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SCIENTIFIC PAPER

URBAN FOOD CROP FARMING AND FARM HOUSEHOLDS' FOOD SECURITY STATUS IN OYO STATE, NIGERIA

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Abstract: *Food production and supply has been on the decline in Nigeria with a consequent impact on household food security. This study examined the influence of urban farming on household food security in Oyo State, Nigeria. Multi-stage sampling procedure was used to select 159 farm households in a cross-sectional survey. Structured questionnaire was used to obtain data on socio-economic characteristics, determine the food security status of urban crop farming households in the study area, and examine the effects of urban crop production on households' food security status. Data were analysed using descriptive statistics while the statistical tools were Food Security Index (FSI) and Probit Regression Model (PRM). Results revealed that 84.9% of the respondents was male, 81.2% married. The average age, household size, and farm size were 49.6 years, 6 persons, 1.1 hectares respectively. Most (75.5%) of the respondents did not have access to consumption credit and 62.3% did not belong to any farmers association. Based on minimum daily energy requirement per adult equivalent of N230.8, 90.6% of the farm households was food secure. The PRM showed that age (β = -0.1, $p<0.05$), household size (β= -0.4, $p<0.01$) and economic efficiency (β = -61.6, $p<0.05$) reduced the probability of household food security while access to consumption credit (β= 1.7, $p<0.05$) and allocative efficiency (β = 67.9, $p<0.05$) increased the probability of household food security. The study concluded that urban farming significantly influence household food security.*

Keywords: *Food Security, Urban Food Crop, Food Security Index, Probit Regression Model*
(JEL Classification: *Q11*)

Introduction

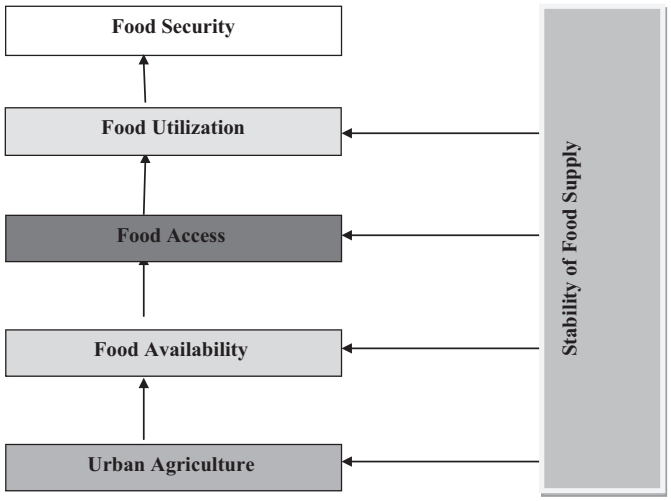
Urban agriculture practice is a major strategy towards improving food security in many cities throughout the world (Chaminuka and Dube, 2017). The challenge of feeding cities lies in enhancing consumer access to food by ensuring increased local food production, processing and distribution as well as reversing dependence on distant production sites, thus enabling cities to become more autonomous in food production (JONGWE, 2014).Urban food insecurity is a growing challenge emanating from rapid urbanization and rising poverty. Urbanization increases resource competition, costs of supplying, distributing and accessing food, thus negatively impacting on urban household food security (Rabinowicz, 2002).

Among the developmental problems Nigeria is faced with, food insecurity ranks topmost (Babatunde et al., 2007a). The level of food insecurity has continued to rise steadily since the early 1980s. It rose from 18% in 1986 to about 41% in 2004 (SANUSI et al., 2006).A large proportion of urban households and dwellers in Nigeria merely eat for survival despite their involvement in urban agriculture, just like many rural households whose occupation is predominantly agriculture (Obayelu, 2012). This implies the existence of some disjoint relationship between household food security and urban food production. This study sought to provide answers to the irregular relationship by the following research questions: i. What are the socio-economic characteristics of the urban farming households in the study area? ii. What is the food security status of urban farming households in the study area? iii. What are the effects of urban food crop production on households' food security status?

Food security can be elaborated into four dimensions which are: food availability, food accessibility, food utilization and stability of food supply (Jrad et al. 2010). Food availability has to do with physical presence of food which may come from own production, purchases from internal market or import from overseas for consumption (Gregory et al. 2005). Household food access deals with the ability to obtain sufficient food of guaranteed quality and quantity to meet nutritional requirements

of all household members. Food utilization entails ingestion and digestion of adequate and quality food for maintenance of good health (Jrad et al., 2010). Stability of food supply is achieved when there is a continuous supply of adequate food all year round without shortages (Jrad et al., 2010).

Figure 1: Conceptual Framework Showing Relationship between Urban Agriculture and Food Security (2017)



MATERIAL AND METHOD

Study Area

Oyo State covers an area of 28,454 square kilometres and has a population of 5,591,589 people according to the 2006 population census. It lies between latitudes 7o 31N and 9o121N and longitudes 2o 471E and 4o 231E (NPC, 2006). Oyo State has the largest arable urban farmland among other South-Western states in Nigeria with about 27,107.5 square kilometres which can be used to cultivate food crops like: cereals (rice, maize and guinea corn), legumes (cowpea, and soybeans), root and tuber (sweet potato, cassava and yam) (Goudie, 2002).

Sampling Procedure and Sample Size

Multistage sampling procedure was employed in the selection of 159 households from the study area. Oyo State is divided into four agricultural zones which are: Saki/Oke-ogun, Ibadan/Ibarapa, Oyo, and Ogbomoso zones. In the first stage, all the four agricultural zones of the state were used for proper representation of urban food crop farmers in the study area. The second stage was a purposive selection of blocks in each zone where urban food crop farmers were identified.

Estimation of food security status of urban crop farming households

The cost of calorie (COC) intake proposed by Foster, Greer and Thorbecke, (1986) was adopted to determine a threshold food security line. This method has been applied to several studies with main focus on food security (Asogwa and Umeh, 2012; Olagunju *et al.*, 2012; Ahmed And Abah, 2014). The COC yields a threshold value which is close to the minimum calorie requirement for human survival. Following the approach of earlier studies, the food insecurity line is given as:

$$\ln h = a + bC \quad \text{..... (1)}$$

Where h = daily adult equivalent food expenditure in naira
C = actual calorie consumption per adult equivalent in a household (kcal)
a = model intercept
b = model slope
FAO's recommended minimum daily calorie requirement per adult equivalent is 2260kcal; this was used to determine the food insecurity line using the equation:

$$Z = e^{(a+bL)} \quad \text{..... (2)}$$

Where Z = food security status
L = recommended minimum daily calorie intake level per adult equivalent of 2260 Kcal.The daily calorie consumption was estimated using the calorie content conversion factor (Table 4) of the consumed food item in each household as used by Babatunde et al., (2007b) and Ayantoye et al., (2011). The daily household calorie intake was then divided by the adult equivalent conversion factor (Table 5) to obtain the daily calorie intake per adult equivalent as used by Babatunde et al., (2007b).

Effects of urban crop production on households' food security status

The probit regression model was used to analyze the effect of urban food crops farming on households' food security status of urban farm households. The food security status of households which is bivariate, taking the value of 1 for food secure households and 0 for food insecure households was used as the dependent variable. The choice of probit model is because it assumes there is a latent, unobserved continuous variable Z* that determines the value of Z and includes observable error term distribution as well as realistic probabilities (Adepoju and Adejare, 2013; Yusuf et al., 2015).

$$\text{Log}\frac{Pi}{1-Pi} = Z_i = \alpha + \beta_i W_i \quad \text{..... (3)}$$

$$Z_i = \alpha + \beta_1 W_1 + \beta_2 W_2 + \ldots\ldots\ldots + \beta_n W_n \quad \text{..... (4)}$$

Where:
Z_i = Food security status (1 = Food secure, 0 = Food insecure)
α and β_i are the parameters to be estimated.
W_1 = age (Years)
W_2 = years of formal education (Years)
W_3 = household size (head count)

W_4 = cultivated farmland (Hectares)

W_5 = urban farming experience (years)

W_6 = output of urban food crops farm (in grain equivalent using the conversion factor of Table 6)

W_7 = access to consumption credit (1 = Yes, 0 = No)

W_8 = membership to farmers' association (1 = Yes, 0 = No)

W_9 = ownership of cultivated land (1= own the land, 0 = rent/lease the land)

W_{10} = proportion of food consumed from production

W_{11} = technical efficiency of respondents

W_{12} = allocative efficiency of respondents

W_{13} = economic efficiency of respondents

W_{14} = respondents' income from urban food crop farming (in naira)

RESULTS AND DISCUSSION

Individual households' socio-economic characteristics and resources were identified as basic factors influencing the food security status of households (SANUSI et al., 2006). Demographic and socio-economic characteristics of urban food crop farmers in the study area are presented in Table 1. These characteristics include: age, sex, household size, farm size, marital status, access to consumption credit, and membership of farmers' association.

Result from the study area revealed that 32.80% of the respondents have their ages between 51 and 60 years; this is consistent with previous work by Ogunniyi et al., (2017). The mean age of 49.58 years indicated that many of the respondents were adults. In the study area, 84.90% of the households were male headed while 15.10% were female headed households; this finding was similar to Ogunniyi et al., (2017). Many (46.60%) of the respondents had a household size of between 4 and 6 in the study area. This average household pattern is consistent with previous study by Ahmed and Abah, (2014). The demographic characteristics of the respondents as observed from the field as shown in Table 1 revealed that approximately 81.8% of the respondents were married just as it was noted in findings by Ogunniyi et al., (2017). Majority (70.4%) of the respondents cultivated their crops on a farmland of less than 1hectare; and the mean farm size was 1.1 hectares. This suggests that the respondents were primarily small holder farmers. Findings from the field survey revealed that a good percentage (75.5%) of the respondents did not have access to consumption credit. Many (62.3%) of the respondents are not members of any farmers association, just a few (37.7%) of the respondents are members.

FOOD SECURITY STATUS OF URBAN FARM HOUSEHOLDS IN THE STUDY AREA

Table 1: Socio-economic and Demographic Characteristics of the Respondents

Social factor	Frequency	Percentage
Age (Years)		
21–30	12	7.5
31–40	31	19.5
41–50	35	22
51–60	52	32.8
61–70	26	16.3
71–80	3	1.9
SEX		
male	135	84.9
female	24	15.1
household size		
1 – 3	36	22.6
4 – 6	74	46.6
7 – 9	36	22.6
10 – 12	9	5.7
13 – 15	4	2.5
marital status		
married	130	81.8
single	29	18.2
farm size (hectares)		
≤ 3.0	145	91.2
3.1 - 6.0	11	6.9
6.1 - 9.0	1	0.6
9.1 - 12.0	2	1.3
access to consumption credit		
have no access	120	75.5
have access	39	24.5
member of farmers' association		
non-members	99	62.3
members	60	37.7

Source: Data Analysis Result, 2017

Presented in Table 2 is the result of the food security status of the urban farm households using the cost of calorie approach in Oyo State, Nigeria as was used in previous studies by Ahmed and Abah, 2014; ASOGWA and UMEH, 2012; OLAGUNJU et al., 2012. The result showed that majority (90.57%) of the respondents were food secure. This implies that 9.43% of the urban farm households were below the food security line of N230.78 per adult equivalent per day on per capita food consumption to attain the FAO recommended daily energy requirement per adult equivalent of 2260kcal.

This suggests that the food secure respondents were experiencing stability in food security which is one of the

four dimensional elements of food security as noted by OKUNEYE, 2002

EFFECTS OF URBAN FOOD CROP FARMING ON HOUSEHOLDS' FOOD SECURITY STATUS

Table 2: Food Security Status of the Respondents

Variable	
Cost of calorie equation	LNH = A+BC
Intercept	5.182031(104.11)
Slope	0.0001148(11.30)
FAO Recommended daily energy requirement per adult equivalent	2260kcal/day
Recommended cost of minimum energy requirement per adult equivalent	₦230.78/day
	₦1,615.46/week
	₦6,923.40/month
	₦84,234.70/year
Number of food secure respondents	144
Number of food insecure respondents	15
Percentage of food secure respondent	90.57%
Percentage of food insecure respondent	9.43%

Source: Field Survey, (2017)

Table 3 revealed the result of the Probit regression model which was used to determine the effects of urban food crop farming on food security status of urban farm households in Oyo State, Nigeria. Out of 14 explanatory variables included in the model, 5 were found to significantly influence the probability of households to be food secure. These are age, household size, access to consumption credit, allocative efficiency and economic efficiency. Age of urban farm households significantly ($p<0.05$) affect food security. Being old tended to reduce the probability of food security of urban farm households by 0.05% while respondents' household size had the probability of reducing food security by 0.36%. This is in line with previous findings by Ahmed and Abah, (2014); Babatunde et al., (2007a); (2007b).This result is consistent with theoretical a priori because the elderly are less productive and are unlikely to diversify their income source to be food secure; in addition, large household size will require greater calorie intake to consume and at greater cost of calorie otherwise they would most likely remain food insecure. Food security was discovered to be significantly ($p<0.05$) affected by respondents' access to consumption credit. This implies that the probability of food security tend to increase with increase in access to consumption credit. This is in agreement with finding by Otunaiya and Ibridunni, (2014). Respondents' allocative efficiency was discovered to significantly ($p<0.05$) affect food security positively. The implication of this is that the probability of food security tended to increase with increase in the respondents' allocative efficiency. The respondents' economic efficiency significantly ($p<0.05$) affected their food security negatively. In other words, increase in the economic efficiency of urban farm households reduced the probability of their food security. By implication while the respondents were attempting to have the maximum ratio of their actual production total cost to expected production total cost at a given frontier of output, their probability of being food secure falls. This could be as a result of poor and inefficient allocation of production resources.

The results showed that the pseudo R2 was 0.3676. This implies that 36.76% of the variation in food security status of the respondents is jointly explained by the 14 explanatory variables in the model. The log-likelihood of -31.4202 implies that the explanatory variables in the Probit regression model significantly explained the factors that had effect on food security of the urban farm households in the study area. Chi-square value of 36.52 associated with the log-likelihood was statistically significant ($p<0.01$) suggesting a strong explanatory power and goodness of fit of the model.

This research work recommends that consumption credit should be made available to urban food crop farmers timely as this facilitates their food security. This study further recommends that urban food crop farmers should be supported with inputs that promote greater output which enhances food security

Table 3: Probit Regression Estimate Showing the Effects of Urban Farming on Food Security

variable	Coefficient	Z	Marginal effect
Age	-0.057573**	-2.34	-0.000593
Education level	-0.042075	-0.83	-0.000434
Household size	-0.351634***	-3.26	-0.003624
Farm size	0.601644	1.32	0.006201
Urban farming experience	0.020549	0.95	0.000212
Output of urban farming	0.000022	0.13	0.0000002
Access to consumption credit	1.713267**	2.3	0.011159
Membership to farmers association	0.144994	0.32	0.001432
Land ownership	0.672808	1.33	0.009604
Proportion of consumed output	1.193283	1.43	0.012299
Technical efficiency	12.76854	1.27	0.131606
Allocative efficiency	67.91355**	2.08	0.699987
Economic efficiency	-61.629500**	-2	-0.635217
Income	0.000004	0.92	0.0000
Constant	-15.3147	-1.46	
Log-likelihood	-31.4202		
Pseudo R2	0.3676		
Prob>chi2	0.0009		
LR chi2(14)	36.52		
Number of observations	159		

** Significance at 10%, **Significance at 5%, *** Significance at 1% Source: Data Analysis Result, 2017*

REFERENCES

Adebayo, A.A. (2010). Food Security Status in Nigeria: Pre and Post Economic Deregulation Review, International Journal of Economic Development Research and Investment. 1(1):135-150

Adenegan, K.O. and Adewusi, O.A. (2007). Determinants of Food Security Status of Rural Households Living With HIV/AIDS in Southwestern Nigeria. African Journal of Biomedical Research. 10(1): 9–18

Adepoju, A.O., Adejare, K.A. (2013). Food Insecurity of Rural Households During Post-planting Season in Nigeria. Journal of Agriculture and Sustainability. 4(1):16–35

Adewuyi, S. A. (2002). Resource use productivity in food crop production in Kwara State, Nigeria. Unpublished PhD Thesis Submitted to the Department of Agricultural Economics, University of Ibadan, Nigeria pp. 109

Ahmed, F.F. and Abah, P.O. (2014). Determinants of Food Security among Low-income Households in Maiduguri Metropolis of Borno State, Nigeria. Asian Journal of Social Sciences and Humainities. 3(1):74-86

Asogwa, B.C. and Umeh, J.C. (2012). Food Insecurity Determinants among Rural Farm Households in Nigeria.Proceedings of International Conference on Ecology, Agriculture and Chemical Engineering (ICEACS), Phuket, Thailand pp. 206-211

Ayantoye, K., Yusuf, S.A., Omonoa, B.T. and Amao, J.O. (2011). Food Insecurity Dynamics and its Correlates among Rural Households in South-western Nigeria. International Journal of Agricultural Economics and Rural Development. 4(1):43-55

Babatunde, R.O., Omotesho, O.A. and Sholotan, O.S (2007a) Socio-economic Characteristics and Food Security Status of Farming Households in Kwara State, North-Central Nigeria. Pakistan Journal of Nutrition. 6(1):49-58

Babatunde, R.O., Omotesho, O.A. and Sholotan, O.S. (2007b) Factors Influencing Food Security Status of Rural Farming Households in North Central Nigeria. Agricultural Journal. 2(3):351-357

Famoriyo, O. A.(1998). Institutional Framework for Agriculture and Food Production in Nigeria: Future Prospects. Applied TropicalAgriculture. 3(1):1-9

Food and Agriculture Organisation of the United Nations (FAO) (2010). The State of Food Insecurity in the World (SOFI): Addressing Food Insecurity in Protracted Crises. Rome, Italy pp. 1-62

Goudie, A. (2002). Great Warm Deserts of the World: Landscape and Evolution. Oxford University Press New York pp. 5-12

Greer, J. andThorbecke, E. (1986). A Methodology for Measuring Food Poverty Applied to Kenya. Journal of Development Economics 24(1): 59–74

Gregory, P., Ingram, J.S.I., Brklacich, M. 2005. Climate Change and Food Security. Philosophical Transactions of the Royal Society B-Biological Sciences. 360 (1463):2139-2148

Ibrahim, H., Uba-Eze, N.R., Oyewole, S.O. and Onuk, E.G. (2009).Food Security among Urban Households: A Case Study of Gwagwalada Area Council of the Federal Capital Territory Abuja, Nigeria. Pakistan Journal of Nutrition.8(6):810-813

Jongwe, A. (2014). Synergies between Urban Agriculture and Urban Households Food Security in Gweru City, Zimbabwe. Journal of Development and Agricultural Economics. 6(2):59-66

Jrad, S., Nahas, B., Baghasa, H. 2010. Food Security Models. Ministry of Agriculture and Agrarian Reform, National Agricultural Policy Center. Syrian Arabic Republic. Policy Brief. 2(33):1-32

National Population Commission (NPC) (2006). Provisional Results, Abuja, Nigeria.

Nyasha Chaminuka and Ernest Dube (2017). Urban Agriculture as a Food Security Strategy for Urban Dwellers: A Case Study of Mkoba Residents in the City of Gweru, Zimbabwe International Journal of Social Science 3(2):26-45

Obayelu, A.E. (2012). Comparative Analysis of Household's Socioeconomic and Demographic Characteristics and Food Security Status in Urban and Rural Areas of Kwara and Kogi States of North-Central Nigeria, African Journal of Food, Agriculture Nutrition and Development. 12(3):6027-6054

Ogunniyi L.T., Fanifosi G.E. and Komolafe O.D. (2017).The Contribution of Urban Agriculture to Household Food Insecurity in Ibadan Metropolis, Oyo State, Nigeria. Scientia Agriculturae 17(2):42-47

Ojogho, O. (2010) Determinants of Food Insecurity among Arable Framers in Edo State, Nigeria. Agricultural Journal. 5(3):151-156.

Okunneye, P.A.(2002). Rising Cost of Food Prices and Food Insecurity in Nigeria and Its Implication for Poverty Reduction. CBN Economicand Financial Review. 39 (4):6-11

Olagunju, F.I., Oke, J.T., Babatunde, R.O., Ajiboye, A. (2012). Determinants of Food Insecurity in Ogbomoso Metropolis of Oyo State, Nigeria. Journal of Production Agriculture and Technology. 8(1):111–124

Oluyole, K.A., Oni, O.A., Omonona, B.T. and Adenegan, K.O. (2009). Food Security among Cocoa Farming Households of Ondo State, Nigeria. ARPN Journal of Agriculture and Biological. Sciences. 4(1):7-13

Otunaiya, A.O. and Ibridunni, O.S. (2014). Determinants of Food Security among Rural Farming Households in Ogun State, Nigeria. Journal of Sustainable Development in Africa. 16(6):33-34

Rabinowicz, J. (2002). Urban Food Security and the Potential for Urban Agriculture. Accessed from http://www.g24.org/ukeje.pdf/2015 Accessed November 20, 2015

Sanusi, R.A., Badejo, C.A. and Yusuf, B.O. (2006). Measuring Household Food Insecurity in Selected Local Government Areas of Lagos and Ibadan, Nigeria. Pakistan Journal of Nutrition. 5(1):62-67

Yusuf, S.A., Balogun, O.L. and Falegbe, O.E. (2015). Effect of Urban Household Farming on Food Security Status in Ibadan Metropolis, Oyo State Nigeria. Journal of Agricultural Sciences. 60(1):61-75