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Analysis of Factors Influencing Food Security Status of Female Headed Farm Households in Abia State, Nigeria

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Abstract

This study analyzed factors influencing food security status of female headed farm households in Abia state, Nigeria. Multistage random sampling technique was employed in selecting 240 female headed farm households from whom data were collected using structured questionnaire. Data collected were analyzed using descriptive statistics, food security indices and probit regression technique. Results of analysis showed that mean age of the female farm households heads was 47.56 years, while, mean farm size, household size, annual farm income and non-farm income of the female headed farm households were 0.71 hectares, 6 persons, 154,086 Naira and 92,034.08 Naira respectively. Food security line of the female headed farm households was ₦9206.81, with food insecurity incidence of 0.5863 and food insecurity gap of 0.4067. Results of probit regression showed that age, dependency ratio, level of education, extension access, farm income, household size, household asset endowment and membership of association were significant determinants of food security status of female headed farm households. Results also showed that 78.75% of the female headed farm households were constrained by inadequate access to credit. Relevant government agencies should mobilize female heads of farm households in Abia State and encourage them to join cooperative associations, so that they can derive benefits associated with being members of agricultural cooperatives such as increased access to credit, extension information and agricultural input, with which to improve farm productivity, farm income and food security.

Keywords: Farm households, Female farmers, Food security

1. Introduction

Food is widely recognized as a basic necessity of life. As such, adequate intake of quality food is a key requirement for a healthy and productive life (Idrissa et al., 2008).The attainment of food security in any country is usually an insurance against hunger and malnutrition, both of which slow down economic development (Davis, 2009). However, according to Shala and Stacey (2001) many developing countries including Nigeria experience food insecurity with food supplies being inadequate to maintain their citizens' per capita consumption.

Food security as defined by Food and Agricultural Organization (1996) is a situation 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 a healthy and active life. Food security has been identified as having food availability, food accessibility, utilization and stability of food access as its elements (Watts, 2013; Otunaiya and Ibidunni, 2014).The recent concept of food security has given more attention to availability and accessibility of food at household and individual levels than its availability at international, national, regional and state levels. At

household level, food security implies physical and economic access to food that is adequate in terms of quantity, quality, safety and cultural accessibility to meet each person's need (Ingawa, 2002).

In food security discourse, women represent a disproportionate share of the food insecure in Nigeria (Simpa, 2014). Women's disadvantaged position, early entry into motherhood and low educational level fuel the incidence of food insecurity amongst female headed households. Unequal opportunity in schooling for girls and boys restricts choices and creative life. Therefore, households headed solely by women tend to be more vulnerable to poverty and food insecurity (Moore, 1994; Fukuda-Parr 1999; Koster, 2008; Bastos, 2009; Ijaiya, 2000; Anyanwu, 2010; International Fund for Agricultural Development, 2012).Although a household's food security status may be the result of factors other than the mere absence of a male-head; its incidence is, however, greater among female than male headed households (Simpa, 2014). Food and Agricultural Organization (2005) noted that female headed households are more vulnerable to sharp rise in basic food prices. In Nigeria, food insecurity is largely a phenomenon among rural farm households particularly the female-headed farm households (Abu and Soom, 2016).

Female-headed farm households in Nigeria deserve special attention, because they are typically disadvantaged in terms of access to land, labour, livestock credit, extension services, insurance, markets, discriminated against by cultural norms and suffering from among others high dependent burden and economic immobility (Simpa, 2014). The proportion of rural population living below food security line is well pronounced among female-headed households. Less than 20% of women in Nigeria own their own farmlands and less than 15% have access to agricultural credits to enhance productivity and income (Anyanwu, 2010; Simpa, 2014). Consequently, meeting the most basic need (food) by female headed farm households is a tedious daily struggle (Simpa, 2014). Reducing food insecurity among vulnerable households continues to be a major public policy challenge in Nigeria. Therefore, this study seeks to: i) describe socio-economic characteristics of female headed farm households in the study area; (ii) profile food security status of female-headed farm households in the study area;(iii) determine socio-economic factors influencing food security of female headed farm households in the study area; and (iv) identify constraints hindering achievement of food security among female headed farm households in the study area.

2. Materials and methods

2.1 Study Area

The study was conducted in Abia State. Abia State is located between latitudes 5047' N and 6012' North of the Equator and between longitudes 7023' E and 8002' East of the Greenwich Meridian (National Root Crops Research Institute, 2003). The State occupies an area of about 5,834 square kilometres and is bounded by Imo State at the western border; Ebonyi and Enugu States at the north; Cross River and Akwa-Ibom States at the east and Rivers State at the south. The projected population stood at 3,460,616 with an annual growth rate of 2.7 percent (United Nations Population Fund, 2013). Abia state has 17 Local Government Areas (LGAs) clustered in three agricultural zones (Aba, Ohafia and Umuahia agricultural zones).

2.2 Sampling Technique and Data Collection

The population for the study comprise of all female headed farm households in the study area. Multi-stage random sampling technique was used to select respondents for the study. First, one LGA was randomly selected from each of the three agricultural zones (Aba, Ohafia and Umuahia) in the State. This gave a total of three LGAs. These LGAs are Obingwa, Bende and Isiala-Ngwa North. Secondly two communities were randomly selected from each of the three selected LGAs, to give a total of six communities, namely Osaa-Ukwu, Nenu, Ozuitem, Nkpa, Apu- na- EkpuUmuoha and Ama-AsaaNsulu.Thirdly, four villages were randomly selected from each of the six communities to give twenty four villages. At the village level, a list of female headed farm households were compiled with the help of enumerators many of who were natives. This served as the sampling frame of female headed farm households from which ten female headed farm households were randomly chosen from each of the twenty four villages. Thus, 240 female headed farm households were selected for the study.

The survey was carried out between February to August, 2017 and data were generated primarily with aid of structured questionnaire administered by interview method. Same set of questionnaire were administered on the selected farm households on regular intervals during the seven months of data collection. Data were generated on socio-economic characteristics of farm households, value of household monthly food expenditure/consumption and constraints to achievement of food security.

2.3 Analytical Technique and Model Specification

Descriptive statistics such as frequencies, percentages and means and inferential statistics such as food security indices and probit regression model were employed in analyzing data.

Food security status (objective ii) was estimated as the two-thirds of the mean per capita monthly food expenditure of all farm households. The farm households were classified into either food secure or food insecure households based on the food security line. A food insecure household is that whose per capita monthly food expenditure falls below two-thirds of the mean monthly per capita food expenditure while a food secure household is that whose per capita monthly food expenditure is above or is equal to two-thirds of the mean per capita food expenditure (Hassan and Badu, 1991; Sulaiman et al., 2015).

The food security index which was used to profile the food security status of the farm households was derived from Foster, Greer and Thorbecke (FGT) weighted poverty measure and had been applied to several studies whose main focus was food security (Hassan and Badu, 1991; Omonona and Agoi, 2007, Sulaiman et al., 2015). The FGT weighted poverty measure was adopted from Foster et al. (1984) as used in Sulaiman et al., (2015). The FGT index is expressed mathematically as:

$$P\alpha = \frac{1}{N}\sum_{i=1}^{q}\frac{z - Yi}{z}\alpha \geq 0 \ldots \quad (1)$$

Where:
Yi = Per capita household food expenditure (i = 1, 2 .....q);
z = Food security line;
N = Total number of farm households;
q = Number of food insecure farm households;

Pα = Weighted food security index, α ≥0 and it can take values of 0, 1 and 2. When = 0, the FGT index P0 measures food insecurity incidence. This represents the proportion of the households that are food insecure i.e. the proportion of households that fall below the food security threshold (line). When = 1, the FGT index P1 measures the food insecurity depth of the households. This denotes the proportion of food security line that the food insecure household requires to get out of food insecurity. When = 2, the FGT index P2 measures the severity of food insecurity status. It measures how far away the food insecure households are from the food security line.

Probit regression was used to analyse determinants of household food security status (objective iii). The probit regression model is considered appropriate when dependent variable (Y) takes one of only two possible values representing presence or absence; the model was adopted as used by Gujarati (2003):

Pi [y=1] = [Fzi] … (2)

Where

Zi = β0 + β1X1 + e

Yi = β1 + β2X2i + ……..+ βkXki+μ…(3)

Yi* is unobserved but Yi = 0 if yi* < 0,1 if Yi* >0

P (Yi = 1) = P (Yi* >0)

P (μ i≥ -β1 + β2X2i ……. -Bk X kL…(4)

Where i = 1,2 ……240

Where Yi = Food security status of female headed farm households(food secure = 1, food insecure = 0)

β1 = Unknown coefficients value of factors; X1 = Age of household head (years); X2 = Credit access (1 if yes; 0 if otherwise); X3 = Dependency ratio (ratio of workers to non-workers in each household); X4= Level of education (years); X5= Extension access (number of contact)

X6= Farm income (Naira); X7 = Farm size (Hectare); X8 = Household size (Number); X9 = Household asset endowment (Total asset value) (Naira); X10 = Marital status of household head (Married = 1; otherwise = 0); X11 = Membership of agricultural association(1 if member; 0 if otherwise); X12 = Non-farm income (Naira).

3. Results and discussion

3.1 Socio-economic characteristics of Female Headed Farm Households

The distribution of the female headed farm households according to socio-economic characteristics is shown in Table 1. Table 1 shows that mean age and mean farming experience of the female farm households heads were 56 years and 18 years respectively. This suggests that the female heads were within the economically active population and were capable of applying physical labour needed in the farming business as well as engaging in off-farm jobs to boost income in order to have more economic access to food (Babatunde et al., 2007a). The number of years of farming experience of a farmer may give an indication of the practical knowledge acquired on how to overcome certain inherent production problems and could impact positively on farm income and food security (Okolo, 2007). Table 1 also shows that the female headed households had mean farm size and household size of 0.71 hectares and 6 persons respectively. Farm size is positively associated with crop output and farm income, and larger farm size boosts agricultural

productivity thereby enhancing achievement of food security (Musinguzi, 2000; Henri-Ukoha et al., 2011). According to Abu and Soom (2016) household size has inverse relationship with household food security status because as household size increases there is more number of people to be taken care of by the same source of income. However, this assertion is expected to hold when other members of the household are economic dependents and are not engaged in income generating job/activity. Table 1 further shows that mean annual farm income, mean annual non-farm income and mean value of monthly food expenditure/consumption of the farm households were₦154,086.00, ₦92034.12 and ₦13,810.21 respectively. The annual farm and non-farm income translates to mean monthly farm income of 12,840.5 and mean monthly non-farm income of 7669.51, which may not be adequate to access food in right amount in the face of the prevailing economic crunch in Nigeria. The higher the gross income (farm and off-farm income), the more likely farmers can save and invest in improved technologies (Osondu and Ibezim, 2015). Level of off-farm activity influence household food security but this can either be positive or negative depending on the level and gains from the activity (Babatunde et al., 2007a). This is because engagement in an off-farm activity can bring in money thereby complementing the farm income earned by the household. On the other hand, if farmers spend more of their time on off-farm activities at the expense of working on their farm and particularly if the wage they earn does not commensurate with the foregone farm income, their food security situation could be worsened. Meanwhile, 51.25% and 32.50% of the female heads of farm households were married and belonged to agricultural association respectively. According to Sulaiman et al. (2015) households where the household heads are married and both spouses are working are expected to be more food secure than households with single, widowed, divorced or separated females as heads. Table 1 shows that 47.50% of the female heads of farm households attended secondary school, while 22.50% of them had no formal education. The ability to read and write would enable the female farm household heads to better utilize effectively and efficiently whatever resources exist in the area for increased food security. Ogbe (2009) and Simonyan et al. (2010) posits that education raises human capital and significantly increases a farmer's ability to make correct and meaningful choices for farm operations.

3.2 Food Security Status of Female Headed Farm Households

Table 2 shows the food security profile of the female headed households. The table results indicate that the mean monthly household income (farm and off-farm) of the female headed farm households was N20,510.00. Food security indices were computed using data on household per capita food expenditure. As shown in the table, the adult equivalent mean monthly household food expenditure was N13810.21. Using this value, the food security line (2/3 of mean per capita household food expenditure) was N9206.81.

Table 2 further shows that food insecurity incidence of the female headed farm households which is also known as head count ratio was 0.5863. This implies that 58.63% of the female headed farm households were food insecure because their food expenditure fell short of two-third mean per caput household food expenditure used as food security line.

Food insecurity gap allows for the assessment of the depth of food insecurity among the farm households and indicates the minimum cost of eliminating food insecurity (relative to the food security line) among the food insecure female headed farm households. Table 2 shows that the food insecurity gap of the female headed farm households was 0.4067. This implies that the food insecure female headed households have household food expenditure shortfall of 40.67% of the food security line. Therefore, an increase of N3,744.41 (0.4067 x N9206.81) in the average monthly food expenditure of the food insecure female headed farm households would enable them rise above the food security line. Abu and Soom (2016) obtained a similar result among farmers in Benue State, Nigeria.

The value of squared food insecurity gaps (food insecurity severity) was 0.2860 for the female headed farm households. This implies that there was 28.60% inequality among the food insecure female headed farm households.

3.3 Factors Affecting Food Security Status of Female Headed Farm Households

The estimates of the probit regression model which was used to determine factors that influenced food security status of female headed farm households in Abia State, Nigeria is presented in Table 3. The model posted a log likelihood value of -78.3559, Mcfadden R2 value of 0.7586 and a goodness of fit LR statistic value of 52.5229 which was statistically significant at 1.0% alpha level. Eight factors (age, dependency ratio, level of education, extension access, farm income, household size, household asset endowment and membership of association) were revealed to be significant

determinants of food security status of female headed farm households.

The coefficient (-0.1458) of age was found to be negative and significant at 5.0% alpha level, implying that food security status of the female headed farm households declines with increase in age of the household head. Younger household heads are more energetic to cultivate larger farms and seek off-farm jobs compared to older household heads (Kuwornu et al., 2012). Olabisi and Olawamiwa (2014) further posits that household heads that are younger tend to be more agile and active thus enhancing their productivity level, rate of adoption of new technology and level of diversification, which helps them to engage in other income generating activities thus enhancing the food security status of their households. This result agrees with the findings of Agboola (2004) and Abu and Soom (2016) that increase in age of household head decreases household food security status.

The coefficient (-0.0406) of dependency ratio was found to be negative and significant at 10.0% alpha level, implying that food security status of the female headed farm households declines with increase in dependency ratio. This is expected because an additional increase in the number of non-working member of a household increases the food requirement of the household thereby reducing the probability of being food secured (Kuwornu et al., 2012). In agreement with this result Ojogho (2010) and Emerole et al. (2014) found significant negative relationship between household's dependency ratio and food security status in Imo and Abia states of Nigeria respectively.

The coefficient (0.1367) of level of education was found to be positive and significant at 1.0% alpha level, implying that the households with an educated female head are more likely to be food secure than one with an uneducated head. This might be due to the fact that years of formal education are a major factor in wage earning opportunities and determination especially in Nigeria where the higher the academic qualification, the higher the wage Olabisi and Olawamiwa (2014). In addition, formal education improves human capacity and technical know-how which aids rate of adoption thus improving the productivity level of such households and consequently their food security status. The result compares favourably with findings of Babatunde et al. (2007b) and Ahmed et al. (2015) that farmers' educational level enhances their probability of being food secure, but differs from finding of Sulaiman et al. (2015). The coefficient (0.3067) of extension access was positive and significant at 1.0% alpha level, implying that the probability of the female headed farm households being food secure increases with access to extension services. Access to extension services tends to enhance the chances of a household having access to better crop production techniques, improved inputs, as well as other production incentives that positively affect farm production and thus household food security (Sulaiman et al., 2015). Ahmed et al. (2015) found that extension access impacted positively on household food security status.

Farm income had a positive coefficient (0.0088) that was significant at 10.0% alpha level, implying that the probability of the female headed farm households being food secure increases with rising farm income. Households that have higher farm income are more likely to be food secure, as income generated through sales of farm produce could be used to buy other food commodities not produced by the farm household. This result is in line with the findings of Arene and Anyaeji (2010) and Abu and Soom (2016) which revealed positive and significant relationship between household income and food security. However, the result contradicts findings by Ojeleye et al. (2014) that farm income had a significant negative effect on household food security status.

Household size had a negative coefficient (-0.6070) and was significant at 10.0% alpha level. The negative sign of this variable implies that household size exerted an indirect effect on female headed farm households' probability of being food secured. This indicates that, most of the female headed household members are economically inactive and are dependents who have little or no contribution towards production and household income. According to Osei et al. (2013) an increase in household size means more people to feed and indirectly reduces household income per head, expenditure per head and per capita food consumption. Another likely explanation is that in an area where households depend on less productive agricultural land, increasing household size results in increased demand for food. This demand, however, cannot be matched with the existing food supply from own production and this ultimately end up with the household becoming food insecure. This result is line with finding of Osei et al. (2013) but contradicts finding of Abu and Soom (2016). The coefficient (0.1476) of household asset endowment was positive and significant at 5.0% alpha level, implying that the probability of the female headed farm households being food secured increases with increase in household asset endowment. This finding supports Olabisi and Olawamiwa (2014) assertion that households that have access to key assets are more food secured since they are able to use such asset to secure loans which can be invested in other

productive enterprises which they can translate into cash if such households experiences shock. This helps households smoothen their consumption pattern. Membership of farmers association had a positive coefficient (0.2314) and was significant at 5.0% alpha level. The positive sign of the coefficient implies that membership to farmers association increased female headed farm households' probability of being food secured. According to Amaza et al. (2008) this can be closely linked to the beneficial effects of their memberships in terms of production and other welfare enhancing services. This result is consistent with findings of Babatunde et al. (2007b); Arene and Anyaeji (2010); Kuwornu et al. (2012); and Ahmed et al. (2015) which revealed positive and significant relationship between membership to association and farm households' food security status.

3.4 Constraints to Achievement of Household Food Security among Female Headed Farm Households

The distribution of female headed farm households according to constraints to achievement of food security is shown in Table 4. Table 4 shows that inadequate access to credit, inadequate income and inadequate extension contact/unavailability of extension agent constrained food security achievement of 78.75%, 71.25% and 67.92% of the female headed farm households respectively. According to Diagne and Zeller (2001) the poor nature of most farm households in developing countries is mostly due to lack of adequate access to credit and this is believed to have significant negative implication on technology adoption, agricultural productivity, food security, nutrition and overall household warfare. According to Ragasa et al. (2012) women farmers in developing countries are rarely seen as primary farmers to be targeted for innovation transfer by extension agents and this reduces the contact between extension agents and women farmers. They also asserted that female headed farm households had smaller and more distant farms compared to male headed farm households and this serves as deterrent to extension agents. Table 4 further shows that 66.25% of the female headed farm households were constrained by limited land for farm expansion. Generally, Nigeria agricultural production landscape is dominated by small scale, subsistence farmers who represent over 80% of the total food production population (Central Bank of Nigeria, 2005). The problem of limited land for farm expansion in the study area was further complicated by unfavourable weather/climatic conditions (52.50%) and infertility of the soil (50.42%) which resulted to low yields of agricultural products. These findings compare favourably with results obtained by Abu and Soom (2016) that inadequate income, low credit access, smallness of farm size and poor weather conditions constrained achievement of food security among farm households in Nigeria.

Table 1. Distribution of the female headed farm households according to socio-economic characteristics

Variables	**Mean**
Age (years)	56.12
Farming experience (years)	18.27
Farm size (hectares)	0.71
Household size (number of persons)	6.37
Annual farm income (Naira)	154,086.00
Annual non-farm income (Naira)	92,034.12
Monthly food expenditure/consumption (Naira)	13,810.21
Marital status	**Percentage**
Single	11.67
Married	51.25
Widow	30.83
Divorced/separated	6.25
Membership of agricultural association	**Percentage**
Yes	32.50
No	67.50
Educational level	**Percentage**
No formal education	22.50
Primary education	19.58
Secondary education	47.50
Tertiary education	10.42

Table 2. Food security profile of the female headed farm households

Food security indices	Female Headed Farm Households
Mean monthly household farm income	12,840.50
Mean monthly household off-farm income	7,669.5
Mean monthly household food expenditure	13,810.21
Food security line (N)	9,206.81
P0 (Incidence of food insecurity)	0.5863
P1 (Gap or depth of food insecurity)	0.4067
P2 (Severity of food insecurity)	0.2860

Source: Field survey, 2017

Table 3. Binary probit regression estimates of factors affecting food security status of female headed farm households

Variables	Estimated coefficients	Standard errors	Z-statistic	Prob.
Constant	11.2189	5.8388	1.9149	0.0555
Age	-0.1458**	0.0721	-2.0218	0.0432
Credit access	0.1085	0.3350	0.3238	0.7461
Dependency ratio	-0.0406*	0.0229	-1.7745	0.0826
Level of education	0.1367***	0.1056	2.9324	0.0032
Extension access	0.3067***	0.0648	2.9041	0.0043
Farm income	0.0088*	0.0055	1.6046	0.0950
Farm size	0.0969	0.2653	0.3651	0.7150
Household size	-0.6070*	0.3229	-1.8802	0.0601
Household asset endowment	0.1476**	0.0669	2.2044	0.0304
Marital status	0.2835	0.3536	0.8019	0.4226
Membership of farmers association	0.2314**	0.1033	2.2411	0.0252
Non-farm income	-0.0156	0.0128	-1.2211	0.2221
Log likelihood	-78.3559			
LR statistic	52.5229			
Prob (LR statistic)	0.0000			
McFadden R^2	0.7586			

Source: Field Survey, 2017.
***, **, * Significant at 1.0%, 5.0% and 10.0% levels respectively.

Table 4. Distribution of the female headed farm households according to constraints to achievement of food security

Constraints	*Frequency	Percentage
Inadequate income/poverty	171	71.25
Illiteracy of some household heads	36	15.00
Infertility of the soil	121	50.42
Limited land for farm expansion	159	66.25
High cost of food items	135	56.25
Inadequate access to credit	189	78.75
Unfavourable weather condition	126	52.50
Inadequate non-farm income generating opportunities	132	55.00
Inadequate extension contact/unavailability of extension agent	163	67.92
Poor communication skill of some extension agents	27	11.25

Source: Field Survey, 2017
* *Multiple responses recorded*

4. Conclusion and recommendations

Based on findings of this study, it is concluded that female headed farm households have low access to land with which to boost farm production and income. Also, the female headed farm households are vulnerable to food insecurity issues as evidenced by their food insecurity incidence and food insecurity gap. Many factors such as age, dependency ratio, level of education, extension access, farm income, household size, household asset endowment and membership of association were significant

determinants of food security status of female headed farm households at varied alpha levels and signs.

Based on results of the study the following recommendations are pertinent:

Membership to cooperative societies enhanced food security status of the female headed farm households. Hence, the relevant government agencies should mobilize female heads of farm households in Abia State and encourage them to join cooperative associations, so that they can derive benefits associated with being members of agricultural cooperatives such as increased access to credit, extension information and agricultural input, with which to improve farm productivity, farm income and food security.

Farm household heads should be encouraged to participate in cooperative societies in order to have improved access to productive resources such as seed input, extension information and credit facilities so as to enhance their productivity level which would invariably improve their household food security status.

National and international development organizations interested in boosting food security status of female headed farm households should concentrate their projects on activities that will raise farm incomes of farm households.

Policies that will make extension services more accessible to female heads of farm households will go a long way in improving female headed farm households' food security in the state.

Policies targeted at enhancing access of female headed farm households to production credits at low interest rate should be made. This willenhance the investment potential, income and food security status of female headed farm households.

Enlightenment programmes on health education and birth control measure should be directed at female headed farm households to help reduce their household sizes to manageable proportion which can adequately be catered and provided for.

Agricultural policies that promote access of female heads of farm households to land should be made as this can lead to increased farm income and food insecurity reduction.

Improving wage earning capacity and exploring income diversification opportunities by female headed farm households are crucial in enhancing households' food security status. Female headed farm households should intensify combination of enterprises and off-farm activities that could generate more income for the households and also help to improve their asset base.

Female heads of farm households should be encouraged to improve on their literacy level so as to enhance their human capital. There is need for adult literacy class, extension services and other forms of informal education especially for the female gender group who have low literacy level. This is expected to help the female headed farm households to improve their food security level.

Heads of farm households that are old should learn other means of income generating activities that are not too energy demanding for their age so as to enhance their purchasing power and enhance food security status of their households.

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