



# **Implications of Land Use Change on Food Insecurity among Rural Households in Peri-Urban Ibadan, Oyo State, Nigeria: Case of Akinyele Local Government Area**

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## **ABSTRACT**

Humans use land to meet their material, social and cultural needs, leading to modifications in the use of land resources. Unplanned land use change can be a limitation to food production, and negatively affect food security, causing food insecurity, especially among rural households. This study analyzed the implications of land use change on food insecurity among rural households in peri-urban Ibadan, Oyo State, Nigeria, using the case of Akinyele Local Government Area. A sample of 200 respondents was selected randomly from four communities proportionate to size. Data were collected with the aid of structured questionnaire and analyzed using descriptive statistics, Household Food Insecurity Access Scale (HFIAS) Score and ordered logistic regression model. Total number of plots held by respondents was 577 with average total land size of 7.7 hectares. As at the time of acquisition, most of the available lands were bushes, but there was a total disappearance of bushes after acquisition and in the current land use, leading into increase in land used for agricultural, housing and commercial purposes across these three periods. The mean area of land that had undergone change (Land Use Change index) was 0.8 (80% of the total land size), indicating that of the 1,543.1 hectares of land held by the respondents, 1,234.5 hectares has undergone one form of change or the other, while 308.6 hectares (20%) is still in their original use. The major factors influencing changes in land use were location attributes of the land (67.5%) and urbanization (62.5%). HFIAS Score showed that 9.0% of the respondents were food secure while 43.5%, 34.5% and 13.0% were mildly, moderately and severely food insecure, respectively. Land use change index significantly ( $P < 0.05$ ) reduced food insecurity status of households by 3.3%. In conclusion, changes in land use over time reduced food insecurity of rural households. Hence, active policy drive towards ensuring proper land use will reduce food insecurity of the households. Also, enforcement of appropriate land management procedure will mitigate illegal and inappropriate conversion of land.

**Keywords:** Land Use Change Pattern, Food Insecurity Status, Rural Households, Land Acquisition

## **1.0 INTRODUCTION**

Expansion in agriculture has been constrained due to massive changes in land use, which has been occasioned by natural topography as well as increase in population (Sonneveld, 2002). Agriculture plays a strategic role in the Nigerian economy in terms of development. According to National Bureau statistics (NBS, 2018), agriculture contributed 20.85% to Nigeria's GDP in 2017. Agriculture has been identified by the Food and Agricultural Organization (FAO) as having a vital role to play in food security. Food is human energy source, but limited access to food impacts health in negative ways. Approximately one billion individuals in the world lack adequate amounts of food to meet their nutritional needs and so, are malnourished (Barrett, 2010).

Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (World Food Summit, 1996). This definition incorporates several needs; availability of food, access to food, and the food should be culturally appropriate. Food security relates directly to nutrition and health. Food security is determined by food availability, food access, food stability and food utilization (Ericksen, 2008; Schmidhuber and Tubiello, 2007). Typically, food security is thought of as being related to availability and access to foodstuffs. The threat to food security lies with population growth and urbanization, leading to land use change, income disparity, overpopulation, ecosystem degradation and poor animal health.

Food insecurity is a concept that refers to the social and economic problem of lack of food due to economic deprivation; not voluntary fasting or dieting or for other reasons. The standard definition used in the United States for food insecurity is that “food insecurity exists whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain” (Tilman *et al.*, 2011).

Humans use land to meet their material, social and cultural needs. In this process, land resources are modified in various ways, often with detrimental impacts on the environment and human well-being. The choice of land use and the decision to change it are influenced by the size of the household, age, gender, education, employment, attitudes, values and personal traits of the household members (Briassoulis, 2000). High rates of water, soil and air pollution are consequences of observed land use and land use change. Biodiversity is reduced when land is changed from a relatively undisturbed state to more intensive uses like farming, construction, and etcetera (Ellis and Pontius, 2007).

Land use change can be referred to as a transformation process from a traditional agricultural society to a modern metropolitan society, associated with major changes in social and economic structures (Ottensman, 1997). Land use change may begin from the growing demands for land based products, or from competition for land resources, not only to produce food but also to provide materials and feedstock for the bio-based economy, for nature conservation, urban development and recreational facilities (Smith, 2013).

One of the factors driving land-use change includes what can be called ‘development attractors’. As explained by Nkolika *et al.* (2018), these are physical features that promote new residential and commercial development. For example, main roads, existing developed areas, and utilities such as electricity, postal services, industrial development and potable water supply are development attractors because new development is likely to occur in their vicinity (National Research Council, 2001). Urbanization can therefore be regarded as a major driving factor of land use change. The Nigerian food insecurity problem has been reported to have increased with urbanization (Omonona and Agoi, 2007).

Land use change due to deforestation was the major contributor of carbon monoxide (CO) emissions which averaged between 0.5 and 2.7 rigatoni of carbon per year (United Nations Framework Convention on Climate Change (UNFCCC), 2007). Agriculture in Nigeria is dominated by small scale farmers who engage in rain fed and traditional agriculture. Therefore, unplanned land use changes, especially in rural areas where these subsistent farmers are located, will have a negative impact on food security, thereby causing food insecurity.

The extent and rate of change in land cover and some land uses are known with some certainty. According to Turner *et al.* (1993), most of the earth’s surface is already modified, except those areas that are inaccessible. Of the total land surface, about 40% have been changed in the form of conversion into other uses. It is only about 25% of the land that has remained nearly unchanged. It is important that the human elements of the land use change be considered to provide a measure of the potentials of human as change agents of land use.

Land use change is the most significant driver of social, economic and environmental change (Foley *et al.*, 2011). According to them, population growth, being the major reason for land use change, has led to a decrease in arable land and food production levels, leaving households food insecure. It was also noted that a growing global population increases the need for food, fuel and shelter. Decline in farm sizes from 2.5 hectares in the year 1994 to 1.4 ha in 2010 and 0.85 ha in 2013 have been reported in Nigeria (Food

and Agriculture Organization, 2017; Heady and Jayne, 2014). The growth of population and the increase in socio-economic activities creates pressure on land which lead to unplanned and uncontrolled changes in land use (Seto *et al.*, 2002). Unplanned and uncontrolled land use changes, as well as inadequate space for farming is a limitation to food production, which negatively affects food security, causing food insecurity.

This study analyzed the implications of land use change on food insecurity among rural households in peri-urban Ibadan, Oyo State, Nigeria, using the case of Akinyele Local Government Area, by achieving the following specific objectives:

- i. Identified the pattern and extent of land use change among households.
- ii. Identified the factors influencing changes in land use.
- iii. Estimated the level of food insecurity of households.
- iv. Assessed the effect of the extent of land use change on food insecurity.

## 2.0 RESEARCH METHODOLOGY

The study was carried out in Akinyele Local Government Area of Oyo state, Nigeria. It is one of the peri-urban local government areas in Ibadan metropolitan area. The choice of Akinyele local government as the study area is based on the fact that it consists of the rural and urban areas of which the rural areas are also developing due to the expansion of the urban areas. Akinyele Local Government headquarters is located in Moniya, comprising of districts and villages. Primary source of data was used for this study. Data were collected with the aid of structured questionnaire. Sampled households were selected proportionate to size from four communities; 80 households were selected at random from Atan, being the biggest of the four communities and 40 each (also at random) from Iware, Camp and Ijaye, making a total of two hundred respondents.

The analytical tools used for this study were descriptive statistics, Household Food Insecurity Access Scale (HFIAS) and ordered logistic regression model.

### 2.1 Patterns of Land Use Change

Land use change pattern was generated using descriptive statistics (frequency and percentage) to explain the aggregate changes that have occurred on the use of each land held by households. The use to which each plot of land was put as at time of acquisition (first land use), after acquisition (second land use) and currently (current land use) were obtained from responses of the household heads. The various uses of land include farming, housing, commercial purposes, bush, plain lands and forest. For each plot, land use change is established when the current land use differs from the land use at acquisition. This helps to establish the pattern of changes in land use over the 3 periods.

### 2.2 Extent of land use change

The extent of land use change was generated using the Land Use Change Index. Land use change index is the proportion of the area of land of a household which use has changed to the total area of land held by the household.

Land Use Change (LUCI) is given by:

$$\text{LUCI} = \frac{\text{area of land that has undergone land use change}}{\text{total area of land held by household}}$$

LUCI ranges between the values of 0 and 1.

LUCI=0 indicates that land use did not change across the three periods; time of acquisition (first land use), after acquisition (second land use) and currently (current land use) on all the plot(s) of land held by the household.

LUCI=1 indicates that there was complete change in land use as at acquisition and current land use on all the plot(s) of land held by the household.

$0 < \text{LUCI} < 1$  indicates that a proportion of the total area of land has undergone land use change.

### 2.3 Food Insecurity Status

The food insecurity status was generated using the Household Food Insecurity Access Scale (HFIAS). HFIAS score is a continuous measure of the degree of food insecurity (access) in the household in the past four weeks (30 days). Nine questions were asked on occurrence of food deprivation and scores were assigned for number of frequency. A score of 1 is awarded to households that experience the situation rarely, that is, once or twice, 2 for households having such experience three to ten times in the past four weeks. For those that have such experience often (more than ten times), a score of 3 is awarded to such households. The maximum score for a household is 27 and the minimum score is 0. The HFIAS is a categorical indicator of Food Insecurity Status and it is used to measure the household food insecurity prevalence.

An HFIAS score variable is calculated for each household by summing the codes for each frequency-of-occurrence question. The higher the score, the more food insecurity a household experienced, and vice versa.

HFIAS score (0-27): Sum of the frequency of occurrence during the past four weeks for the 9 food insecurity related conditions

### 2.4 Effect of Extent of Land Use Change on Food Insecurity

Ordered logistic regression was used to analyze the effect of extent of land use change on food insecurity. The four levels of food insecurity status were used as the dependent variable  $Y^*$ . The model is specified as:

$$Y_i = \beta_0 + \beta_1 X_1 + \varepsilon$$

$Y_i$  = Ordered categories of food insecurity status

1 = Food secure

2 = Mildly food insecure

3 = Moderately food insecure

4 = Severely food insecure)

$X_1$  = Land use change index ( $0 \leq LUCI \leq 1$ )

$\varepsilon$  = error term

## 3.0 RESULTS AND DISCUSSIONS

### 3.1 Pattern and Extent of Land Use Change

#### 3.1.1 Means of Land Acquisition by Respondents

Table 1 shows the means of land acquisition by respondents. The total number of plots held by the 200 households equals 577 amounting to 1,543.1 hectares. Land acquisition by purchase was predominant with 37.4% of the plots and this could be as a result of the growing need for more land for other uses and that land market is active in the area, which is classified as peri-urban. Land acquisition by inheritance with 32.8% proves that there are respondents that are natives of the land. Also, more than half (55.0%) of the respondents had less than 5 hectares and an average of 7.7 hectares. This high mean value is due to the fact that most of the respondents had more than one plot of land, and also, some of the respondents were able to get their land through government allocation where one holding is 25 acres. Meanwhile, some farmers had as low as 0.1 hectare while some had as much as 34.4 hectares.

**Table 1: Means of Land Acquisition by Respondents**

Means of land acquisition	Frequency (n=577)	Percentage (%)
Inheritance	189	32.8
Gift	42	7.3
Purchase	216	37.4
Rent	84	14.6
Lease	6	1.0
Government allocation	40	6.9
<b>Land size in hectare</b>	<b>Frequency (n=200)</b>	<b>Percentage (%)</b>
<5.0	110	55.0
5.01-10.0	34	17.0
>10.0	56	28.0
Min=0.1		
Max=34.4		
Mean=7.7(±8.3)		

**Source: Field Survey, 2019**

### 3.1.2 Pattern of land use

The pattern of land use change is shown in Table 2. Results show that all the respondents had at least one plot while only 10.0% of the respondents had 5 plots of land. Results indicate the use to which the various plots were put as at the time of acquisition, after acquisition, and the use to which they are put currently. It was indicated that as at the time of acquisition, most of the available lands (69.5%) were bushes and this can be attributed to the fact that the factors influencing changes in land use were not in play. Land for commercial purposes had the least percentage across the five plots; this could be due to lower levels of urbanization and population growth.

On the use to which land was put after acquisition, results indicate that none of the respondents had bush lands and this is because all lands acquired as bush initially have been put to other uses such as farming, indicated by the increase in percentages as compared with the land use at acquisition. Comparing forest lands at acquisition and after acquisition, there was a decrease in forest lands and this could be as a result of the growing need for such land for other purposes.

It was also indicated that for current land use, there was a further increase in farmlands. This is possible since the main occupation of rural households is farming and since the population has been growing overtime, there's need to expand farmlands in order to meet the needs of the growing population. Increase in commercial lands was also recorded and this could be an indicator for urbanization as more lands are put into commercial purposes such as construction of market places, health centers, shops, and etcetera.

**Table 2: Land Use Pattern**

Land Use at Acquisition	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Farming	46	23.0	34	17.0	28	14.0	12	6.0	2	1.0
Housing	7	3.5	4	2.0	0	0.0	1	0.5	0	0.0
Commercial	1	0.5	1	0.5	0	0.0	0	0.0	0	0.0
Bush	139	69.5	126	63.0	83	41.5	44	22.0	18	9.0
Bare land	1	0.5	3	1.5	1	0.5	1	0.5	0	0.0
Forestry	6	3.0	8	4.0	7	3.5	4	2.0	0	0.0
Total	200	100.0	176	88.0	119	59.5	62	31.0	20	10.0
Land Use after Acquisition	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Farming	131	65.5	120	60.0	85	42.5	41	20.0	8	3.5
Housing	31	15.5	34	17.0	17	8.5	16	8.0	5	2.5
Commercial	6	3.0	2	1.0	2	1.0	2	1.0	2	1.0
Bush	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Bare land	30	15.0	20	10.0	15	7.5	3	1.5	5	2.5
Forestry	2	1.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	200	100.0	176	88.0	119	59.5	62	31.0	20	10.0
Current Land Use	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Farming	138	69.0	120	60.0	85	42.5	41	20.0	6	3.0
Housing	41	20.5	46	23.0	28	14.0	17	8.5	8	3.5
Commercial	4	2.0	4	2.0	2	1.0	2	1.0	2	1.0
Bush	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Bare land	15	7.5	6	3.0	3	1.5	2	1.0	4	2.0
Forestry	2	1.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	200	100.0	176	88.0	119	59.5	62	31.0	20	10.0

**Source: Data Analysis, 2019**

*Freq. = frequency; number of plots*

### 3.1.3 Pattern of Land Use Change

Table 3 shows the aggregate changes that have occurred on land in each use category. Results indicate that while land for farming at acquisition was about 21.1%, bush area was 71.1%, forest was 4.4%, housing was 2.1%, bare land was 1.0% and land for commercial purpose was just 0.3%. This implies that at the period of acquisition, a higher percentage of land was left unused as compared with the land in use. This could be due to the fact that there was little or no pressure on land as at the time of acquisition. For land use after acquisition, all acquired lands have been put to one use or the other, which accounts for the total absence of bush land in the results. This, in turn, must have caused an overall reduction in the bush land in the area, leading to expansion of land and increase in other uses except forest land which reduced from 4.4% to 0.5%. Current land use shows a further increase in agricultural land and housing.

According to the results, land for farming increased from 21.0% to 66.6% and to 67.6% from the first land use to second land use and current land use, respectively. This could be due to the population growth over time which would lead to expansion and intensification of agricultural land. It could also be due to the active labour force present in the area. The use of land also increased from 2.1% in the first land use for housing to 17.9% in the second land use and 24.2% in the current land use. This could be a consequence of socio-economic factors such as household size, age, marital status, educational level, and etcetera, of the respondents as this puts more pressure on the respondents to build and own houses. Land use for commercial purposes also increased over time from 0.3% to 2.4%. This could serve as a precursor to urbanization as it indicates that more land is now used in the construction of shops and houses for renting purposes.

On the other hand, 71.1% of the plots as at the time of acquisition had nothing. Overtime, the respondents found other uses for the land. This account for the uses of the land at other periods; second and current land use. Bare land also increased from 1.0% to 12.7%, and then decreased to 5.2%. The increase could be due to land degradation making it unsuitable for farming. But as the area became more urbanized, other uses were found for the bare land which could be housing and commercial purposes. There was an increase in the conversion of forest land to other uses by the respondents over time, and this could have accelerated climatic change and loss of bio-diversity in the area. These findings are supported by Alem- Meta and Singh (2017) and the findings of Ogechi and Hunja (2014) where there was a decrease in forest land, shrub land (bush) but increases in crop land (farming land) and rural settlements (housing) were recorded.

**Table 3: Pattern of Land Use Change**

Uses	First Land Use		Second Land Use		Current Land Use	
	Frequency	%	Frequency	%	Frequency	%
Farming	122	21.0	385	66.6	390	67.6
Housing	12	2.1	103	17.9	140	24.2
Commercial	2	0.3	14	2.4	14	2.4
Bush	410	71.1	0	0.0	0	0.0
Bare land	6	1.0	73	12.7	30	5.2
Forestry	25	4.4	2	0.3	3	0.5
Total	577	100	577	100	577	100

**Data Analysis, 2019**

*Freq. = frequency; number of plots*

**3.1.4 Extent of Land Use Change**

The extent of land use change was generated using the Land Use Change Index (LUCI). Results are presented in Table 4. The mean area of land that had undergone change was 0.8 (80.0% of the total land size). The results showed that 8.5% of the households did not change the use to which the lands have been put since acquisition (LUCI=0) while 63.5% of the households had completely changed the use to which their lands were put since acquisition (LUCI=1). Also, 11.0% of the households changed the use of 0.50-0.75 (50-75%) of their land holding. The proportion of households whose lands have undergone total change, would have been household lands with bush or forest while those that did not undergo any form of change, would mostly be household lands used for farming. This shows that there was no reduction in land used for farming but rather an extension and intensification, judging from the total absence of bush land after acquisition. This could mean more agricultural practices, better availability and accessibility of food products and furthermore, less food insecurity.

**Table 4: Extent of land use change**

Land use index (ha)	Frequency(n=200)	Percentage
0	17	8.5
0.001-0.25	17	8.5
0.251-0.50	9	4.5
0.501-0.75	22	11.0
0.75-0.99	8	4.0
1	127	63.5
Mean 0.8 (±2.4)		

**Data Analysis, 2019**

### 3.2 Factors Influencing Land Use Change

From the results in Table 5, location attributes of the land is a major factor influencing land use (67.5%). This is an underlying consequence of expansion of settlements which could be caused by urbanization or population growth. Lands close to residential areas are prone to changes, especially from bush and agricultural uses to non-agricultural uses. Also, urbanization (62.5%) implies that there have been changes in land use due to the increase in construction of various infrastructure such as market, health centers, and etcetera. This is followed by population growth (56.0%). Population growth leads to an increase in the need of land for various uses which can account for the changes in bush land to other uses. Land fragmentation (33.5%) reduces the area of land that could be available for agricultural purposes and such land is then used for other purposes such as building of houses. Soil geology (34.5%) determines the suitable use to which the land can be put. For soil that is very fertile, it will be preferable to use it for agricultural purpose as compared to infertile soil. From the results, other factors influencing land use change are climatic condition (0.5%) and land degradation (11.0%).

Socio-economic factors that influence land use change include age, immigration status, total monthly income, and secondary occupation of the respondents, of which the immigration status of the respondents had the highest percentage (42.0%). It was further explained that immigrants have no other use for the land than for farming as the land held by them is usually acquired through rent and in some cases, lease. Only immigrants who have stayed long enough in the area have opportunity to purchase land. In the same vein, the non-immigrants or natives have access to permanent ownership of the land through inheritance or purchase and this means that they can put the land to any use and change such use at any time.

**Table 5: Factors Influencing Land Use Change**

Factors	Cause	Frequency	%
Biophysical	Location attributes	135	67.5
	Land fragmentation	67	33.5
	Climatic condition	1	0.5
	Soil geology	69	34.5
	Land degradation	22	11.0
Economic	Population growth	112	56.0
	Urbanization	125	62.5
Socioeconomic	Age of the respondent	46	23.0
	Immigration status of the respondent	84	42.0
	Total monthly income of the respondent	52	26.0
	Secondary occupation of the respondent	37	14.0

Source: Field Survey, 2019

### 3.3 Food Insecurity Status

#### 3.3.1 Food Insecurity Categories

According to the results in Table 6, households who experienced anxiety and worry in relation to food availability in the past four weeks prior to data collection period were 78.5%, and 77.0% reported inability to eat preferred food. Those who reported consuming limited varieties of food and unwanted choice of food were 79.5% and 77.0%, respectively. Those who reported consumption of smaller meals than they felt they needed were 55.0%; 47.0% reported moments of fewer daily meal intakes and 31.5% reported total absence of any kind of food in the household because of lack of resources to get food. Also, 24.5% reported having to go to bed hungry because there was not enough food while 7.5% reported not eating anything throughout the day and night because there was nothing to eat.

Also, 49.0% of those that had worry/anxiety experienced it sometimes, 56.5% of those that had inability to eat preferred food experienced it sometimes and 44.1%, 48.1%, 50.0% and 44.9% of those that had limited varieties of food, unwanted food, smaller amount of food and going hungry to sleep, respectively, experienced them sometimes. On the other hand, 44.7%, 55.6% and 60.0% of those who had fewer daily

meals, absence of food in the household and going a whole day without food respectively, had the experience rarely.

**Table 6: Description of Household Food Insecurity Access Scale (HFIAS)**

Category	Frequency	Percentage	Number of occurrence (%)		
			Rarely	Sometimes	Often
Worry or anxiety	157	78.5	19.1	49.0	31.9
Inability to eat preferred food	154	77.0	24.7	56.5	18.8
Limited variety of food	159	79.5	35.8	44.1	20.1
Unwanted food	154	77.0	33.1	48.1	18.8
Smaller amount of food	110	55.0	39.1	50.0	10.9
Fewer daily meal	94	47.0	44.7	39.3	16.0
Absence of food in the household	63	31.5	55.6	36.5	7.9
Going hungry to sleep	49	24.5	38.8	44.9	16.3
Whole day without food	15	7.5	60.0	20.0	20.0

Source: Field Survey, 2019

### 3.3.2 Food Insecurity Categories

On the basis of the analysis of the Household Food Insecurity Access Scale (HFIAS) in Table 7, food insecurity access prevalence scores of the sampled households show that most (43.5%) of the households were mildly food insecure while 34.5% were moderately food insecure. Results show that less than one-tenth (9.0%) of the households were food secure but more than one-tenth (13.0%) were severely food insecure.

**Table 7: Household Food Insecurity Access Prevalence (HFIAP) Score**

HFIAP Score	Categories	Frequency	Percentage
0-1	Food secure	18	9.0
2-8	Mildly food insecure	87	43.5
9-16	Moderately food insecure	69	34.5
17-27	Severely food insecure	26	13.0

Source: Data Analysis, 2019

### 3.4 Effect of Extent of Land Use Change on Food Insecurity Status

The ordered logistic regression results in Table 8 show the effect of land use change on food insecurity of the rural households. The Chi square value is significant at 5% which shows goodness of fit of the model. This means that the explanatory variable can be used to explain changes in the dependent variable. Land use change was negatively correlated to household food insecurity status at 5% level of significance. This implies that as more changes in land use occurs, the likelihood of the household being food insecure decreases by 3.3%. This could be due to the fact that although, there was an increase in the use of land for other purposes over time, use of land for agricultural purposes recorded an increase from 21.0% to 66.6% of total land held as shown in Table 3. Also, agricultural land had the highest percentage (67.6%) of total land holding in the current land use. This increase in agricultural land promotes food production which will not only ensure food availability but also its accessibility, thereby reducing food insecurity.

**Table 8: Effect Land Use Change on Food Insecurity**

Food insecurity	Co-efficient	Marginal effect	Standard error	z	P>/z/
Land use change index	-0.7092136	-0.0328701**	0.3493283	-2.03	0.042
Number of observations 200, LR $\chi^2(1) = 4.15$ , Prob> $\chi^2 = 0.0417$ Pseudo R <sup>2</sup> 0.0034, Log likelihood -599.67357					

Source: Data Analysis, 2019

\*\* Significant at 5%

#### 4.0 CONCLUSIONS

Based on the findings, there has been significant decline in forest, bush and plain land as against the significant increase in land used for farming, housing and commercial purposes over time. Land use change is influenced mainly by location attributes of the land, population growth and urbanization. Most of the households are mildly food insecure and the least proportion of the households was food secure. Land use change, especially more into farming reduces food insecurity of households. Active policy drive towards ensuring proper land use will reduce food insecurity of households. Also, appropriate land management procedure should be enforced to mitigate illegal and inappropriate conversion of land. Further, controlled urbanization and rigid adherence to development plans by local planning authorities will help to control the level of encroachment into land that could be used for farming by other uses.

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