EFFECT OF HOME GARDEN ON HOUSEHOLDS' FOOD SECURITY IN ONDO STATE, NIGERIA

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Abstract
This study investigated the effect of home garden on households' food security in Ondo State, Nigeria. A multistage sampling procedure was used to select 190 households for the study. Data were collected with a semi-structured questionnaire, and the information gathered was analysed with descriptive statistics such as frequency distribution, mean and standard deviation. A 3-point Likert scale was employed to ascertain households' perceptions of home garden contributions to households' food security. A probit regression model was used to analyze factors influencing households' participation in home gardens, and an independent sample t-test was used to test the stated hypothesis for the study. Results revealed that, mean age of home gardeners was 46.9±6.7 years, 60.5% were male, and 61.1% were married, with a household size of 10.0±3.0 members, and 55.3% had primary education. It was discovered that home garden promotes access to food, as a means of livelihood and enhance food security in the households. Home garden was found to be confronted with inadequate land and capital, inputs, pilfering or theft of crops. The probit regression results indicated that age, gender, access to inputs, size of garden and distance to the home were the significant variables influencing participation in home garden in the study area. The independent sample t-test showed that there was no significant difference between the contributions of home gardens to households' food security based on gender. Hence, access to credit and access to inputs should be encouraged, while more available land in the environment should be acquired for gardens among participating households to increase food production.

Keywords: food insecurity, food security, home garden, livelihoods, sustainability

Introduction

Home garden is a traditional approach to the cultivation of land in the backyard of the house or very close to the dwelling place, either in rural areas or urban centres. Home garden is a small-scale production system supplying plant and animal products for households' consumption, which tends to be located close to the home for security, convenience, and special care or attention (Galhena *et al*., 2013). Home garden occupies marginal land for field production and for household economic activities and featuring friendly ecologically adapted practices with low capital inputs and simple technology. Home garden entails the cultivation of a small area of land close to or around the household, usually within walking distance of the family home, and they are maintained by the household at any time due to proximity to the household. It is mainly practiced to supply food, fruits/vegetables for the households. Home garden constitutes a form of local strategy widely practiced in various local or urban communities for guiding against food insecurity in households.

Globally, Sustainable Development Goal 2 targets providing an end to hunger, achieving food security, and improving nutrition of average households. Food is an important component of human life and wellbeing, and is the dominant activity of smallholder farmers in the rural areas. In Nigeria, smallholder farmers who are the major producers of food are constrained by poor soil fertility, climate change, inadequate land and capital, pests and diseases problems, herders-farmers attacks, and insecurity on the farm in the rural areas. These had affected food production and the productivity of smallholder farmers in rural areas. Hence, an average household in the country suffers from hunger, malnutrition, and food insecurity, among other serious challenges, which may not be unconnected with the level of food production and the increasing rate of insecurity in the rural areas. However, studies revealed that the global population is envisaged to increase by 9 billion people by the year 2050, and several billion people all over the world will be faced with food insecurity (Galhena *et al*., 2013; Adeosun *et al*., 2020). Hence, this portends a danger to food security globally.

Food security connotes the state by which individuals or households have access to nutritious, safe and healthy food in the right quality and quantity for consumption (Adeosun *et al*., 2020). It connotes a situation when all people at all times have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 2004). A vast majority of households in developing countries are reported to be food insecure because their food security index is less than one (Mishra *et.al*, 2014). Food insecurity has been a global concern across countries of the world (Duda *et al*., 2018; FAO, 2017; Mishra *et.al*, 2014). Hence, there is a need for a continuous increase in food production and buffer stocks to meet the growing demand for food and cope with volatilities in food production (Depenbusch *et al*., 2021). Home garden have been observed as one of the strategies to increase food production and address food insecurity, both in rural areas and urban communities, using marginal, vacant/uncompleted building plots and abandoned land close to the households in developing countries.

Home garden entails the art of cultivation of various crops, or rearing of animals on a small plot of land near homes or homesteads to provide an additional source of food and income for the households. It is a food and income supplementary plan for households. According to Galhena *et al*. (2013), home gardening has been widely accepted and practiced in various settings by subsistence families in developing countries. Literature (Galhena *et al*., 2013; Furness and Gallaher, 2018; Saediman *et al*., 2018) has shown that home gardens for an essential part of the households' local food system and subsistence family farming in both rural and urban areas thus improving the food security, nutrition, and livelihoods of the people. However, due to the relative proximity of the home garden to the home, it is often referred to as a production unit and a dwelling place and as an additional source of food to improve household food security and nutritional diversity (Mondal, 2009).

Several scholars (Galhena *et al*., 2013; Adeosun *et al*., 2020; Saediman *et al*., 2021; Uzokwe *et al*., 2016), among others have defined home garden in different ways and studies have been conducted by scholars on home garden such as; socio-economic determinants of home gardening

practice (Adeosun *et al*., 2020), health benefits of home garden (Hawkins *et al*., 2013), women participation in home garden (Umar, *et al*. 2009; Akerele *et al*., 2017 and small home garden for sustainable livelihoods (Mitchell and Hanstad, 2004) among others. However, there are limited studies or empirical evidence on the effects of home garden on household food security, most especially in the study area. Hence, findings of this study will provide information that could help in policy formulation and guide against household food insecurity through the home garden approach. Moreover, it will serve as a source of literature to other researchers in this line of study. Specifically, the study examined the socio-demographic characteristics of the home gardeners, identified the contributions of home garden to households' food security and constraints facing the home garden participating households, estimated the effects of home garden on households' food security in the study area; and determined factors influencing households' participation in home garden in the study area.

Hypothesis

This hypothesis is formulated to guide the study.

Ho_1: There is no significant difference in the contributions of home garden to households' food security based on gender in the study area.

Methodology

The study was carried out in Ondo State, Nigeria. Ondo State has an estimated population of 7,930,787 people (National Population Commission of Nigeria, NPC, 2021). The state lies on a bearing of latitude 5^0 45^1 and 8^0 15^1 North and longitude 4^0 45^1 and 6^0 East of the equator. The study area is characterised by farming as a major occupation, and the area supports the cultivation of cocoa, kola, yam, and maize, among other crops. The multistage sampling procedure was adopted in the selection of home gardeners for this study. Firstly, five (5) local government areas were randomly selected, which included: Akoko-North-West, Owo, Ondo-West, Odigbo and Okitipupa. Secondly, five (5) towns/communities were selected using simple random sampling techniques. Thirdly, accidental sampling was employed in the selection of 8 home gardeners in each of the selected towns/villages in the study area. A total of 190 home gardeners were used as a sample for the study. Data were collected using a structured questionnaire, and an interview schedule was used for respondents who could neither read nor write. Information was gathered on socioeconomic/demographic characteristics of home gardeners, types of crops planted, size of garden, access to inputs and challenges, among others, in the study area. Data collected were analysed using descriptive statistics (simple percentage, mean and standard deviation) and the probit regression model was performed to determine factors influencing households' participation in home garden. The independent sample t-test analysis was used to test the stated hypothesis. The contribution of home garden to households' food security was ascertained using a 3-point Likert scale.

Results and Discussion

The distribution of home gardeners by socio-economic characteristics is shown in Table 1. The mean age of the respondents was 46.9±6.7 years. This implies that the majority (63.2%) of the participants in home gardening are between 45 – 49 years, showing that they are still physically active to engage in crop cultivation in home gardening. This finding is in agreement with Umar *et al*. (2009), who reported that the majority of participants engaging in home gardens were between 31-50 years. Further, 65.5% of the home gardeners were male, and this concurs with Gbedomon *et al*. (2017), who found more male participants in home gardens in Kaduna State, Nigeria. The result also shows that 63.7% of households engaging in home gardening were married. This suggests that being married conferred the responsibility on the household heads the need to diversify into other economic activities to cater for the family. On the educational attainment of participants, 57.9% had secondary education. This is contrary to findings by Uzokwe *et al*. (2016), who reported that the majority of participants in home gardens had tertiary education. The study reveals a mean household size of 9.0±3.0 members; however, this is above the average national household size of 5 members (GLSS, 2020)

Table 1: *Distribution of Home Gardeners by Age, Sex, Marital Status, Education and Household*

Variables	Frequency	Percentage (%)
Age		
<30	5	2.6
30 – 44	62	32.6
45 – 59	120	63.2
>60	3	1.6
Mean/SD		46.9±6.7
Gender		
Female	75	39.5
Male	115	60.5
Marital Status		
Single	30	15.8
Married	121	63.7
Widowed	21	9.5
Divorced/Separated	18	11.0
Educational Attainment		
No formal education	20	10.5
Primary education	44	23.2
Secondary education	110	57.9
Tertiary education	16	8.4
Household Size		
<5	9	4.7
5 – 8	22	11.6
9 – 12	139	73.2
>12	20	10.5
Mean/SD		9.2±2.8

Table 2 shows that 11.8±3.7 years was the mean years of experience of the respondents, suggesting that households have gained a quantum of experience in participation in home gardens. The mean cultivable land size was 2.4±1.2 hectares of land for farming. This suggests that household heads engaging in home garden cultivation have less than the national average size of a farm operated by smallholder farmers of less than 5 hectares (Federal Office of Statistics, FOS, 1999). The mean income realized from home garden participants or households was ₦52395.83±₦21909.98. This could help to supplement household income and for other contingencies, and improve household welfare.

Table 2: *Distribution of Home Gardeners by Years of Experience, Size of Garden/Farm, Distance to Garden, and Income realized*

Variables	Frequency	Percentage (%)
Years of Experience		
<6	2	1.1
6 – 10	33	17.4
11 – 15	152	80.0
>15	3	1.5
Mean/SD		11.8±3.7
Garden/Farm Size		
<1.00	7	3.7
1.00 – 2.49	143	75.3
2.50 – 3.99	22	11.6
>3.99	18	9.4
Mean/SD		2.4±1.2
Income Realized		
<25000.00	10	5.3
25000.00 – 54999.00	101	53.2
55000.00 – 84999.00	64	33.7
85000.00 – 114999.00	9	4.6
>114999.00	6	3.2
Mean/SD		52395.83±21909.98

Source: Field Survey, 2024

Distribution of Home Gardeners by Crops Planted, Contributions and Constraints

The results in Table 3 revealed that mostly home garden favours the cultivation of arable crops (yam, cocoyam, maize, cassava), fruits and vegetables (15.9%). Further, it was discovered that home garden contributes to households' food/herbs consumption (47.3%), serve as a means of livelihood and employment (21.1%), among others. This is in line with Saediman *et al*. (2021). On constraints facing household heads participants in home garden, it was indicated that destruction by animals accounted for 23.7%, theft/stealing of farm crops was represented by 25.3%. Other constraints included pests and diseases, inadequate finance and farm land, among others. This is in agreement with findings by Ayodele and Olukotun (2020), who reported financial inadequacy, shortage of land, and cattle invasion as challenges facing home gardeners.

Table 3: *Distribution by Crops Planted, Contributions to Households and Constraints to Engagement in Home Garden*

Variables	Frequency	Percentage (%)
Crops Planted		
Yam	28	14.7
Cocoyam	17	8.9
Vegetables/Fruits	30	15.9
Okra	15	7.9
Pepper	10	5.3
Maize	25	13.2
Tomato	19	10.0
Plantain	11	5.8
Cassava	26	13.7
Groundnut	9	4.7
Contributions of Home Garden		
Supply of Food/Herbs	90	47.3
Means of Livelihoods/Employment	40	21.1
Fights Hunger/Malnutrition	26	13.7
Alleviates Poverty	8	4.2
Checks Idleness in the Households	14	7.4
Enhances Organic Farming	12	6.3
Constraints to Engagement in Home Garden		
Destruction by Animals (Cattle)	45	23.7
Theft/Stealing/Pilfering	48	25.3
Pests/Diseases Infestation	20	10.5
Inadequate Finance	30	15.8
Shortage of Land	27	14.2
Inadequate Inputs	11	5.8
Low Output	9	4.7

Effects of Home Garden on Households' Food Security

The result (Table 4) shows the effects of home garden on the food security status of home gardeners in the study area. It was discovered that the result of the 3-point Likert-type scale for food security status was rated as: highly food secured (HFS = 3), moderately food secured (MFS = 2) and not food secured (NFS = 1) relative to home gardener households by household size. The analysis revealed that all the households were food secure through their engagement in a home garden. The result shows that the grand mean was 2.8. The food security index was 0.937, and this suggests that 93.7% of the households that engaged in home garden were food secure. Based on the decision rule, household sizes with a mean less than 2 (< 2.00) were classified as not food secured, while those with a mean above or greater than 2 (> 2.00) were classified as food secured. Hence, all the households with the various household sizes were food secure. This finding is similar to Depenbusch *et al*. (2021) but contrary to Adenegan *et al*. (2020), who used the per capita food expenditure approach to determine food security.

Table 4: Effects of Home Gardeners on Households' Food Security

Household Size	Frequency	HFS (3)	MFS (2)	NFS (1)	Total Score	Mean Score	Remark
< 5	18	15(45)	2(4)	1(1)	50	2.78	FS
5 – 8	22	18(54)	3(6)	1(1)	61	2.77	FS
9 – 12	130	112(336)	12(24)	6(6)	366	2.82	FS
>12	20	16(48)	4(8)	0(0)	56	2.80	FS
Total	190	161(483)	21(42)	9(9)	534	2.81	

Food Security Index = $\frac{Grand\ Mean}{3} = 0.937$; *Decision rule = <2.00 = NFS; ≥ 2.00 = FS (Food Secured); HFS = Highly Food Secured; MFS = Moderately Food Secured; NFS = Not Food Secured.*

Contributions from Home Garden to Households' Food Security

Table 5 shows the analysis of home garden contributions to food security of home gardeners in the study area. The result of the Likert-type scale for contributions to home garden states as: extremely contributed (EC = 4), moderately contributed (MC = 3), somewhat contributed (SoC = 2) and slightly contributed (SC = 1) against the various item statements for the responses of home gardeners. The result shows that home garden contributes extremely to household food security. The grand mean was 3.71 while the contribution index was 0.929, suggesting that home garden contributes about 92.9% to households' food security. The decision rule indicates that item statements with a mean less than 2 (< 2.00) are classified to contribute slightly to household food security, and those with a mean above or greater than 2 (>2.00) are found to have contributed extremely to household food security. Hence, responses to all item statements (Table 5) show that home gardens extremely contributed to households' food security in the study area. This corroborates findings by Uzokwe *et al*. (2016), Depenbusch *et al*. (2021) and Saediman *et al*. (2021).

Table 5*: Distribution by Home Garden Contributions to Households' Food Security*

Item Statements	SC (1)	SoC (2)	MC (3)	EC (4)	Weighted Score	Mean ($\bar{X}$)	Remark
It serves as a source of income	3 (3)	2 (4)	26 (78)	159 (636)	721	3.79	EC
It helps to supply food/herbs	1 (3)	0 (0)	12 (36)	176 (708)	747	3.93	EC
Means of livelihoods & employments	3 (3)	4 (8)	20 (60)	163 (652)	723	3.80	EC
Home Garden fights hunger and malnutrition	1 (3)	4 (8)	19 (57)	166 (664)	732	3.85	EC
Home Garden helps to alleviate poverty	3 (0)	1 (2)	31 (93)	155 (620)	715	3.76	EC
It checks idleness in the households	8 (8)	10 (22)	48 (96)	124 (496)	622	3.27	EC
Enhances organic farming	12 (12)	10 (20)	25 (75)	143 (572)	679	3.57	EC
Increases food availability and better food diversity	4 (4)	1 (2)	32 (96)	153 (612)	714	3.76	EC

Decision rule = < 2.50 = Slightly Contributed (SC); ≥ 2.50 = Extremely Contributed (EC); SoC = Somewhat Contributed; MC = Moderately Contributed Grand Mean ($\bar{X}$) = 3.71; Contribution Index = $\frac{Grand\ Mean\ (\bar{X})}{4}$ = 0.9291

The analysis of the probit model on drivers of participation in home garden revealed that log-likelihood was -214.0654, the LR Chi^2 = 168.451, the Pseudo R^2 was 0.5214, while Prob>Chi^2 = 0.0000, which was significant at 1% level. This implies the fitness of the model and that the specified variables are joint predictors or drivers of participation in home gardens. Ten (10) variables were hypothesized to influence participation in home garden; however, seven (7) (age, gender, household size, land size, distance, access to input and ownership of land) were found to have a significant influence on households' participation in home garden in the study area.

Age was found to have a negative coefficient and significantly influence the probability of households' participation in home gardens at 5% level of significance. This suggests that as the age of the household head increases, the probability of participation in home gardens decreases by -9.8%. This is not unconnected with the fact that as the household head increases in age, the strength for physical and strenuous activities reduces. This concurs with findings by Depenbusch *et al*. (2021) that as farmers advanced in age, active participation in farm activities dwindled. Gender had a positive and significant coefficient on participation in home gardens. This implies that being male influences household participation in home gardens. Household size showed a positive and significant coefficient on participation in home garden at 1% level of significance. This suggests that an increase in household size increases participation in home gardens by 8.5%. This is in line with Adeosun *et al*. (2020)'s position that an increase in household size increases enhanced labour supply for farm and other income-generating activities for the households.

Land size and distance had positive and negative coefficients at 1% and 5% levels of significance, influencing the probability of household heads' participation in home gardens. This portends that

a hectare/a kilometre increase in land size and distance decrease/increase the probability of participation in home garden by 1.4% and -9.4% respectively in the study area. This is in agreement with Gasali *et al*. (2023) and Gwacela *et al*. (2024). Access to inputs and ownership of land showed a positive and significant coefficient on the probability of participation in home gardens by the household heads. This indicates that access to land and having ownership of land enhance the probability of household heads' participation in home gardens. This corroborates the finding by Gwacela *et al*. (2024) that access to more farm land and inputs empowers home gardeners to expand their gardens and scale of operations.

Table 6: *Probit Analysis of Drivers of Households' Participation in Home Garden*

Variables	Coefficient	P>/z/	Marginal Effect
Age (yrs)	-0.068(0.028)	0.018**	-0.098
Gender (male =1; otherwise = 0)	0.051(0.035)	0.036**	0.078
Marital Status (married =1; otherwise = 0)	0.189(0.151)	0.213	0.041
Education (Years of completed education)	0.042(0.033)	0.210	0.169
Household Size (number)	0.067(0.029)	0.021**	0.085
Land Size (hectares)	0.061(0.019)	0.002***	0.014
Distance (km)	-0.403(0.181)	0.023**	-0.094
Household Income	0.129(0.333)	0.699	0.030
Access to Inputs (yes =1; no = 0)	0.083(0.031)	0.008***	0.104
Ownership of Land (yes =1; no = 0)	0.871(0.246)	0.000***	0.017
Constant	-9.689(2.984)		-0.001
Observation	190		
Log Likelihood	-214.0654		
LR Chi^2 (10)	168.451		
Prob-Chi^2	0.000		
Pseudo R^2	0.5214		

Hypothesis Testing

The null hypothesis of "no significant difference between male and female household heads in the contributions of home garden to food security" in the study area was assessed. The result of the independent t-test analysis showed a calculated t-value of 0.172 and a p-value of 0.864, testing at 5% level of significance. Since the p-value is higher than the alpha level, the null hypothesis, which states that there is no significant difference between male and female household heads in the contributions of home garden to households in the study area, is retained or accepted. Consequently, there is no significant difference between male and female household heads in the contributions of home gardens to household food security in Ondo State, Nigeria. This is an indication that the contributions of home gardens to households in the study area are not different.

Table 7: *Independent Sample t-test Analysis by Gender of Home Gardeners*

Gender	Mean	Std. Deviation	df	T	Sig. (2-tailed)
Male	75.88	4.49	188	0.172	0.864
Female	76.02	4.53			

$\alpha = 0.05$

Conclusion and Recommendations

Home gardens have been found to serve as sources of food, means of livelihood, and contribute to household income and food security. It enhances the conversion of vacant and marginal land around the home or households into a useful asset that could positively impact households. It helps to ensure farmers' safety from kidnapping, insecurity and banditry. Moreover, home gardens serve as a pathway out of poverty, hunger and malnutrition through the supply of food to the households and home gardeners in the study area. However, participation in home gardens by household heads is constrained by invasion of cattle and domestic animals, inadequate land, theft and stealing in the garden, among others. Based on the findings of this study, it was recommended that household heads should be granted access to inputs, youth should be encouraged into home gardens, and access to land should be encouraged for effective participation in home gardens.

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