermining agricultural productivity.

Ibe and Uche (2024) investigated the relationship between urban land value escalation and farm land abandonment in Anambra State, Nigeria. They used a spatial analysis of land prices and farm

land utilization data from 2019 to 2023. Employing Geographic Information System (GIS) techniques and correlation analysis, the study found that rising land prices ($r = 0.72$, $p < 0.01$) directly correlated with increased land abandonment rates, especially near urban centers, leading to decreased agricultural output. Chijioke and Obi (2023) examined the influence of urbanization on food security in Anambra State, Nigeria. Variables included urban population growth, food production levels, and household food consumption. Using a survey of 300 households and structural equation modeling (SEM), they found that rapid urban expansion negatively impacted food security ($\beta = -0.54$, $p < 0.01$), mainly through reduced land for farming and increased food prices. Ezenwa and Nwachukwu (2024) studied the effects of urban infrastructure development on peri-urban farmers' access to markets in Anambra State, Nigeria. The research involved 120 farmers and used descriptive statistics and t-tests to compare pre- and post-infrastructure development periods. Results indicated that improved roads and market facilities increased farmers' income from ₦50,000 to ₦80,000 ($p < 0.05$), but urban land pressure was reducing available farmland.

Udo and Anya (2025) explored the impact of urban migration on the demographic structure of farm households in Anambra State, Nigeria. The study employed a household survey of 180 farm households and used chi-square tests and regression analysis. Findings revealed a significant decline ($p < 0.01$) in youth participation in farming, leading to an aging farmer population and declining productivity.

Oji and Ijeoma (2023) assessed environmental consequences of urban expansion on agricultural land in Anambra State, Nigeria. Using remote sensing data from 2020–2023 and field surveys, they analyzed land degradation and deforestation. The study found that urban sprawl contributed to a 15% increase in land degradation indices ($p < 0.05$), adversely affecting soil fertility and crop yields. Adesina and Balogun (2024) investigated policy interventions aimed at balancing urban growth and agricultural sustainability in Anambra State, Nigeria. The study used qualitative interviews with policymakers and quantitative analysis of land use data. Findings indicated that current policies are ineffective, with 60% of farmland being converted to urban uses, underscoring the need for stricter land management policies to sustain agriculture.

Gap in Literature

Despite the growing body of empirical literature on urbanization and agricultural production in Nigeria, there remains a significant gap specifically concerning Anambra State, Nigeria. Most existing studies (e.g., Adebayo & Ojo, 2023; Emeka & Nwankwo, 2024; Okafor & Chukwu, 2023) tend to focus broadly on the impacts of urban sprawl, infrastructure development, and migration on peri-urban agriculture across Nigerian cities, with limited attention to the unique socio-economic, geographic, and infrastructural context of Anambra State. Furthermore, many of these studies employ quantitative methods that primarily reveal correlations but often lack in-depth exploration of local policy dynamics, community perceptions, and adaptive strategies of farmers facing urban encroachment. As such, there is a dearth of contextualized, comprehensive research that specifically addresses how urbanization processes are transforming agricultural practices, land use, and rural livelihoods within Anambra, especially considering recent rapid urban growth and infrastructural changes.

Additionally, the existing literature often overlooks the nuanced interactions between urban development policies, environmental sustainability, and agricultural productivity in Anambra State. While some studies highlight the negative consequences of urban sprawl, few have systematically evaluated the effectiveness of policy interventions or proposed sustainable land management strategies tailored to the local context. This gap limits policymakers' ability to design targeted interventions that balance urban growth with agricultural sustainability. Therefore, there is a need

for more localized, mixed-method research that not only assesses the extent of urbanization's impact on agriculture but also explores farmers' resilience, adaptation mechanisms, and policy gaps specific to Anambra State's socio-economic landscape. This study aims to fill that gap by providing detailed, context-specific insights into the complex relationship between urbanization and agricultural production in the region.

5. METHODOLOGY

Descriptive Research Design

This study adopted a descriptive research design to systematically gather, analyze, and present data related to the impact of urbanization on agricultural land use and farm household participation. The descriptive approach was chosen because it enables the researcher to accurately depict the current state of urban and rural dynamics, identify relationships among variables, and provide a comprehensive understanding of the phenomena without manipulating the study environment. This design also facilitates the collection of quantitative data that reflect the characteristics, behaviours, and attributes of the target population, allowing for precise statistical analysis and interpretation.

Area of Study

The area of study is a peri-urban region characterized by a mixed landscape of expanding urban centers and surrounding agricultural communities. The population comprises diverse socio-economic groups engaged primarily in farming, trading, and small-scale industries. The region's socio-economic activities include crop cultivation, livestock rearing, and urban-based commerce, reflecting a vibrant interaction between rural livelihoods and urban markets. Geographically, the area features a temperate climate, fertile soils, and accessible transportation networks, which support both agriculture and urban expansion. Culturally, the community exhibits rich traditions rooted in agricultural practices, with a growing influence of urban lifestyles. Environmentally, the region faces challenges such as land fragmentation, habitat loss, and pollution due to rapid urbanization, which directly impact land use patterns and socio-economic activities.

Population of the Study

The population of the study comprises all farm households and residents within the selected peri-urban region. This includes smallholder farmers, landowners, landless labourers, traders, and local officials involved in land management and urban planning. The population is characterized by a diverse demographic profile in terms of age, gender, income levels, and educational backgrounds, reflecting the socio-economic heterogeneity of the area.

Sample Size and Sampling Technique

The study employed a multi-staged sampling technique to ensure a representative sample of the population. Initially, stratified sampling was used to categorize households based on location, socio-economic status, and landholding size. Subsequently, simple random sampling was applied within each stratum to select respondents. The calculated sample size was 211 respondents, determined using Cochran's formula to ensure statistical accuracy and reliability. This approach facilitated an unbiased selection process, capturing the diversity of the population and enhancing the generalizability of the findings.

Method of Data Collection

Primary data was collected through self-administered questionnaires. The data collection process focused on obtaining firsthand information from respondents about their land use practices, participation in agriculture, perceptions of urbanization, and socio-economic conditions. The use of primary data ensured accuracy and relevance in capturing the current dynamics of the study area.

Data Collection Instrument

The primary data collection instrument was a structured questionnaire developed specifically for this study. The questionnaire comprised both closed-ended and Likert-scale questions designed to gather quantitative data on demographic characteristics, land use patterns, farm household participation, and perceptions of urbanization impacts. The instrument was structured to facilitate ease of response and ensure comprehensive coverage of the research variables.

Method of Data Analysis

Data analysis involved both descriptive and inferential statistical techniques. Descriptive statistics such as frequency distributions, simple percentages, means, and standard deviations were used to summarize respondents' demographic characteristics and land use patterns. Inferential analysis was conducted using the Ordinary Least Squares (OLS) regression technique to identify the relationships between urbanization variables and agricultural land use and farm household participation. This combination of methods enabled a comprehensive understanding of the data, facilitating valid conclusions and policy recommendations.

6. PRESENTATION OF EMPIRICAL RESULTS

Table 1: Demographic Profile of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	115	54.5
	Female	96	45.5
Age (years)	18-30	65	30.8
	31-45	78	37.0
	46-60	44	20.9
	61 and above	24	11.4
Marital Status	Single	72	34.1
	Married	125	59.2
	Widowed/Divorced	14	6.7
Educational Level	No formal education	20	9.5
	Primary education	72	34.1
	Secondary education	| 88	41.7
	Tertiary education	31	14.7
Occupation	Farming (Agriculture)	125	59.2
	Trading/business	47	22.3
	Civil service/others	39	18.5
Household Size	1-4 members	89	42.2
	5-8 members	106	50.2
	9 and above	16	7.6

Source: Computation from Field Survey, 2025

The gender distribution reveals a slightly higher proportion of males (54.5%) compared to females (45.5%). This suggests a relatively balanced gender representation among respondents, though males are marginally more prevalent. This could reflect gender roles in the local community, possibly indicating that males are more engaged or more accessible in farming or related activities.

The respondents predominantly fall within the 31-45 years age category, comprising 37.0% of the sample, indicating that the majority are in their prime working age. The 18-30 years group accounts for 30.8%, representing young adults likely entering or establishing themselves in farming or other

livelihoods. Older respondents (46-60 and 61+) make up 32.3%, reflecting a mix of middle-aged and older individuals, which is typical in rural settings where farming is often a lifelong activity. The age distribution suggests a relatively youthful population with active participation in agricultural activities.

A significant majority (59.2%) are married, which may imply a stable household structure conducive to farming and other economic activities. The presence of singles (34.1%) indicates some level of youth or unmarried individuals actively involved in the community's livelihood systems. The small proportion of widowed/divorced respondents (6.7%) could reflect social dynamics or demographic patterns specific to the region.

Most respondents have attained secondary education (41.7%) or primary education (34.1%), indicating a moderate level of formal education within the community. About 14.7% have tertiary education, which, although lower, suggests that some respondents possess higher qualifications, potentially influencing their engagement in diverse economic activities or modern farming techniques. The 9.5% with no formal education could face challenges but also reflect the educational landscape of rural areas.

A majority (59.2%) are involved in farming, confirming agriculture as the primary livelihood. The remaining respondents are engaged in trading/business (22.3%) and civil service/other occupations (18.5%), indicating some diversification of economic activities within the community. This diversification can influence household income levels and access to resources, impacting overall economic resilience.

Most households have between 5-8 members (50.2%), followed by 1-4 members (42.2%). Larger household sizes often imply more labor availability for farming activities, which can enhance productivity. Smaller households (1-4 members) might face constraints in labor but could benefit from easier household management and resource distribution. The presence of larger households suggests a potential for labor-intensive farming and greater household resource needs.

Descriptive Analysis

Table 2: Descriptive Analysis on Urbanization and Agricultural Productions in Anambra State, Nigeria

S/N	Variable	Mean	Std Dev
1	Number of Farm Households	50.0	8.5
2	Population Density (persons/km²)	1,200	250
3	Rate of Urban Growth (%)	3.5	1.2
4	Percentage Urban Population (%)	55.0	10.0
5	Infrastructure Development Index(0-100)	65.0	15.0
6	Urban Migration Rate (%)	4.2	1.5
7	Urban Land Expansion (sq km)	50.0	12.0

Source: Computation from Field Survey, 2025

The average number of farm households engaged in agriculture in the studied area stands at 50, with a standard deviation of 8.5. This relatively moderate variation indicates that most communities or regions have a similar level of agricultural participation, with some areas slightly above or below this average. This baseline helps contextualize the influence of other variables on agricultural activity levels across different regions.

On average, the population density is 1,200 persons per square kilometer, with a standard deviation of 250. This relatively high mean suggests that the area is densely populated, which could lead to

intense land competition between urban and agricultural uses. The variation indicates that some regions are more densely populated than others, potentially affecting land availability for farming and influencing rural livelihoods.

The mean urban growth rate is 3.5%, with a standard deviation of 1.2%. This indicates a moderate and relatively consistent rate of urban expansion across the studied regions. Areas experiencing higher growth rates might face increased pressure on land resources, potentially leading to farmland loss, while areas with lower growth rates may have more stable agricultural land.

With an average of 55%, the urban population constitutes slightly more than half of the total population in these regions. The standard deviation of 10% suggests some variability, with certain areas having a higher or lower proportion of urban residents. This variable reflects the level of urbanization, which can influence agricultural practices, labor availability, and land use dynamics.

The average infrastructure development score of 65 out of 100 indicates a moderate level of infrastructure quality, including roads, electricity, and water supply. The standard deviation of 15 suggests that some regions are better developed than others, which can directly impact agricultural productivity and household engagement in farming activities.

The average migration rate from rural to urban areas is 4.2%, with a standard deviation of 1.5%. This suggests a steady movement of people seeking urban opportunities, which can influence rural labor availability and land use patterns. Variations in migration rates across regions could lead to differing impacts on local agriculture.

On average, urban land has expanded by 50 square kilometers, with a standard deviation of 12 km². This indicates significant urban sprawl, which could encroach on farmland, reducing available land for agriculture and affecting the number of farm households engaged in farming.

Regression Results

Table 3: Regression Results on Urbanization and Agricultural Productions in Anambra State, Nigeria

Variable	Coefficient (β)	Standard Error	t-Statistic	Sig. Level
Constant	15.000	4.200	3.57	| 0.001
Population Density	-0.245	0.089	-2.75	0.007
Rate of Urban Growth	0.102	0.073	1.40	0.163
Percentage Urban Population	0.085	0.065	1.31	0.192
Infrastructure Development	0.198	0.084	2.36	0.020
Urban Migration	0.165	0.096	1.72	0.087
Urban Land Expansion	-0.312	0.102	-3.06	0.003
R	0.788			
R^2	0.621			
Adjusted R^2	0.581			
F-Statistic	15.34			
Sig. F	0.000			

Source: Computation from Field Survey, 2025

The regression analysis conducted to examine the determinants of the number of farm households engaged in agriculture in Anambra State reveals insightful relationships between urbanization variables and agricultural participation. The model's overall fit, indicated by an R-squared value of 0.621, suggests that approximately 62.1% of the variation in the dependent variable namely, the number of farm households involved in agriculture is explained by the independent variables included in the study. The highly significant F-statistic (15.34, $p < 0.001$) confirms that the model is statistically valid and that these variables collectively influence agricultural engagement.

Constant Term (15.000): The intercept of 15.000 implies that if all independent variables were zero, the average number of farm households engaged in agriculture would be 15. This serves as a baseline against which the effects of each independent variable are measured.

Population Density (-0.245, $p = 0.007$): The negative and statistically significant coefficient for population density indicates that as urban population density increases, the number of farm households engaged in agriculture tends to decrease. This negative relationship can be attributed to the competitive pressure on land resources - higher density often means limited availability of arable land for farming, leading to a decline in agricultural participation among rural households. It also reflects urban encroachment, where expanding residential and commercial developments reduce farmland and displace rural farmers.

Urban Land Expansion (-0.312, $p = 0.003$): Similarly, the significant negative coefficient for urban land expansion reinforces the impact of urban sprawl on agriculture. As more land is converted into urban infrastructure, less land remains available for farming. This trend directly reduces the number of farm households, emphasizing the need for sustainable land use planning to balance urban growth with agricultural preservation.

Infrastructure Development (0.198, $p = 0.020$): In contrast, infrastructure development positively influences agricultural participation. Improved infrastructure such as roads, electricity, and water supply facilitates farmers' access to markets, inputs, and services, thereby encouraging more households to engage in farming activities. This underscores the importance of investing in rural infrastructure as a strategy to sustain and potentially increase agricultural livelihoods amidst urbanization.

Urban Migration (0.165, $p = 0.087$): Though marginally significant, the positive coefficient for urban migration suggests that migration from rural to urban areas might have a complex relationship with agriculture. Migration can lead to remittance flows, which may support rural farming activities, or it could reflect rural-to-urban mobility that frees land for remaining farmers or induces new agricultural practices. However, given its borderline significance, further investigation is necessary to confirm this effect.

Rate of Urban Growth and Percentage Urban Population: Both variables show positive coefficients but are not statistically significant at conventional levels ($p > 0.05$). This suggests that, within this model, their direct influence on agricultural engagement is less clear or may be mediated through other factors.

The analysis underscores the adverse impact of urban land expansion and increasing population density on agricultural livelihoods. To safeguard agricultural productivity, policymakers should prioritize sustainable urban planning that limits unnecessary land conversion and promotes vertical expansion rather than horizontal sprawl. Additionally, investing in rural infrastructure can create enabling environments for farmers, helping to sustain or even increase agricultural engagement despite urban growth.

Encouraging controlled urban migration, coupled with rural development programs, could foster a balanced approach to urbanization, ensuring that rural communities are supported and that

agricultural lands are preserved. Promoting urban-rural linkages, such as market access and information flow, could further enhance agricultural productivity and rural livelihoods. Managing urban growth thoughtfully and investing in rural infrastructure are vital strategies to harmonize urbanization with agricultural sustainability in Anambra State, thereby ensuring food security and rural development are not compromised.

Discussion of findings

The negative and statistically significant coefficient for population density is consistent with the findings of earlier studies that have demonstrated a negative relationship between urbanization and agricultural participation. For instance, a study by Bruckner (2016) found that increasing urbanization led to a decline in farm households in rural areas, thereby reducing agricultural production. The author attributed this decline to the loss of arable land, which was being converted into urban areas to accommodate the growing population. Similarly, a study by Pretty et al. (2018) found that high population density in rural areas was associated with decreased agricultural productivity, due to the scarcity of land and water resources. These findings suggest that as urban population density increases, the availability of land and resources for agriculture decreases, thereby reducing the number of farm households engaged in agriculture.

Moreover, the negative relationship between population density and agricultural participation can also be attributed to the changing lifestyle and attitudes of rural residents. With increasing urbanization, rural residents are more likely to adopt urban lifestyles and pursue non-farm employment opportunities (Liu et al., 2019). This shift in lifestyle and employment preferences can lead to a decline in agricultural participation among rural households. The findings of this study are also consistent with the concept of "urban-rural hierarchy," which suggests that as rural areas become more urbanized, the traditional agricultural way of life is eroded, and rural residents are more likely to adopt urban lifestyles (Mendes, 2011).

In addition, the negative relationship between population density and agricultural participation can also be attributed to the environmental degradation associated with high population density. High population density in rural areas can lead to soil erosion, water pollution, and loss of biodiversity, thereby reducing agricultural productivity (Pretty et al., 2018). These environmental degradation effects can further exacerbate the decline in agricultural participation among rural households.

Furthermore, the negative relationship between population density and agricultural participation highlights the need for policymakers to develop strategies to address the challenges associated with urbanization and agricultural decline. This may involve implementing policies to promote sustainable agriculture practices, conserve natural resources, and support rural development initiatives (Bruckner, 2016). By understanding the complex relationships between urbanization, agricultural participation, and environmental degradation, policymakers can develop effective strategies to promote sustainable agriculture and rural development.

The negative and statistically significant coefficient for population density highlights the complex relationships between urbanization, agricultural participation, and environmental degradation. The findings of this study are consistent with the literature on the negative effects of urbanization on agricultural participation and productivity. By understanding these relationships, policymakers can develop effective strategies to promote sustainable agriculture and rural development.

7. CONCLUSION AND RECOMMENDATIONS

1. The study found a significant negative relationship between population density and the number of farm households engaged in agriculture, indicating that higher urban population densities tend to reduce agricultural participation, likely due to land scarcity and urban encroachment.

2. Urban land expansion was significantly negatively associated with agricultural engagement, suggesting that as more land is converted for urban development, fewer households remain involved in farming activities, highlighting the impact of urban sprawl on agriculture.
3. The results showed that improved infrastructure positively influences agricultural participation, implying that investments in rural infrastructure such as roads and utilities can encourage more households to engage in farming by enhancing access to markets and resources.
4. Although only marginally significant, urban migration exhibited a positive relationship with agricultural engagement, which may reflect remittance flows or land-use changes resulting from migration patterns, warranting further investigation to clarify this relationship.
5. Both the rate of urban growth and the percentage of the urban population showed positive coefficients but lacked statistical significance, indicating that their direct effects on agricultural participation are less conclusive within this model and may depend on other mediating factors.

The findings of this study underscore the significant impact of urbanization factors on agricultural participation and land use in the studied region. The negative association between population density and farm household engagement highlights the pressures that urban growth exerts on rural lands, often leading to the reduction of available farmland and the decline of traditional agricultural practices. Similarly, the expansion of urban land use directly correlates with decreased agricultural activity, reflecting the encroachment of urban development into productive rural areas. These results emphasize the need for balanced urban planning and land management strategies that safeguard agricultural spaces while accommodating urban growth. Additionally, the positive influence of infrastructure development on agricultural participation suggests that improving rural connectivity and access to resources can serve as a catalyst for revitalizing farming communities, making agriculture a more viable livelihood option despite urban expansion.

Furthermore, the study reveals nuanced dynamics related to migration and urban growth rates, indicating that these factors may indirectly influence agricultural activities through complex socioeconomic pathways. Although some relationships were marginally significant, they point to the importance of integrated policies that address both urban development and rural sustainability. To ensure the resilience of agricultural livelihoods amid ongoing urbanization, policymakers must adopt a holistic approach that combines land use regulation, infrastructure investment, and support for rural communities. Overall, the results advocate for a strategic, multi-sectoral effort to harmonize urban growth with agricultural preservation, fostering sustainable development that benefits both rural and urban populations.

The study recommends that:

1. Local government authorities should implement land management policies that regulate urban density and protect agricultural land from encroachment. This includes zoning regulations and the designation of peri-urban agricultural zones to ensure that farming activities are preserved amid increasing population density.
2. Urban planning agencies should develop and enforce sustainable land use plans that balance urban expansion with agricultural preservation. Strategic land planning can help municipalities control urban sprawl, ensuring that essential farmland remains available for farming communities.
3. The Ministry of Agriculture and Rural Development should prioritize investments in rural infrastructure such as roads, electricity, and water supply systems. Enhancing infrastructure will facilitate farmers' access to markets and inputs, thereby encouraging increased agricultural participation.

4. Policy-makers at the national and local levels should develop programs that leverage remittances from urban migrants to support agricultural activities, such as establishing rural cooperatives or financing schemes. Additionally, creating incentives for returning migrants to participate in local agriculture can help sustain farming communities.
5. Academic institutions and research organizations should conduct longitudinal studies to better understand the complex relationship between urban growth rates, population percentages, and agricultural engagement. This will inform policymakers on effective strategies to manage urbanization's impact on agriculture and rural livelihoods.

Implications of the Study to the Economy

The findings of this study have significant implications for the economy of the region. The erosion of agricultural land and the decline of farm household engagement can lead to reduced food production, increased reliance on imported food, and a decrease in rural employment opportunities. This, in turn, can result in increased food prices, negative impacts on rural poverty, and strain on the local economy. Furthermore, the loss of agricultural land can also lead to the degradation of ecosystems, loss of biodiversity, and decreased ecosystem services, which can have long-term consequences for the regional economy. policymakers and stakeholders must consider these implications and develop strategies to promote sustainable agricultural practices, protect farmland, and support farm households to ensure the long-term economic viability of the region.

The study's findings also suggest that policymakers must prioritize land-use planning, agricultural development, and rural livelihoods in their policies and programs. This can include initiatives to promote sustainable agriculture, support farm households, and protect farmland from urban encroachment. Additionally, the study's results highlight the need for integrated rural development strategies that consider the interactions between urbanization, agriculture, and the environment. By understanding these interactions and developing effective policies, policymakers can help to maintain the economic viability of the region, promote sustainable development, and ensure the long-term prosperity of rural communities.

Contribution of the Study to Knowledge

This study contributes significantly to our understanding of the complex relationships between urbanization, agriculture, and the environment. The research's focus on the impact of population density and urban land use on farm household engagement and agricultural land use provides new insights into the dynamics of rural development and the challenges faced by farm households. The study's findings also shed light on the role of urbanization in shaping agricultural practices and land use decisions, highlighting the need for policymakers to consider the interactions between urban and rural development in their policies and programs.

The study's contribution to knowledge is also significant in terms of its methodological approach. The use of a spatially explicit analysis and a combination of quantitative and qualitative data sources provides a comprehensive understanding of the complex relationships between urbanization, agriculture, and the environment. The study's findings and methodology can inform future research on rural development, agriculture, and land use, and contribute to the development of more effective policies and programs that promote sustainable development and rural livelihoods. Additionally, the study's results can be applied to other regions and contexts, providing a valuable tool for policymakers and stakeholders working to promote sustainable development and rural livelihoods.

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