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*Adewale Olufunlola Yoade<sup>1</sup>, Solomon Ayodeji Olatunji<sup>1</sup>,  
Olabisi Omowumi Adeyemi<sup>2</sup>*

<sup>1</sup>*Wesley University Ondo*  
<sup>2</sup>*Federal Polytechnic Ado-Ekiti*  
*Nigeria*

## **VULNERABILITY TO FOOD INSECURITY AMONG RURAL HOUSEHOLDS IN SUB-SAHARAN AFRICA**

**Purpose.** *The purpose of this study was to examine the factors that affect food shocks and how vulnerable are people to food shocks using Ife North Local Government Area of Osun State Nigeria as a case study.*

**Methodology / approach.** *Data were collected from 150 households through multistage sampling from ten political wards in Ife North Local Government Area. Descriptive statistics was used to describe the socio-economic characteristics and profile food shocks experienced and identify the coping strategies employed among rural households in the study area.*

**Results.** *The study revealed that majority of the household age range of between 40 to 59 (62.0 %), married (77.3 %). Also, majority of the respondent own their farm (85.3 %). The result shows that the shocks that are prevalent in the study area include high price of input (66.6 %), loss of close relatives (72.0 %), low agricultural production (64.6 %), pest and disease (66.6 %), harsh economic time (54.0%), and Ill health (50%). The other shocks experienced having low prevalence among households are non-availability of labour (23.4 %), accident (32.0 %), flood (31.4%), and theft (35.4 %).*

**Originality / scientific novelty.** *The age categorization of vulnerability to food insecurity indicates that household heads aged 80 and above are more vulnerable to food insecurity (0.7158) followed by those within age 21–39 (0.6895). Also, the distribution of household head by their educational level shows that the household that have no formal education (0.5123) are more vulnerable to food insecurity.*

**Practical value / implications.** *The implication of this study is that Government should regulate price fluctuation of agricultural goods and inputs. The use of pesticides should be encouraged to prevent pests and disease prevalence. Also, agricultural credit should be made available to farmers.*

**Key words:** *vulnerability, food security, rural, household, Africa.*

**Introduction and review of literature.** Food insecurity remains a fundamental problem in Nigeria [1–3]. The Food and Agriculture Organization enlisted the country among countries faced with serious food insecurity problems. The vision of Nigeria to have physical and economic access to food on a continuous basis has therefore continued to remain a mirage [4; 5]. The country has not been sufficient to satisfy the demand of an increasing population [6]. Government past policies and programs on food security has been ineffective [7; 8]. The populations of people in Africa, Nigeria inclusive who lack economic and physical access to food are increasing [9]. Using the USDA approach, examined the food security situations of

farm households in Ekiti State, Nigeria [10–12]. They found out that only 12.2 % of the respondents were food secure, 43.6 % were food insecure without hunger, 35.9 % were moderately food insecure with hunger and 8.3 % were severely food insecure with hunger [13]. The major coping strategies adopted against food shortages were the purchase of less preferred food and reduction in the quantity of meals.

However, analyzing the food security situation among urban households in Lagos State (Nigeria), using food security index, scientists found out that food insecurity among urban households in the study area was 0.49. As age of household heads increases, food insecurity also increases [14]. Household heads between the age of sixty one and seventy years had the highest food insecurity index (at 0.58) and least between twenty one and thirty years at 0.30. Female household heads had the highest food insecurity index of 0.49 compared to male household head at 0.38. As level of education increases, food insecurity reduces. Household heads that were engaged in professional occupation had relatively low food security index at 0.36 compare to those who were traders at 0.48. Households within the range of 1–4 and greater than twelve members had the food insecurity index ranging between 0.27 and 1.00 respectively [15; 16].

Previous studies that have evaluated household expenditure concluded that food is important in household expenditure because of the amount of income dedicated to food [17]. It was noted that for most households spending on food is the largest expense followed by housing (rent, mortgage payments, opportunity cost or implied rent), but for richer households, it comes second after housing expenditure [18; 19]. Idrisa, Gwary and Shehu [20] analyzed the determinants of food expenditure patterns among urban households in Nigeria. Their results showed that 60 % of the household income expenses on food were considered high, suggesting low income and possible high cost of food in the study area. Their results further revealed that household income, tribe, household size and the composition of the household had a significant effect on food expenditure [20].

A major food insecurity measure is the household wealth status which accounts for the accessibility concept of food security and is measured by total food consumption, food expenditures or income [21]. Food expenditure comprises a large share of the spending of poor households, making them relatively more vulnerable to the impacts of food price inflation [22]. A household may slash its food purchases and alter its consumption patterns in order to cope with rapid food inflation. Typical coping strategies include buying smaller quantity of food, switching to different types of food, reducing dietary diversity and skipping meals [2]). Also, [13] in a study on determinants of household's food security study in Southern Ethiopia, with a number of factors affecting food security such as age, education, sex, unemployment rate and income level.

The recent economic recession in Nigeria has further led to the high incidence of food insecurity most especially among the poor, rural and landless smallholder farmers who occupy more than 70% of Nigeria's population. Food expenditure comprises a large share of the spending of poor households, making them relatively

more vulnerable to the impacts of food price inflation [21]. Food production in Nigeria has not met with food demand, thus increasing national budget.

Several studies have carried out vulnerability assessments using the three-stage feasible generalized least squares (3FGLS) in relation to poverty studies. Some of which are vulnerability using VEP (vulnerability as expected poverty) measured vulnerability as low expected utility [22]. Also, several empirical studies have been carried out on food insecurity in Nigeria [23]. But none of these studies examined the vulnerability profile and shocks experienced by farming households and literature is limited in the application of this methodology in estimating vulnerability to food insecurity among farming households in Nigeria. This study therefore contributes to empirical literature in studies on household food security in Nigeria. It also examines the determinants of future consumption among rural households. This study will also assist the government in the achievement and attainment of its national food security objectives as explained in the Agricultural Transformation Agenda (ATA) and the newly implemented Agricultural Promotion Policy (APP). It will also meet the goal two and three of the Sustainable Development Goals (SDGs) which is aimed at ending hunger and ensuring good health and wellbeing.

It is against this background that this study examined the vulnerability to food insecurity and identifies shocks experienced by rural households in Ife North Local Government Area, Osun State, Nigeria.

**The purpose of the article.** The purpose of this study was to examine the factors that affect food shocks and how vulnerable are people to food shocks using Ife North Local Government Area of Osun State Nigeria as a case study. The questions addressed in this paper are to: (i) describe the socio-economic characteristics of rural households (ii) profile the shocks experienced by rural households (iii) estimate the food security status of rural households (iv) estimate the vulnerability to food insecurity by rural households (v) identify the coping strategies employed by rural households.

*The study area.* Ife north local government areas was carved out of the defunct Oranmiyan local Government area in may 1989. It is made up of ten wards namely Ipetumodu 1 and 2, Edunabon 1 and 2, Moro, Yakooyo, Asipa and Akinlalu, Oyere 1 and 2 and Famia. By the 2006 National population census, the population of Ife-North was put at 153, 274, out of which 76,852 were male and 76,422 were female. The people in the area are predominantly Yorubas but Hausas, Igbos, Edos and Itsekiris form a sizeable proportion of the population. The people of Ife North are essentially farmers, traders and artisans though agriculture forms the backbone of the economy in the area. Like in most Yoruba towns, the crops produced include Yams, cassava, maize, plantains and citrus fruits. Apart from the residential land uses which dominate the town structure, other major land uses types includes educational, commercial (traditional markets and modern shops), religious and public uses. Ife North Local Government area of Osun state is approximately located on latitude 7° 47' North of the Equator and Longitude 4° 26' East of the Greenwich Meridian and covers the land area of about 985sqkms. The local government areas is surrounded by

Ede South in the north, Atakumosa East in the west, Obokun and Ife East in the East, Ede North, Ede South and Egbedore Local Government Areas in the South and Ifelodun Local Government Area in the West.

**Material and methods.** Primary data was collected with the aid of well-structured questionnaire. Data on socio-economic characteristics, food expenditure, food shocks experienced by households and coping strategies employed was elicited from farming households. A multistage sampling technique was employed for the study. The first stage involved the random selection of five wards out of the ten [10] political wards in the study area which are Asipa, Oyere I, Oyereye II, Famia and Akinlalu. The second stage involved the random selection of three [3] villages from each of the wards giving a total of 15 villages. The third stage involved the random selection of ten [10] households from each village respectively, giving a total of 150 households.

Data analysis. Descriptive statistics was used to describe the socio-economic characteristics; profile food shocks experienced and identify the coping strategies employed among rural households in the study area.

The food security status of farming households was estimated by adapting the class of decomposable poverty measures by Foster, Greer and Thorbecke (FGT). They are widely used because they are consistent and additively decomposable [24]. It is a generalized measure of food security status that measures the outfall from the food insecurity line and it is usually weighted by a food insecurity aversion parameter ( $\alpha$ ).

The formula for FGT is given by:

$$FGT\alpha = \frac{1}{N} \sum_{i=1}^H \left( \frac{z - y_i}{z} \right) \alpha \quad (1)$$

$z$ : an agreed upon food insecurity line (using Moderate food insecure: two-third of mean per capita food consumption expenditure of respondents).

$N$ : total number of respondents in the study.

$H$ : number of food insecure (those with per capita food expenditure at or below  $z$ ),

$y_i$ : individual household per capita food expenditure

$\alpha$ : sensitivity parameter.

Low  $\alpha$  implies that the FGT metric weights all the individuals with food expenditures below  $z$  are roughly the same. If  $\alpha$  is high, those with the lowest food expenditures (farthest below  $z$ ) are given more weight in the measure. The higher the FGT statistic, the more food insecurity among the households. By setting the value of  $\alpha$  to zero, one, two respectively, the FGT food insecurity measure formula delivers a set of food insecurity indices which are contributing factors to vulnerability. They are, headcount ratio (H), poverty Gap (I), squared coefficient variation among the food insecure (Cv2).

The household's vulnerability is estimated by adapting the approach that allows the estimation of expected food consumption expenditure and its variance using cross-section data [25]. This approach has an advantage especially in terms of its

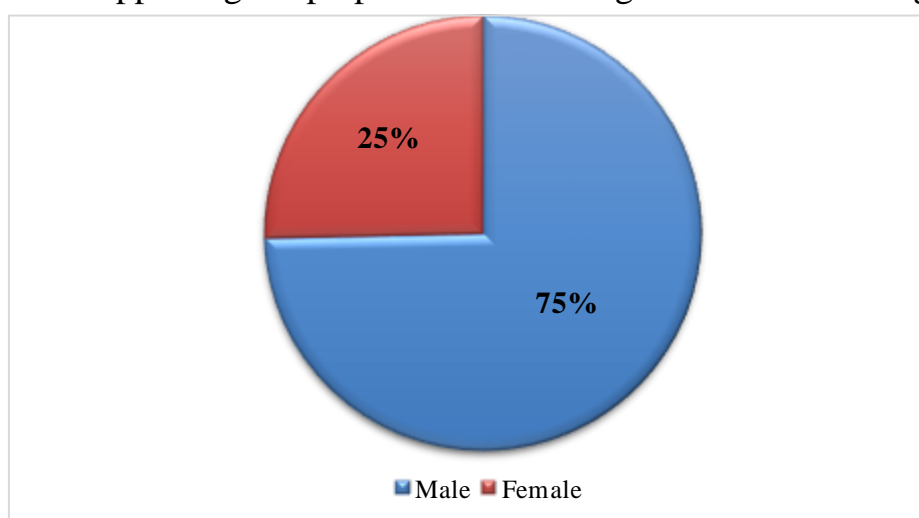
ability to identify households exposed to risks but who are not food insecure. In this approach vulnerability is defined as the probability of being food insecure in the future and basically can take on two forms, it is either the ex-ante risk that a household that is currently food secure at a time  $t$  will fall below the food insecurity line at a time  $t+1$  or the risk that a household that is currently food insecure will remain food insecure. This can be expressed as:

$$V_t = \text{Prob} (C(t + 1) < Z) \quad (2)$$

The stochastic process of generating the food expenditure of the household is dependent on the household characteristics and the error term (with mean zero) that captures the shocks to households' food expenditure that are identically and independently distributed over time for each household. Hence, any unobservable shocks on households that have specific effects over time on households' food expenditure are ruled out.

**Results and discussion.** *Socio-economic characteristics.* Findings revealed that there are more male-headed farming household heads (74.6 %) than female (25.3 %). The reason for male dominance agrees with the pattern of headship in Nigeria. The result further agrees with the findings of [26] who concluded that farming in Nigeria is male dominated profession. Findings also revealed that about 62.0 % of household heads were ages of 40-59 years while about 2.7 % are 80 years and above. The mean age was approximately  $59 \pm 9.35$  years. This implies that most household heads are aged.

Findings established that 77.3 % of them were married while 16.0 % being single. This implies there is likelihood that there will be more family labour for farming activities. Findings revealed that about 52.0 % of households had between 7-9 household members, while those with 4-6 household members were about 33.3%. The mean household size was  $8.08 \pm 4.317$  persons. This implies that households are fairly large, thus supporting the preponderance of large households in Nigeria.

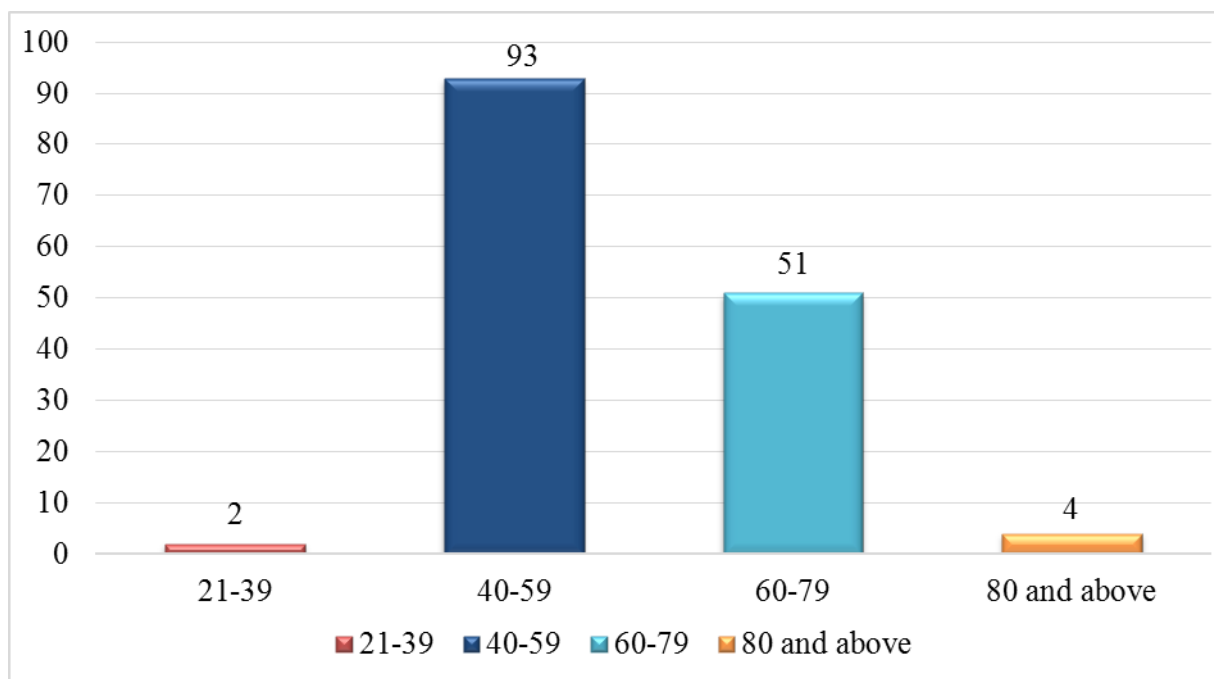


**Fig. 1. Respondents' Sex Distribution**

*Source:* built by the authors.

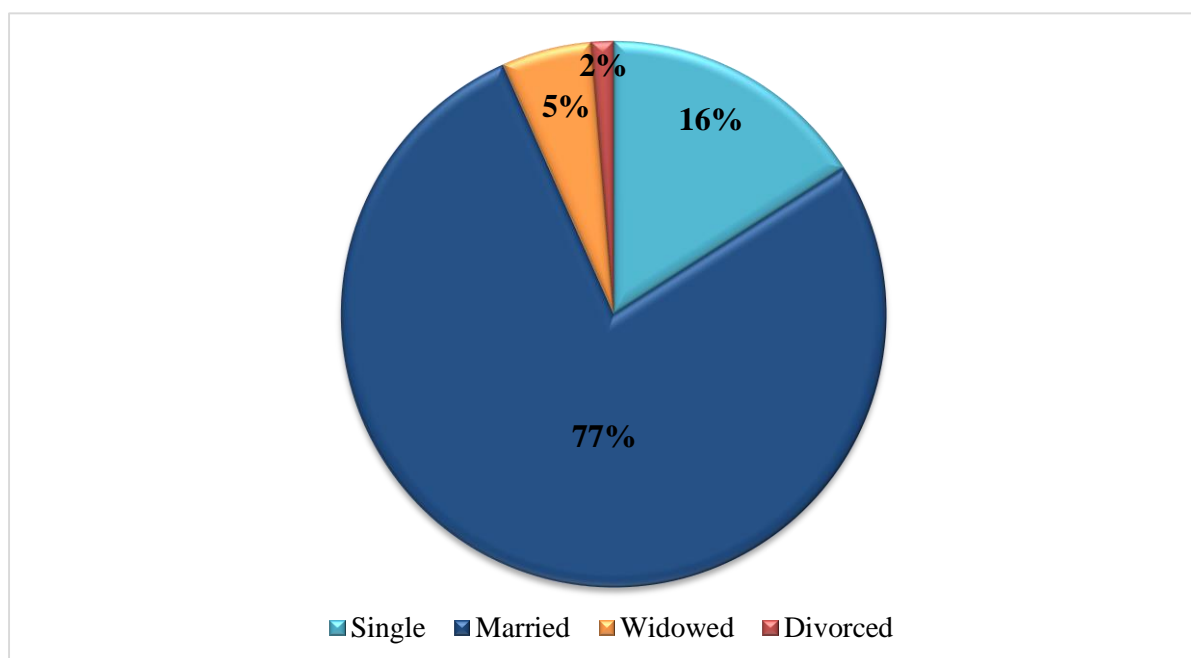
Findings revealed that about 50.6 % of household heads have a secondary

education while about 8.0 % of them have no formal education. This implies that education of household head could impact positively on the food security status of household (Figure 1, 2, 3, 4 and 5).



**Fig. 2. Respondents' Age Distribution**

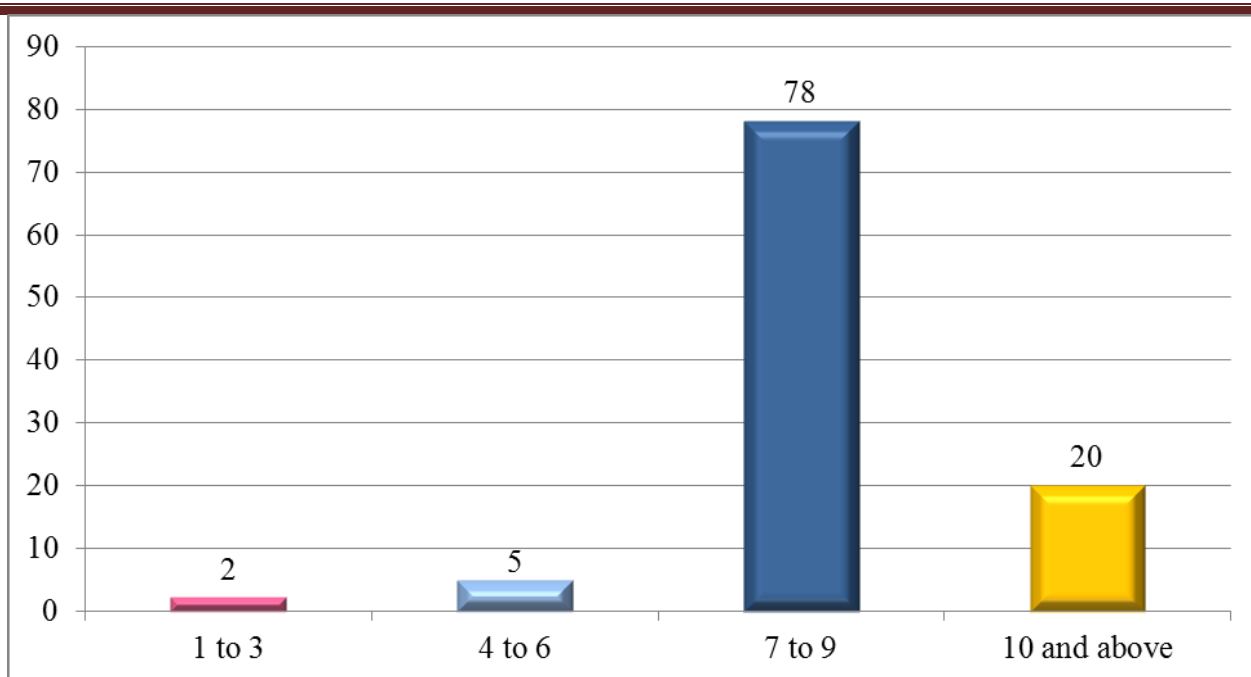
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**Fig. 3. Respondents' Marital Status**

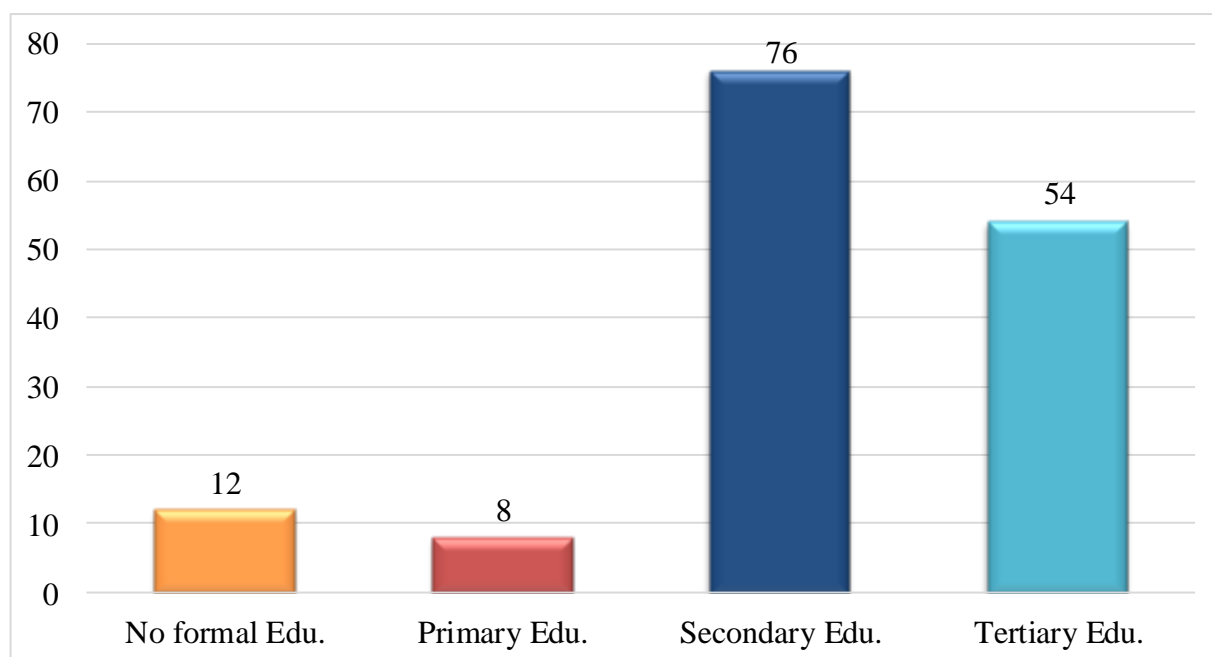
Source: built by the authors.

The specific risks that affect the consumption among household in the study area are presented in table 2.



**Fig. 4. Respondents' Household Size**

Source: built by the authors.



**Fig. 5. Respondents' Educational Level**

Source: built by the authors.

*Profile of shocks experienced by households.* Table 2 shows the profile of shocks experienced by farming household in the study area. The result shows that the shocks that are prevalent in the study area include high price of input (66.6 %), loss of close relatives (72.0 %), low agricultural production (64.6 %), pest and disease (66.6 %), hash economic time (54.0 %), and Ill health (50.0 %). The other shocks experienced having low prevalence among households are non-availability of labour (23.4 %), accident (32.0 %), flood (31.4 %), and theft (35.4 %).

Table 2

**Profile of another formulation experienced by households**

Shocks	Yes	No
High price of input	100 (66.6)	50 (33.4)
Low agricultural production	97 (64.6)	53 (35.4)
Loss of close relatives	108 (72.0)	42 (38.0)
Loss of property due to conflicts	70 (46.6)	80 (53.4)
Accident	48 (32.0)	102 (68.0)
Hard economic time/decline in our economy	84(54.0)	66 (44.0)
Fire outbreak	63 (42.0)	87 (58.0)
Flood	42 (31.4)	103 (68.6)
Price fluctuation	61 (40.7)	89 (59.3)
Policy change	69 (46.0)	81 (54.0)
Ill health	75 (50.0)	75 (50.0)
Theft	53 (35.4)	97 (64.6)
Rainfall shock	78 (52.0)	72 (48.0)
Pests and disease outbreak	100 (66.6)	50 (33.4)
Non availability of credit	64 (42.6)	86 (57.3)
Non availability of labour	20 (23.4)	130 (86.6)

*Note.* Figures in parenthesis are percentage.

*Source:* author's computation, 2017.

*Vulnerability to food insecurity.* Classification of households into their vulnerability status based on food insecurity line. Adopting a standard vulnerability threshold of 0.5 following [27; 28], households were classified into their vulnerability status as shown in table 3 below.

The classification of households into their vulnerability status was based on the food insecurity line (two-third of MPCHHFE). The table shows that not all the household that are food secure are vulnerable while a significant proportion of the household that are food insecure are vulnerable (38.7 %). Thus there may be some households whose vulnerability level may be high who are nevertheless observed to be food insecure; conversely there may be some households who are observed to be food secure, whose vulnerability level is nevertheless low enough for them to be classified as non-vulnerable. Overall, the results revealed that about 96 (64.0 %) households were vulnerable. This implies that a large proportion of rural households in the study area are vulnerable to food insecurity.

Table 3

**Vulnerability to Food Insecurity Profile**

Food insecurity status	Vulnerable	Non-vulnerable	Total
Food insecure	58 (38.7)	26 (17.3)	84 (56.0)
Food secure	38 (25.3)	28 (18.7)	66 (44.0)
Total	96 (64.0)	54 (36.0)	150 (100)

*Note.* Figures in parenthesis are percentage.

*Source:* author's computation, 2017.

*Vulnerability/ observed food insecurity profile.* Table 4 below depicts the food insecurity status of rural households in the study area. The columns show both the



predicted and observed food insecurity profile as well as the vulnerability to insecurity ratios. The result of the decomposition of food insecurity and vulnerability by selected socio-economic characteristics revealed that food insecurity and vulnerability varied across groups. It can be seen that a group with a relatively high food insecurity rate tends to have much higher vulnerability while low food insecurity rates are associated with considerably lower vulnerability. The predicted/observed food insecurity rate was used to estimate the expected food insecurity incidence based on the static food insecurity estimate.

*Table 4*

**Vulnerability/observed food insecurity profile in Ife-North Local Government Area, Osun State**

Demographic/socio-economic characteristics	Vulnerability index	Observed food insecurity or food incidence	Predicted/observed food ratio
<i>Gender</i>			
Male	0.6313	0.5143	1.1329
Female	0.6186	0.4143	1.3423
<i>Age of Household head</i>			
21-39	0.6895	0.5010	1.3251
40-59	0.6376	0.5342	1.1236
60-79	0.6017	0.4878	1.2735
80 and above	0.7185	1.0000	0.7185
<i>Marital status</i>			
Married	0.6917	0.5204	1.3292
Single	0.6405	0.6429	0.9648
Widowed	0.6096	0.5000	
<i>Household size</i>			
1-3	0.6534	0.1890	3.5101
4-6	0.5727	0.2000	2.8625
7-9	0.6729	0.6500	1.0138
>= 10	0.6806	0.8043	0.8413
<i>Educational attainment</i>			
No formal education	0.5123	0.5001	1.0574
Primary Education	0.6124	0.5435	1.2501
Secondary Education	0.6134	0.5000	1.3268
Tertiary Education	0.6144	0.5933	1.1572

*Source:* author's computation, 2017.

The distribution of gender of household head reveals that female headed households are food insecure, that female headed households had a higher probability of staying below the food insecurity line. Male headed households are three times more than female headed households in rural areas; about 63 % of rural households are male headed. The age categorization of vulnerability to food insecurity indicates that household heads aged 80 and above are more vulnerable to food insecurity (0.7185) followed by those within age 21–39 (0.6895). The distribution of household head by their marital status reveals that the widowed are more vulnerable to food insecurity (0.6096) followed by the single (0.6405). The distribution of household by

their household size shows that the household that have between 4–6 members are more vulnerable to food insecurity. Also, the distribution of household head by their educational level shows that the household that have no formal education (0.5123) are more vulnerable to food insecurity.

Table 5 shows the coping strategies of vulnerability to food insecurity.

*Table 5*

**Coping strategies**

Coping strategies	Frequency	Percentage (%)
Borrow money to buy food	11	8.9
Receive food from family member	7	5.7
Cook whatever food is available	23	15.3
Reduce the amount of food cooked	17	13.8
Switch from consuming meat to soya mince	40	26.6
Buy smaller quantity of food	11	8.9
Reduce the amount of food intake	14	13.9
Skip meal for the whole day	17	13.8
Switch to different type of food	10	8.1
Total	150	100.0

*Source:* author’s computation, 2017.

**Conclusions.** Understanding the causes and level of food security would help policy makers to design and implement more effective policies and programs for the poor and thereby helps to pave way to improve food security. The study examined the vulnerability to food insecurity among rural household in Ife North Local Government Area Osun State, Nigeria. Empirical findings show that in the study area, households repeatedly fall in and out of food insecurity. The shocks experienced by the farming households are high input price, low agricultural produce, loss of close relatives, hard economic times, price fluctuation, pests and disease outbreak, ill health, loss of property due to conflicts, among others. Price fluctuation, pests and disease attack, non-availability of credit, non-availability of labour, hard economic times and fire outbreak increase the probability that households will be food insecure in the future.

From the findings of this study, a number of policy implications and recommendations are made toward ensuring reducing rural household’s vulnerability to food insecurity in Osun State, Nigeria. The most substantive are: government should enable to regulate price fluctuation of agricultural goods and inputs. The use of pesticides should be encouraged to prevent pests and disease prevalence. Agricultural credit should be made available to farmers. Education of farmers should be a priority of the government and access to good road transport as they represent positive factors that reduce overall vulnerability to food insecurity. The more household head educated, the higher will be the probability of educating family member and familiar with modern technology, which the twenty first century so badly demands. So, strengthening both formal and informal education and vocational or skill training should be promoted to reduce food insecurity in the study area.

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