

Disaster Risk Implications of Urban Expansion and Its Impact on Food Security and Livelihood Systems in the Greater Port Harcourt Region of Rivers State

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DOI: <https://doi.org/10.47772/IJRISS.2026.100900048>

Received: 18 September 2026; Accepted: 23 September 2026; Published: 29 September 2026

ABSTRACT

This study examines the impact of urban expansion on food security and livelihoods in the Greater Port Harcourt region of Rivers State. Over the years, the region has experienced phenomenal urban growth, leading to both approved and unapproved conversion of productive agricultural land to other uses, including residential, commercial, industrial, and infrastructure. These changes have created significant challenges for local food production and distorted the livelihood systems of food-producing communities. The study explicitly investigates the effects of these land-use conversions, driven by urban expansion, on the local food production chain, which has also led to rapid rural-urban migration, urban-rural conflict, distorted livelihood systems, land fragmentation, and the loss of productive agricultural land. This scenario has engendered acute food shortages. A quantitative research design was adopted, using structured questionnaires administered to 398 respondents selected from four LGAs in the Greater Port Harcourt Area. Data were analysed using descriptive statistics, including frequencies, percentages, mean scores, and Likert-scale ranking. The findings revealed that unprecedented land-use change and urban expansion have major implications for food prices, arable land loss, reduced local food production, and displacement of smallholder farmers. The study concludes that uncontrolled urban expansion poses significant threats to agricultural land availability, rural livelihoods, and local food security. The study recommends integrating agricultural land protection into urban planning policies, improving land-use regulation, preserving peri-urban agricultural zones, and adopting sustainable urban growth strategies in peri-urban areas through containment boundaries.

Keywords: Urban Expansion, Food Security, Livelihood, Perception and Greater Port Harcourt

BACKGROUND

The rate of global urbanisation has made urban expansion an important driver of land-use change. As cities expand, increasing expanses of agricultural and other productive land are transformed into built-up areas, with significant consequences for environmental sustainability, agricultural production, food systems, and rural livelihoods (Seto & Ramankutty, 2016). Earlier studies show that urban expansion largely occurs through agricultural land conversion. For instance, Zhang et al. (2020) projected that agricultural land accounted for about 68.93% of the total land converted to urban uses. This trend is most evident in the Global South, where rapid population growth, economic development, and rising demand for residential and infrastructure development continue to put pressure on available land resources. Converting agricultural land not only reduces the area available for food production but also weakens the livelihoods of indigenous and rural communities whose economic activities depend on access to land (Radwan et al., 2019). Hence, urbanisation should not be understood exclusively as an increase in urban population or the physical enlargement of settlements; it also creates direct and indirect alterations in existing land-use systems (van Vliet, 2019; de Bruin et al., 2021).

The future scale and spatial scope of urban expansion additionally raise concerns about the availability of land for agriculture. While the global urban population is estimated to reach nearly 6.4 billion by 2030 (Ishrak et al., 2026), significant doubt remains concerning where, how rapidly, and to what degree urban areas will expand. If existing population-density patterns persist and areas with a high probability of urban development are converted to urban uses, global urban land cover could expand by about 1.2 million km² by 2030. This could represent

almost three times the projected global urban land area around 2000 (Seto et al., 2012). The consequences are most significant for Africa, where agricultural land losses linked to urban expansion could substantially affect food production. Bren d'Amour et al. (2017) projected that a 3% reduction in cropland might lead to about a 9% reduction in crop production, with countries like Egypt and Nigeria predicted to experience considerable effects.

The loss of agricultural land linked to urban expansion has important consequences for food availability and access because agricultural land is an essential resource for food production (Akmal & Mohammadi, 2025). As productive farmland is converted to residential, commercial, industrial, and infrastructure uses, local communities' ability to produce food may decline. These circumstances can increase reliance on food from external markets and may make households more vulnerable to food price instability, supply disruptions, and other socioeconomic pressures. The implications are particularly significant in communities where agriculture remains a main source of household income, employment, and survival.

Food security remains one of the most important global development challenges. According to the Food and Agriculture Organisation (FAO) and its partner agencies, about 821 million people globally were undernourished in 2017, representing approximately one in every nine people globally (Yila & Sylla, 2020). In acknowledgement of the multi-dimensional state of this challenge, the 1996 World Food Summit defined food security as a condition in which all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary necessities and food preferences for an active and healthy life (Yila & Sylla, 2020). This definition highlights that food security depends not only on food availability but also on people's ability to consistently access and use adequate food.

Rapid urban expansion can affect food security and rural livelihoods in many interconnected ways, including competition for agricultural land, changing employment opportunities, rural–urban migration, land-use conflicts, and environmental pollution. Growing pressure between urban development and the need to maintain productive agricultural systems has become a key issue in global sustainable development planning. Urban expansion affects food security directly and indirectly. Directly, converting agricultural land to urban uses reduces the land available for food production and gradually limits the spatial extent of agricultural activities (Cao & Wang, 2025). Indirectly, unrestrained urban growth and expansion may contribute to land degradation, fragmentation of agricultural areas, declining agricultural productivity, and a shift of rural labour from farming to non-agricultural activities (Martellozzo et al., 2015). These methods may further weaken the traditional rural–urban food supply connections and affect the accessibility, reliability, and stability of food supply channels (Barthel et al., 2019).

The implications of urban expansion extend beyond the physical loss of agricultural land; changes in land availability can shift household livelihood strategies, reduce opportunities for agricultural employment, increase competition for remaining productive land, and alter traditional forms of land use and resource management (Rahman, et al., 2023). For households that rely heavily on agriculture, these conversions may affect their ability to produce food, earn income, and maintain sustainable livelihoods (Rahman, et al., 2023). Therefore, understanding the connections between urban expansion, land-use change, food security, and rural livelihoods requires considering both physical changes in land resources and the perceptions and experiences of affected households.

This study aimed to assess households' perceived implications of urban expansion for food security and rural livelihoods in the study area. The study also adds to the growing literature on urban expansion and food security in Nigeria by providing empirical evidence on how households perceive and experience the implications of urban growth. The findings provided useful insights for land-use planning and policies aimed at balancing urban development with the protection of agricultural land and the promotion of sustainable food security and rural livelihoods in the Greater Port Harcourt City Area.

Study Area

The Greater Port Harcourt region extends across eight (8) Local Government Areas (LGAs) of Rivers State (Port Harcourt, Obio/Akpor, Oyigbo, Eleme, Ikwerre, Okrika, Etche and Ogu/Bolo). Based on the master plan report, the Greater Port Harcourt population is approximately 1,864,570 persons, with a projected growth rate of 2.8%

in 2008; the projected population of the study area in 2025 is estimated at 3,001,468 persons (GPHCDP, 2013). The Greater Port Harcourt City is bounded by Port Harcourt Local Government Area, the most southern LGA, by the East and South of the Central Business District (CBD); Oyigbo, Eleme, Okrika and Ogu-Bolo Local Government Areas, to the North; Obio/Akpor, to the North-west; Ikwerre LGA and to the North-East; and Etche LGA and includes the Otamiri-Etche River (GPHCDP, 2013). It covers a total land area of approximately 1,900 square kilometres. Geographically, the Greater Port Harcourt Area lies between latitudes 4°40'00"N and 5°05'00"N and longitudes 6°50'00"E and 7°15'00"E (see Fig. 1).

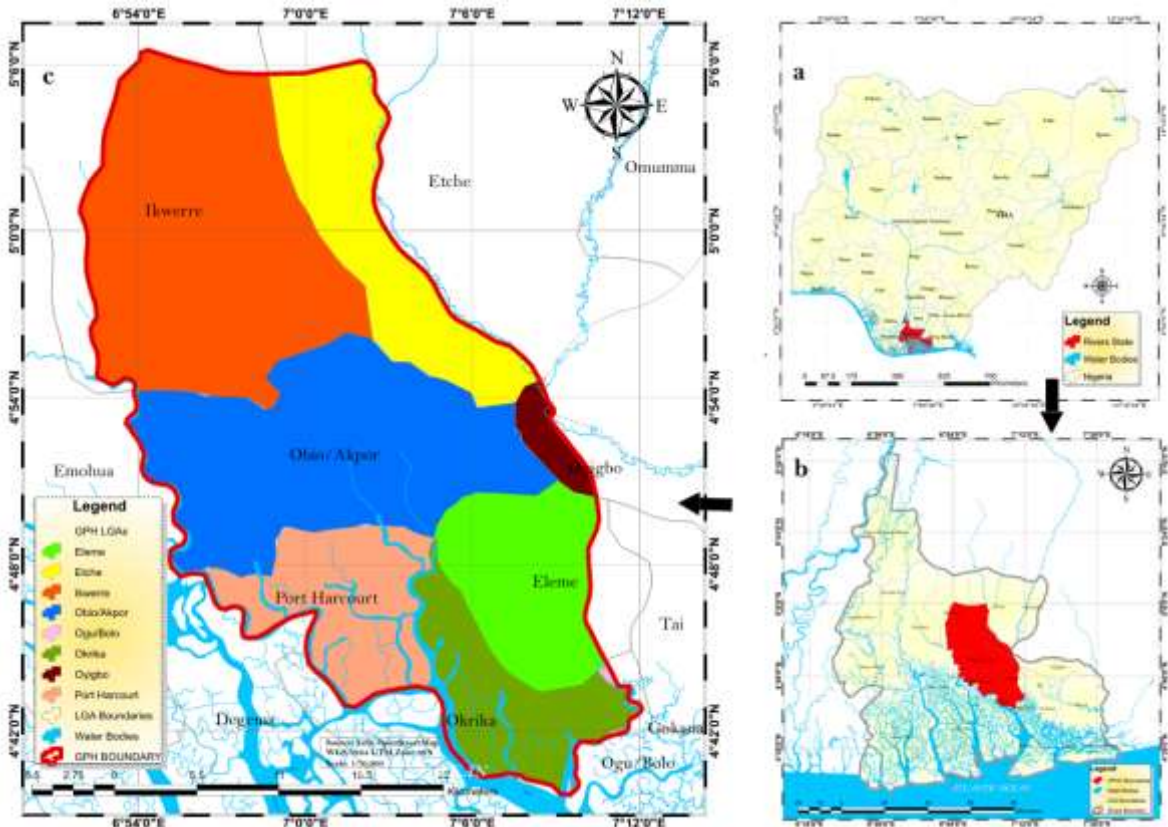


Fig. 1: Map of Greater Port Harcourt City

Source: GIS Lab, Department of Urban and Regional Planning, RSU, Port Harcourt, 2025.

Empirical Review

Empirical evidence suggests that approximately 50–63% of newly developed urban areas may be converted from existing croplands, potentially reducing global food production by 1–4%, equivalent to the annual food requirements of an estimated 122–1,389 million people (Chen et al., 2020). This pattern is particularly pronounced in Asia, Africa, and South America, where rapid urbanisation has intensified competition between agricultural land and expanding urban settlements (van Vliet et al., 2017). Urban expansion affects food production through several interconnected pathways. In terms of land resources, the physical expansion of urban areas directly encroaches on large areas of productive agricultural land, reducing the land available for food cultivation (Li et al., 2018). Urban development may also affect the quality of surrounding agricultural land through infrastructure construction and industrial pollution, which can alter soil physical and chemical properties. In addition, converting highly productive land for urban development reduces the availability of land with high agricultural potential (Salvati, 2013).

These changes can ultimately affect soil quality, crop yields, and the quality of agricultural produce. From a water-resource perspective, urbanisation substantially increases water demand, while associated development pressures can affect water quality and undermine water security (da Encarnação Paiva et al., 2020). Seto et al. (2012) found that urban expansion often occurs at the expense of cropland, raising concerns about the implications of future urban growth for global agricultural production. Despite the extensive conversion of

agricultural land to urban uses, scientific understanding remains inadequate about how the spatial distribution and expected growth of cities may affect the global availability of cultivated land. To address this concern, Seto et al. (2012) combined spatially explicit projections of future urban expansion with global datasets on cropland distribution and crop yields to estimate the potential implications for agricultural production.

In Nigeria, numerous studies have stated a considerable decline in the availability of agricultural land (Idoko, et al., 2023; Atu et al., 2012). Of particular concern is the growing conversion of farmland to non-agricultural uses, including residential and industrial developments, transportation infrastructure such as road construction, and tourism and recreational facilities (FAO, 2014; Saleh et al., 2018). Agricultural land is also increasingly affected by environmental degradation processes, such as soil erosion and desertification, which reduce the productive capacity of available land (Oyekale, 2020). Collectively, land change and environmental degradation have reduced the land available for agricultural production and food supply (Ademiluyi et al., 2008). In Nigeria and other parts of West Africa, changes in the availability and accessibility of farmland and grazing land have also been linked to increased resource competition, which can disrupt agricultural activities and negatively affect household food security (Usman & Nichol, 2022).

The connection between urban expansion and food production has brought growing scholarly attention in recent years, with studies exploring the issue at global, national, and regional scales. Bren d'Amour et al. (2017) projected that urban expansion could lead to a global loss of about 1.8–2.4% of agricultural land by 2030, with about 80% of the predicted loss happening in Asia and Africa. The implications extend beyond the physical loss of farmland, as declines in crop production from urban land expansion could also affect the annual food needs of an estimated 122–1,389 million people (Chen et al., 2020). These predictions show that the consequences of urban expansion can spread beyond individual communities and may influence broader food supply systems.

Indications from different countries further demonstrate these challenges. He et al. (2017) found that rapid urban expansion in China between 1992 and 2015 put growing pressure on food security and was linked to an about 2% decline in average annual food self-sufficiency. Likewise, in the arid region of central Iran, unrestrained low-density urban expansion has contributed to the disintegration of agricultural land and decreases in crop yields (Nadoushan, 2022). These findings suggest that the effects of urban expansion depend not only on the amount of agricultural land converted but also on the spatial pattern of development. Fragmented farmland, for instance, can become less accessible and less economically feasible to cultivate, thereby reducing agricultural productivity even in areas where substantial amounts of farmland remain.

While urban expansion carries important challenges to agricultural production and food security, its negative effects are not essentially unavoidable. Proper land-use planning and effective land management can reduce the loss of productive agricultural land and sustain agricultural systems' capacity to support food production (Li et al., 2023; Wang et al., 2021). Well-designed land-use policies can also help control unrestrained urban growth and direct development away from highly productive agricultural areas. Andrade et al. (2022) also highlighted the importance of developing land-use policies that protect major agricultural land, especially areas used to produce essential food crops. These approaches are increasingly important in rapidly urbanising areas, where competing demands for residential development, infrastructure, economic activities, and food production must be prudently balanced.

The literature shows that urban expansion is a major driver of agricultural land-use change and can significantly affect food production and household food security. These effects are particularly pronounced in developing countries such as Nigeria, where rapid population growth, expanding urban settlements, environmental degradation, and increasing competition for land continue to put high pressure on agricultural resources. Understanding how households perceive and experience these changes is therefore critical for developing land-use strategies that can accommodate rapid urban development while protecting agricultural resources and sustaining food security.

METHODOLOGY

The study methodology adopted a quantitative cross-sectional survey design. The study collected primary data from selected respondents using a structured questionnaire to assess their perceptions and experiences of how

urban expansion affects food security and rural livelihoods. The target population consisted of households in the selected Local Government Areas within the Greater Port Harcourt Area. The study selected a sample of 398 respondents using the Taro Yamane formula. The study used descriptive statistics; results were presented in Tables, Means, and Standard Deviations. The sampled LGAs comprise Ikwerre, Etche, Eleme and Obio/Akpor.

Population and Sampling

The study population comprises the entire eight (8) LGAs of Greater Port Harcourt City in Rivers State. Namely, Port Harcourt City, Obio/Akpor, Ikwerre, Eleme, Etche, Oyigbo, Okrika and Ogu/Bolo. Of the eight LGAs, four (4) Local Government Areas were purposively selected based on the study's peculiarities. The selected areas were identified and listed; all fourteen communities identified in the four Local Government Areas were chosen to represent the sampled LGAs, as shown in Table 1. The sample LGAs have a population of 63,789 persons in 1991 in the National Population Census (NPC, 1991) and a projected population of 542,788 persons in 2025 using a linear exponential growth projection model, given as $P_n = P_0(1+r)^n$. Equation 1 with a growth rate of 6.5% (NPC, 2016).

Table 1: Population of the Study Areas

S/No	LGAs	Names of Communities	No. of Community
1	Ikwerre	Igwuruta, Igwuruta- Ali, Omagwa, Ipo, Ozuaha, Omademe, Omuchi, Omunwei, Omuodukwu, Mbodo, Omuahunwo, Omuike, Omuoda, Omuigwe, Omuchiolu, Omuokiri, Omuoko and Omuhuechi	18
2	Etche	Igbo-Etche, Abara, Elele-Etche, Umuebulu, Chokocho, Edegelem, Odagwa, Umuosukpo, Ikwerrengwo	9
3	Eleme	Nchia, Ebube, Esama, Eteo, Onne, Ogale, Alode, Aleto, Akpajo and Alesa	10
4	Obio/Akpor	Eneka, Rumuodomaya, Elemenwo, Rukpokwu, Rumuosi, Iriebe, Rumuagholu, Ogbogoro, Eliozu and Rumukwursi	10
	Total		47

Source: Greater Port Harcourt City Development Plan, 2025

Determination of Sample Size

The study strategically selected four (4) sample areas making a 30% sample unit and use the Taro Yamane formula, which is widely used to determine the ideal sample size for surveys involving large populations.

The Taro Yamane formula used to determine the sample size is expressed as:

$$n = \frac{N}{1 + N(e)^2} \dots\dots\dots \text{Eqn 2}$$

Where:

n = Sample Size,

1 = Constant,

N= Population Size,

e = Sampling error (5%) = 0.05

Therefore:

$$n = 90,466/1 + 90,466(0.05)^2$$

$$= 90,466/1 + 90466(0.0025)$$

$$= 90,466/1 + 226.1$$

$$= 90,466/227.1$$

$$n = 398.3$$

$$n = 398$$

However, the number of questionnaires to be obtained for administration in the sampled area will be proportionally derived from the households (see Table 2).

Table 2: Determination of Sample Size for the Study

S/N	Sampled Communities	1991 Population	Projected 2025 at 6.5% Growth Rate	No. of HH (6 person per HH)	No. of HH to Sample
	Igwuruta	7104	60,449	10,075	44
2	Ipo	2125	18,082	3,014	13
3	Omuike	1109	9,437	1,573	7
4	Omunwei	3554	30,241	5,040	22
5	Omuokiri	303	2,578	430	2
6	Igbo-Etche	8261	70,294	11,716	52
7	Umuebulu	5069	43,133	7,189	32
8	Elele-Etche	2397	20,396	3,399	15
9	Ebube	8727	74,259	12,377	54
10	Eteo	3828	32,573	5,429	24
11	Aleto	6376	54,254	9,042	40
12	Iriebe	3549	30,199	5,033	22
13	Rumuosi	2037	17,333	2,889	13
14	Ogbogoro	9350	79,560	13,260	58
	Total	63,789	542,788	90,466	398

Source. NPC, 1991; NBS, 2016; Researcher's Fieldwork, 2025

Data Collection

The study used two (2) data collection methods to achieve the study's aim and objectives: primary and secondary sources.

Primary data sources included administering questionnaires face-to-face to households in the study area. This involved designing, structuring, and administering open- and closed-ended questionnaires to community residents on the impacts of urban sprawl and land resources for quantitative data; physical observations and photographs were also used to validate the current situation of the study area regarding the subject matter.

The secondary data sources included maps showing the study area boundaries, the location of sampled areas, and land-use change in the study area; materials from internet sources and published materials on land-use change, planning implications, and food security; and records from Government agencies.

Analytical Techniques

The study developed a database using the Statistical Package for the Social Sciences (SPSS) Version 22 to process the data collected during the field survey. The study used univariate statistics and bivariate analysis.

Hypothesis (H₀₂): There is no significant relationship between land-use change and food security.

The hypothesis was tested using simple linear regression to determine if the extent to which physical development has replaced agricultural land significantly influences food security in the study area. The degree of agricultural land replacement by physical development was used as the independent variable. In contrast, the implications of land-use change on food security, comprising reduction in local food production, land fragmentation, increase in food prices, loss of productive agricultural land, increased urban-rural conflicts, displacement of livelihoods, migration, and climate change, are the dependent variables.

RESULTS

Table 3 results indicated that increased food prices were the most significant perceived implication of urban expansion, with the highest aggregate mean score of 3.86 ± 1.03 , and were therefore ranked first. This was followed by loss of productive agricultural land (3.48 ± 1.09), ranking second, and reduction in local food production (3.39 ± 1.15), ranking third. Displacement of livelihood also had an aggregate mean above the decision threshold (3.21 ± 1.23), ranking fourth.

Conversely, land fragmentation (2.91 ± 1.08), migration (2.88 ± 1.24), climate change (2.83 ± 1.24), and increased urban-rural conflicts (2.67 ± 1.14) recorded aggregate mean scores below the decision threshold of 3.00. These findings indicate that, at the cumulative level, respondents did not generally perceive these factors as major implications of urban expansion within the study area. These findings indicate that respondents were more concerned about the direct economic and production-related consequences of land-use change than its broader social and environmental effects (see Table 3).

Table 3: Perceived Implications of Urban Expansion for Food Security and Rural Livelihoods in Greater Port Harcourt Area

S/N	Perceived Implication	Ikwerre Mean $\pm$ SD	Etche Mean $\pm$ SD	Eleme Mean $\pm$ SD	Obio/Akpor Mean $\pm$ SD	Aggregate Mean $\pm$ SD	Rank	Decision
1	Reduction in local food production	3.42 $\pm$ 1.11	3.21 $\pm$ 1.29	3.37 $\pm$ 1.12	3.59 $\pm$ 1.06	3.39 $\pm$ 1.15	3rd	Agree
2	Land fragmentation	3.05 $\pm$ 0.93	2.67 $\pm$ 1.17	2.70 $\pm$ 0.96	3.28 $\pm$ 1.15	2.91 $\pm$ 1.08	5th	Disagree
3	Increase in food price	3.90 $\pm$ 0.83	3.27 $\pm$ 1.27	3.95 $\pm$ 0.80	4.33 $\pm$ 0.92	3.86 $\pm$ 1.03	1st	Agree

4	Loss of productive agricultural land	3.82 ± 0.82	3.08 ± 1.19	3.43 ± 1.04	3.64 ± 1.16	3.48 ± 1.09	2nd	Agree
5	Increased urban–rural conflicts	3.03 ± 1.09	2.45 ± 1.14	2.63 ± 1.05	2.67 ± 1.23	2.67 ± 1.14	8th	Disagree
6	Displacement of livelihood	3.51 ± 0.95	2.84 ± 1.36	2.98 ± 1.18	3.59 ± 1.22	3.21 ± 1.23	4th	Agree
7	Migration	3.26 ± 1.18	2.90 ± 1.28	2.46 ± 1.16	3.06 ± 1.20	2.88 ± 1.24	6th	Disagree
8	Climate change	2.69 ± 1.04	3.22 ± 1.33	2.65 ± 1.29	2.82 ± 1.18	2.83 ± 1.24	7th	Disagree

Source: Authors' fieldwork 2026

Decision Rule: Mean score ≥ 3.00 = Agree; Mean score < 3.00 = Disagree.

Likert Scale: Strongly Disagree = 1; Disagree = 2; Neutral = 3; Agree = 4; Strongly Agree = 5.

Note: Mean and standard deviation were calculated using valid responses only and non-responses were excluded.

Source: Field Survey, 2026.

There is no significant relationship between land-use change and food security.

The regression model summary revealed an R-value of 0.612, indicating a considerably strong positive relationship between land-use change and its implications for food security (Table 4). The coefficient of determination ($R^2 = 0.374$) shows that about 37.4% of the variation in the implications of land-use change for food security is described by the extent of physical development replacing agricultural land. The adjusted R^2 of 0.368 indicates that about 36.8% of the variation remains explained after adjustment for the model.

The ANOVA results show that the regression model is statistically significant. The model produced an F-statistic of 24.621 with 1 and 41 degrees of freedom, and a significance value of $p < 0.001$ (Table 5). Since the significance level is below the 0.05 threshold, the regression model offers sufficient statistical evidence that land-use change significantly explains variation in the identified implications for food security. The coefficient results reveal that physical development replacing agricultural land has a significant positive effect on the dependent variable ($B = 0.612$; $\beta = 0.612$; $t = 4.962$; $p < 0.001$). The positive coefficient suggests that increasing conversion of agricultural land to physical development is connected with increasing adverse implications for food security (Table 6). This means that as agricultural land is progressively converted to residential, commercial, infrastructural, and other physical developments, communities are increasingly exposed to consequences such as declining local food production, fragmentation and loss of productive agricultural land, increased food prices, livelihood displacement and other associated pressures.

As a result of the statistically significant regression ($p < 0.001 < 0.05$), the null hypothesis (H_{02}) is rejected. Therefore, the study establishes that there is a significant relationship between land-use change and food security in the study area. The findings demonstrate that the replacement of agricultural land by physical development constitutes a critical factor connected with food-security outcomes. Nevertheless, given that the model describes 37.4% of the observed variation, land-use change is regarded as one of several factors influencing food security and not the sole determinant factor.

Table 4: Regression Model Summary

Model	R	R Square	Adjusted R Square
1	0.612	0.374	0.368

Source: Fieldwork 2026

Table 5: Summary of ANOVA

Model	Sum of Squares	df	F	Sig.
Regression	9.292	1	24.621	.000
Residual	15.462	41		
Total	24.754	42		

Source: Fieldwork 2026

Table 6: Summary of Coefficients

Variable	B	Beta	t	Sig.
Constant	1.204		3.135	.003
Physical Development Replacing Agricultural Land	.612	.612	4.962	.000

Source: Fieldwork 2026

DISCUSSIONS

The results on the implications of land use change for food security in the study area revealed both agreement and disagreement on the effects of urban expansion on livelihoods and food security. These implications include reduced local food production, land fragmentation, increased food prices, loss of productive agricultural land, livelihood displacement, and climate change (see Table 1). The reduction in local food production indicates that land-use change has important implications for food security in the study area. Overall, the response patterns suggest that converting agricultural land to non-agricultural uses is increasingly reducing the study area's capacity to sustain local food production. The finding can be understood within the context of rapid urban expansion and increasing competition for land. This trend matters for food security because food production is a fundamental dimension of food availability. When productive agricultural land is continuously converted to built-up uses, local communities' ability to produce sufficient food may decline, increasing dependence on food supplies from outside the area (Saleh, et al., 2018).

Seto, et al., (2012) observed that urban expansion is a main driver of land-cover change and has significant implications for ecosystem productivity and productive land use. Similarly, Brien d'Amour et al. (2017) found that urban expansion frequently occurs on cropland, with particularly significant consequences for food-producing areas in Africa and Asia. Their study further projected that the Greater Port Harcourt Area is likely to experience substantial cropland loss as urban areas continue to expand.

Land fragmentation generally occurs when a farmer's landholding is divided into several small and often spatially separated plots. Such fragmentation can challenge agricultural production by increasing the time and cost of moving labour, inputs, and produce between plots. It may also limit the adoption of mechanisation, irrigation, and other modern farming practices, reducing farm efficiency and potentially affecting food production. A recent systematic review similarly found that land fragmentation can constrain agricultural productivity, profitability

and technical efficiency, particularly where farms consist of small and dispersed parcels (Aslam & Fazal, 2025). However, fragmented landholdings are an important characteristic of smallholder agriculture and can influence agricultural productivity and the effective use of land resources (Apata, 2016). The relatively high proportion of neutral respondents in this study is also noteworthy because land fragmentation does not necessarily produce negative outcomes in every context.

In most cases, farmers may benefit from cultivating plots located in different environmental conditions, allowing them to grow a variety of crops and spread the risks associated with drought, flooding or other localised shocks. According to Knippenberg et al. (2020), the study stated that land fragmentation in Ethiopia could reduce food insecurity by enabling households to diversify crop production across parcels with different characteristics. This suggests that the relationship between land fragmentation and food security is complex and context-dependent.

The study also reflects the broader relationship between urbanisation, changing land-use patterns and the transformation of food systems. The Food and Agriculture Organisation and its partner agencies have emphasised that urbanisation alters agri-food systems and can affect access to affordable and nutritious diets across the rural-urban continuum (FAO et al., 2023). In rapidly urbanising areas, competition for land between agricultural production and urban development can therefore indirectly contribute to food price increases, particularly when the loss of nearby farmland reduces local food supplies and lengthens supply chains. Evidence from developing countries further shows that urban expansion and agricultural land-use change can create significant pressures on agricultural systems and household food security (Okeleye et al., 2023; Hatab et al., 2019; Adamgbe & Ujo, 2012; Alagbe, et al., 2013).

The high level of agreement in this study therefore suggests that respondents are experiencing or observing a connection between land-use transformation and food affordability. This is particularly important because food security concerns not only the availability of food but also people's economic access to adequate and nutritious food. When food prices increase faster than household incomes, low- and middle-income households may reduce the quantity, quality or diversity of food they consume. Thus, uncontrolled conversion of productive agricultural land may have wider implications beyond changes in the physical landscape, as it can also affect household purchasing power and access to food.

Furthermore, land-use competition and conflict can be a concern. Land-use change can contribute to conflicts when urban expansion, agricultural activities, and other competing uses put pressure on land resources. A study by de Jong et al. (2021) found that land-use-change conflicts often involve interacting factors such as population growth, migration, overlapping land rights, economic inequality, and weak institutional arrangements, rather than land-use change alone. Thus, the relatively high level of disagreement in the present study may indicate that respondents do not directly associate changes in land use with increased urban–rural conflicts, or that other social, economic and institutional factors are perceived as more important causes of such conflicts. According to de Bruin et al., 2021, rapid urbanisation can intensify competition for land and generate conflicts of interest over land use, while the conversion of agricultural land may affect local food production and food systems.

Consequently, effective and participatory land-use planning, protection of agricultural land, and clear land-rights arrangements remain important for reducing potential conflicts and safeguarding agricultural livelihoods and food security (Owusu Danquah et al., 2026; Metternicht, 2018; Palmer et al., 2009). Land is changing its role in supporting rural livelihoods for many households, particularly those engaged in farming, as it is not only a physical resource but also provides employment, food, income, and a means of sustaining household welfare (Chipenda & Adesina, 2025). Consequently, when agricultural land is converted to residential, commercial, industrial, or infrastructural uses, households that depend on it may lose an important source of livelihood. The Food and Agriculture Organisation (FAO) emphasised that land underpins agri-food systems and supports millions of livelihoods. In contrast, human-induced land degradation and land-use pressures can have significant consequences for both food security and livelihoods (Båsand & McCarthy, 2026).

Migration has also been linked to land-use and land-cover change. This is evident in parts of North-Central Nigeria, where migration of rural people, particularly young farmers, to urban areas is associated with land-use and land-cover change (Okeleye et al., 2023). Migration can have both positive and negative implications for food security (Köse et al., 2026). On the negative side, when productive members of farming households migrate,

the availability of agricultural labour may decline, potentially reducing household and local food production. On the other hand, migration may provide households with alternative sources of income through remittances. Such income can improve the ability of households that remain in the community to purchase food and meet other basic needs. Consequently, the effect of migration on food security depends on whether it results in the loss of productive agricultural labour, as peri-urban areas are increasingly occupied by aged people who have little strength to engage in traditional agricultural activities (Ayuba et al., 2023), or provides sufficient alternative income to compensate for that loss.

The study found that, because of land conversion and loss, many households may be forced to change occupations, reduce agricultural activities, or relocate in search of alternative income, which can trigger food insecurity and livelihood displacement. The FAO similarly notes that displaced populations frequently lose livelihoods and productive assets and may face difficulties obtaining land and other resources needed to resume their economic activities (Båsand & McCarthy, 2026), while the IPCC also stated that land-use change is driven by interacting factors including population growth, migration, livelihoods, land tenure, markets and economic conditions, producing complex and sometimes different outcomes for food security (Elbehri et al., 2017). Moreover, the study suggests that livelihood displacement is an important social and economic pathway through which land-use change can influence food security and households' ability to access food with their income (Cohen & Garrett, 2010). The relatively high proportion of respondents who agreed or strongly agreed suggests that land conversion may be affecting people's traditional means of making a living, particularly where agriculture is an important livelihood activity. It is imperative to ensure that urban and infrastructural development does not inadvertently undermine the livelihoods and food security of communities that depend on land; therefore, fair compensation in the form of replacement sustainable livelihoods should be considered.

Changes in land cover, particularly deforestation, vegetation removal, wetland conversion and the expansion of built-up areas, can alter carbon storage, greenhouse-gas emissions, surface temperature, evapotranspiration and hydrological processes. The Intergovernmental Panel on Climate Change (IPCC) identifies land-use and land-cover changes as important contributors to anthropogenic greenhouse-gas emissions and climate-system changes (Mir, et al., 2025). Land-use decisions can therefore influence both the magnitude of climate change and the capacity of communities and ecosystems to adapt to its effects ((Mir, et al., 2025). This is particularly relevant in rapidly urbanising areas, where converting vegetation and agricultural land to built-up surfaces can alter local environmental conditions. This is particularly important for food security because agriculture is highly sensitive to changes in temperature, rainfall patterns, flooding, drought, and other climate-related stresses. The IPCC notes that climate change already affects food security through changes in agricultural productivity, water availability, and the frequency and intensity of extreme weather events. When land-use change reduces productive agricultural land and increases environmental vulnerability, local communities' capacity to produce sufficient food may be further weakened (Mir, et al., 2025). In this sense, land-use change and climate change can interact to create cumulative pressures on food production and food access. Overall, the study confirms that the relationship between land-use change, climate change, and food security is complex and interconnected, as respondents show substantial agreement. Hence, poor urban or peri-urban households, including displaced farmers who are unemployed, are at risk of becoming food insecure (Crush, et al., 2012).

CONCLUSION

This study assessed the perceived implications of urban expansion for food security and rural livelihoods in the Greater Port Harcourt Area, Rivers State, Nigeria. Based on respondents' perceptions, urban expansion is associated with several socioeconomic and environmental challenges, including reduced local food production, perceived loss and fragmentation of productive agricultural land, livelihood displacement, migration, and urban–rural conflict. As a result of the statistically significant regression ($p < 0.001 < 0.05$), the null hypothesis (H_{02}) is rejected. Therefore, the study establishes a significant relationship between land-use change and food security in the study area. The perceived impacts of urban expansion show that rapid urban growth can have far-reaching implications for communities whose livelihoods rely deeply on agriculture and other land-based activities. These implications may include significant changes in household livelihood systems, disruption of traditional income sources, increased dependence on livelihood diversification, and, in some cases, the displacement of households from productive land and settlements. As access to agricultural land becomes progressively limited, affected

households may experience declining food production and fewer income-generating opportunities, thereby increasing their susceptibility to food insecurity. Without timely and effective intervention by policymakers and relevant institutions, the continued urban expansion may further increase these challenges and undermine the food security and socioeconomic well-being of land-dependent communities. Policymakers must recognise and integrate the potential livelihood and food security implications of urban growth into land-use planning and development policies. The findings of this present study have significant implications for urban planners, policymakers, agricultural stakeholders, and institutions concerned with food security and rural development. As urbanisation continues to expand into agricultural areas, strategic urban planning and evidence-based policy interventions are required to reduce the adverse effects of land conversion on food production and household livelihoods. These interventions provide practical, policy-oriented solutions to competing demands for urban development and agricultural land. Urban planners can use insights from this study to encourage more compact, efficiently managed patterns of urban growth that reduce undesirable encroachment into agricultural areas. Integrating green infrastructure into urban development frameworks and establishing proper land-use zoning regulations can also help protect strategically important agricultural land. Moreover, integrating peri-urban agriculture into urban planning can help sustain local food production while accommodating population growth and urban development. Governments and their agencies can also use the findings to frame targeted interventions that support households and farmers affected by urban expansion. Such interventions may include incentives for implementing sustainable agricultural practices, stronger legal mechanisms to protect productive farmland, and adaptive agricultural policies designed to improve productivity in areas under increasing development pressure. Strengthening land-use planning institutions, improving coordination among relevant stakeholders, and ensuring that agricultural interests are adequately represented in urban development decisions can further contribute to a more balanced approach to urban growth.

RECOMMENDATION

Based on the findings that urban expansion reduces local food production, the study recommends that urban and regional planning policies should give greater consideration to food systems, agricultural livelihoods, and the socioeconomic welfare of communities affected by urban expansion in the region's master plan.

As access to agricultural land becomes progressively limited there is the need to reinforce effective land-use planning that accommodates urban growth while protecting productive agricultural land. Consequently, planning policies are needed to protect viable agricultural land, discourage indiscriminate conversion of farmland, and promote a balance between urban development and agricultural production. Such measures are necessary to ensure that the demand for physical development does not undermine the productive land base required to support sustainable local food systems.

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