Are Female-Headed Households Less Food Secure? Evidence from Nigeria and Ethiopia.

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Abstract

Household headships and food security—access to sufficient, affordable and nutritious food at all times—have presented very important policy concerns in the drive towards achieving the first two of the Sustainable Development Goals (SDGs). This study, therefore, examines the determinants of food security amongst male and female-headed families in Ethiopia and Nigeria—and whether female-headed households are more food secured. Using the Ethiopia Socioeconomic Survey and General Household Survey (GHS) cross-sectional panel data for Nigeria while equally applying the Tobit and Probit models, we found significant differences in the determinants of food security between male and female-headed households and with significant differences across regions in both countries. The empirical findings further show that there are common determinants of food security between the two-panel countries, other than the gender of the family heads. The increase in household income and educational attainment increases the likelihood of food security for the male households than their female counterpart. Hence, educational attainment, higher levels of income, proximity to market, resident in the urban and household assets have a significant varying impact on household's food security. The general findings, however, show that female-headed families are poorer and indeed less food secure than the male headed households. This study, therefore, suggests the introduction of social justice in the area of food security through good governance, equity and equality that allows for the proper utilization, accessibility and availability of food for a typical developing countries of Ethiopia and Nigeria respectively.

Keywords: Food Security; Male-Heads; Female-Heads; Regions; Ethiopia; Nigeria.

1. Introduction

Over the years, the study whether the female-headed households (FHH) are more food secure or insecure than their male-headed households (MHH) has been the focus of a number of researchers and policymakers (Fuwa, 2000; Gangopadhyay and Wadhwa, 2004; Mallick and Rafi, 2010; Kassie, Stage, Teklewold and Erenstein, 2015). The FHH has been observed to be more food insecure than the MHH, which is due to the economic, non-economic and political challenges the female-head faces as the main income earner (see Quisumbing, 1995; World Bank, 2001; Odame, Hafkin, Wesseler and Boto, 2002). The female-heads are exposed to several unfavorable conditions in labor market leading to productivity shortfalls and negative consequences on the livelihood of the FHH members. They are responsible for both household and non-household productions. Household production involve the maintenance of the family, including the child care and other household chores. The non-household responsibilities rests on their employment related responsibilities. All these ultimately may lead to higher income variability of the FHHs compared to the MHHs. According to Fuwa (2000) the FHH faces a high dependency ratio, since they engage in single income earning productive activities. Female-heads incomes are mostly spent on pressing household needs such as food and health while significant shares of the male-heads may be spent on tobacco, alcohol and or other personal responsibilities other than food (Duflo and Udry 2004). Similarly, costs of participating in the market between female and male heads may also vary due to the variations in their income flows (Quisumbing, Brown, Feldstein, Haddadd, Pena, 1995).

Although the proportion of income spent on food may be large given that most female heads may be single, divorced or widows, their income are lower leading to smaller amounts of expenditures being spent on family needs. Male-heads with relatively higher income rather spend a larger proportion of incomes on other needs (see Hamilton, Popkin & Spicer 1984). Hopkin, Levin, and Haddad (1994). These observations are often presented as the 'feminization of poverty' hypothesis. In this scenario there is a higher incidence of poverty amongst the FHHs as compared to MHHs, hence, leading to a higher likelihood of food insecurity amongst the FHHs (Anyanwu 2010; Felker-Kantor and Wood 2012; Bastos *et al.* 2009)

In Africa, there has been a rise in the incidence of undernourished people. This figure has significantly exceeded that of other areas of the world. Millions of people are hovering near starvation in Africa, a region where people are supposed to be living in food abundance. Although,

the region is blessed with fertile soils and rich agricultural productivities, sub-Saharan Africa (SSA) countries has been experiencing 3% decline in food availability since 1990, this is a huge, when compare to the rise in the per capita of 20% and 30% in Latin America and Asia (FAO, 2015). Table 1 presents the number of undernourished people in millions in Africa between the periods 1990-92 and 2014-16 respectively.

Table 1: Number of undernourished people across Africa.

African region	Population	No of Undernourished	% of Population	Population	No of Undernourished	% of Population
		1990-92			2014-16	
East	198.6	103.9	52	410.6	124.2	30.2
Middle	71.3	24.2	34	158.5	58.9	37
Southern	42.8	3.1	7.2	64.3	3.2	4.9
Western	180.5	44.6	25	362.2	31.5	8.7
Total	493.2	175.8		995.6	217.8	

Source: FAO (2015) and Worldometer (2017)

The East, Middle and West Africa countries between the periods 1990-1992 have experienced a high level of undernourished people, due to rapid population growth. A major problem facing the countries in these regions is how to ensure that households have access to staple and sufficient food. The population of SSA has increased annually by 2.7% from 507 million reported in 1990 to 936 million at the end of year 2013 (FAO, 2015). The decrease however, of the recorded in the number of undernourished people within the West Africa countries between the periods 2014-2016 might have been as a result of implementing the Comprehensive Africa Agriculture Development Programme (CAADP) with the Environmental Policy (EP), Regional Investment Plan (RIP), and Regional Agricultural Policy (RAP) via various national and regional projects and programmes.

Despite these regional differences, country specific factors could also affect the level of food availability and security especially within the gendered dimension of household headships. Thus, this study considers these differences by analyzing comparative cases of food security across for Ethiopia and Nigeria including the household's headship dimension (MHHS and FHHs). In this study, we carry out a comparative study on the determinants of food security amongst MHH and

FHH in Ethiopia and Nigeria, using the Ethiopia Socioeconomic Survey (ESS) and Nigeria General Household Survey (NGHS) cross-sectional panel. The choice of both countries rests on each country's significant stance in Africa. According to the World Bank (2015) report, Ethiopia, as a developing economy is the fastest growing non-oil dependent African economy, and has witnessed rapid economic growth, averaging 10.9 per cent between 2004 and 2014. It is also considered to be the second most populous country with a population of over 102 million people—yet having a per capita income of $660 as of 2016 (World Bank, 2016). While, Nigeria a mixed economy emerging market on the other hand, is the 12th largest oil producer and 8th largest oil exporter in the world (World Bank, 2015). Similarly, Nigeria is considered as the largest population in Africa of about 196 million people (Worldometers, 2017) with a per capita income of $2178 (World Bank 2016). With the disparities in the level of economic activities, demographic and income per capita, one would expect significant differences in household heads income, hence difference in determinant of food security. Thus, this study is intended to investigate whether the FHH are more or less food secure than the MHH and if there are common determinants of food security between the oil and non-oil dependent African economies.

This paper differs from the existing literature in two fundamental ways. First, to the best of our knowledge, this study is the first of its kind to carry out a comparative analysis regarding the existing studies on FHHs food security measures and its determinants, putting into consideration oil and non-oil dependent African countries. Most of the existing studies focus on the gender household heads disparity as it relate to food (in)security using time series analysis for individual sampled countries but not on a comparative basis (Rasaki *et al.* 2006; Titus and Adetokunbo, 2007; Li and Yu, 2010; Omuemu *et al*. 2012). This study appears to be an addition to food security-households heads literature. We are of the opinion that the ability to compare food security measures and determinants across countries of same region would help to make more reliable food security-households heads policy that cut across such regions. Our study improves on the literature by adopting experiential and perceptive food security measures[1] to investigate whether FHHs are more food secure and also, if there exist common determinants of food security in the sampled countries. The novelty of this study is in using a large sample size to carry out comparative analysis

[1] See Table in Appendix for description of experiential and perceptive food security measures.

of household heads experiential and perceptive food security measures between Nigeria and Ethiopia via application of cross-sectional probit and tobit econometric models.

Findings from the probit and tobit estimation results show that, FHHs are indeed less food secured than their MHHs in Ethiopia and Nigeria. Furthermore, other determining factors play crucial roles in determining the level of food security such as occupation of the household heads, particularly those that are engaged in agriculture as primary occupation, household head's year of schooling, household size, household head's income, household's, proximity to market, presence of children below and above age of 15, urbanization and household own residence all have significant impact on household heads self-evaluation of food (in)security at ($p < 0.01$), ($p < 0.05$) and ($p < 0.10$) significance levels respectively. Thus, the study highlights that despite the differences in the level of economic activity (i.e., oil and non-oil dependent) or demographics (population sizes) or income levels (per capita income) level of income, Ethiopia and Nigeria share most common determinants of food (in)security measures and indicators.

The remainder of the study is scheduled as follows: In section 2 we discuss the conceptual framework and description of the variables under observations, while in sections 3 and 4 the data and methodology employed are presented for the study. Then in section 5 the empirical results are presented and discussion of findings, while section 6 concludes the study.

2. Conceptual framework and food security in Ethiopia and Nigeria.

Food security cannot be defined in one word (Chung *et al.* 1997). It is better explained through availability, accessibility, utilization and stability of food (USAID 2002; FAO 1996; Bonnard 1999; Gross, Schultrink and Kielman 1999). Food availability is associated with the supply of food, while food access is determined by economic or physical factors. The physical factors depends on the location and quality of the available food. Economic factors on the other hand, are influenced by food prices, consumer's purchasing power and/or levels of poverty. Likewise, food utilization captures food supply, food consumption, and the prevalence of children with sufficient food intakes across households. Food security prevails when individual and/or households have access to require dietary and sufficient food at all times to meet their desired levels of consumption (World Bank 1980; FAO 1992; Siamwalla and Valdes 1994). Food insecurity on the other hand, is a situation in which access to adequate food either by individual or households is limited by a lack of money or other resources at times during a day, week, month or year. (USDA, 2015)

Thus, we present descriptive evidences of food (in)security in Ethiopia and Nigeria by the headship's gender. Table 2 show that Nigeria has about 33.865 million households in total. The FHH account for 19.4% (6.570 million) while the MHH account for 80.6% (27.295) of the aggregate. Based on the data extracted from the GHS, 6.589 million (19.5%) MHHs and 2.132 million (6.3%) of the FHH were food insecure, while 20.706 million (61.1%) MHHs and 4.438 million (13.1) FHH were food secure. Ethiopia on the other hand has about 17.869 million households, 24.7% (4.419 million) of these are FHHs, while the MHHs is about 75.3% (13.450 million) of the total. Unlike in Nigeria, 3.976 million (22.2%) MHHs and 1.463 million (8.2%) FHHs were food insecure, while 9.475 million (53%) MHHs and 2.956 million (16.5%) FHHs were food secure. This is an indication that large part of these countries population has not been able to adequately consume food and daily dietary required to maintain a healthy living and obtained through food consumption energy levels require to carry out productive activities. The severe food insecurity condition, particularly for Ethiopia, has been attributed to periodic poor and inadequate rainfall.

Table 3 report the distribution of countries households' food (in)security by primary employments, income and household food expenditure. As shown in Table 3 below, there are variations in term of distribution of countries households' food (in)security for the male- and female headed households. The percentage of food (in)security is more in Ethiopia (30.4%) compared to Nigeria (25.8%) which also varies by household headships. While the household food expenditure (measured in US$) for the FHHs is higher in Ethiopia (for both food secured and insecure households), the case is different in Nigeria where percentage house food expenditure on food is higher for the MHHs for both food (in)security levels. It is therefore important to present a brief structure of the existing nexus between food security and the household heads between the two countries.

Despite the engagement of the HHs in agriculture, about 90.02% and 70.07% of the MHHs and FHHs are food insecure, compare to Nigeria MHHs and FHHs of about 47.05% and 45.75% respectively. An outbreak of successive droughts had weakened Ethiopia's food condition couple with erratic and poor rainfall. In addition, global situations, in terms of high fuel prices and food prices that have lingered in Ethiopia since year 2008 with global economic meltdown also play significant role in the country failing food security. The rate decline significantly for households

in non-agriculture sector for Ethiopia MHHs and FHHs of about 9.98% and 29.93% compare to Nigeria MHHs and FHHs of about 52.95% and 54.25%. It appears in Nigeria, HHs that engaged in agriculture as their primary occupation are more food secured than those in non-agriculture, however, the reverse is the case for Ethiopia.

From the foregoing, there appear to be differences in terms of the determinants of food security across the sampled countries for the MHHs and FHHs. We therefore rely on the probit and tobit models towards ascertaining the determinants of food (in)security for Ethiopia and Nigeria. This current study selects the variables under observation for the probit and tobit regression models on 3 identified indicators of food security. Under food availability, three variables were captured, such income of the head, household size and occupation of the household head, under food accessibility, we captured four (4) variables such as, proximity to market, urbanization, own home and regional/geopolitical dummies, while household head gender (sex) and educational attainment were captured under food utilization respectively. Individual variables were considered at household's level. Table 4 report descriptive statistics for the sampled countries

Table 2: Distribution of Countries' Household Food (In)Security by Gender (Weighted Observations)

	Ethiopia						**Nigeria**					
	Food Secure		Food Insecured		Total		Food Secure		Food Insecured		Total	
	%	No (in Millions	%	No (in Millions	%	No (in Millions	%	No (Millions)	%	No (in Millions)	%	No (in Millions)
Male-Headed	53	9.475	22.2	3.976	75.3	13.450	61.1	20.706	19.5	6.589	80.6	27.295
Female-Headed	16.5	2.956	8.2	1.463	24.7	4.419	13.1	4.438	6.3	2.132	19.4	6.570
Total	69.6	12.431	30.4	5.439	100	17.869	74.2	25.144	25.8	8.721	100	33.865

Source: Authors' Computation using the 2013/2014 Ethiopian Socioeconomic Surveys (ESS) and 2011/2012 General Household Surveys (GHS) for Nigeria.

Table 3: Distribution of Countries' Household Food (In)Security by Primary employments, incomes and food expenditure (Weighted Observations)

	Ethiopia				**Nigeria**			
	Male-Headed		Female Headed		Male-Headed		Female Headed	
	Food Secured	Food Insecured	Food Secured	Food Insecured	Food Secured	Food Insecured	Food Secured	Food Insecured
Agriculture (%)	79.92	90.02	56.05	70.07	57.91	47.05	45.78	45.75
Non-Agriculture (%)	20.08	9.98	43.95	29.93	42.09	52.95	54.22	54.25
Total	100	100	100	100	100	100	100	100
Head's Exp (Median - USD)	45.20	25.42	39.55	21.92	203.43	139.86	100.24	63.57

Source: Authors' Computation using the 2013/2014 Ethiopian Socioeconomic Surveys (ESS) and 2011/2012 General Household Surveys (GHS) for Nigeria.

3. Sampling procedure and source of data

The data used in this study were obtained from primary source as obtained from the Living Standard Measurement Surveys and the Integrated Surveys in Agriculture (LSMS-ISA) for Ethiopia and Nigeria. Thus, we draw from the panel structures of the LSMS-ISA[2] comprising of the Ethiopia Socioeconomic Survey (ESS) and General Household Survey (GHS) cross-sectional panel data for Nigeria (Post-planting and Post-harvest surveys). The ESS and GHS are well designed to capture the national population which applied a two stage probability sampling methods. The study makes use of the second wave of the GHS 2011/2012 and ESS 2012/2013. Within the sampled countries, the survey obtained data with regards to household characteristics in terms of education, credit and savings, labour, household assets, meals away from home expenditures, non-farm enterprises, household heads food expenditures, household heads non-food expenditures, other income and food security. In the case of Nigeria, the study sampled, 36 states which comprises of 6 geopolitical zones, while 11 regions was sampled for Ethiopia. For Nigeria, the geopolitical zones sampled are North-Central, North-East, North-West, South-East, South-South, and South-West, while for Ethiopia they are Afar, Amhara, Oromia, Somalie, Benshagul Gumuz, SNNP, Gambelia, Harari, Addis Ababa, and Diredwa, with 5000 households, 26,000 and 17,000 individuals in each wave in the case of Nigeria and Ethiopia respectively (see Table 5 for description of variables and sample sizes). However, for the selected years, in order to account for population bias of the countries, the study makes use of the data weights as suggested by GHS.

On food insecurity estimation, the study uses 7 days and 12 months to recall food inadequacy and/or food shortages as food insecurity indicators. These indicators serve as an affirmative to the question, whether the household, within a year, have you been faced with food inadequacy or shortages to meet the household need. Basically, these indicators are used to capture both experiential and perceptive food insecurity indicators. The experiential food insecurity indicators are based on the questions whether within a week, the household or individual had to: (a) limit the type of food eaten (food limitation); (b) reduce his or her number of meals eaten in a day (food reduction) and (c) possibly restrict (moderate) consumption by adults for small children to have

[2] The LSMS-ISA is sponsored by the World Bank Development Economics Research Group and funded by the Bill and Melinda Gates' Foundation. Thus each country's statistical agency implemented the collection, administration and distribution of the data.

something to eat (food restrictive). Meanwhile, households responding to these experiential food insecurity indicators questions are perceived to be suffering from increasing days of food insecurity, i.e. perceptive food security indicator.

4. Approach of data analysis

According to Li and Yu (2010) self-evaluation of households' food consumption is a dependable measure of food security. However, taking into account the nature of the household's responses on food security, alongside theoretical analysis, the study uses probit and tobit regression models to capture food security levels among the MHHs and FHHs. The study employs these models, due to unsuitability of the Ordinary Least Square (OLS) for our current study. This is because; one of the OLS assumptions is built on the premise that, when two or more respondents provide common responses, they share same experiences. On the other hand, the probit regression model accounts for binary outcomes, while the tobit regression model is used in a situation when sampled data is censored. The experiential food insecurity indicators are measured using days of food shortages and inadequacy. Households or individuals responding by answering zero day to any of the experiential food insecurity indicator questions stated earlier are food secured. Consequently, tobit regression model will be appropriate as it allow for the censored data with no day of food insecurity.

The probit regression model control for the inherent problems discussed above, since it will allow the estimation of the parameters of distribution rather than the responses (Daykin and Mofflat, 2002). The multivariate probit and tobit regression equation is given as follows:

$$y_i^* = X_i\beta_j + \varepsilon_i \qquad (1)$$

where, X_i represent vector of the independent variables ($X_{i=}$ 1, $X_{i1,}$ X_{i2} … X_{in} and $B_j = B_1, B_2$ ... B_j), while y_i^* depict latent dummy variable for food (in)security across MHH and FHH. The relationship between observed binary variables y_i and y_i^* is given as:

$$y_i = \begin{cases} 1 = food\ secured\ if\ y_i^* > 0 \\ 0 = food\ insecured\ if\ y_i^* \leq 0 \end{cases} \text{ for the Probit model and}$$

$$y_i = \begin{cases} \geq\ 1 = food\ insecured\ if\ y_i^* > 0 \\ 0 = food\ secured\ if\ y_i^* = 0 \end{cases} \text{ for the Tobit Model}$$

The appropriate probit expression is specified as follow:

$$\Pr(y = 1/ X) = \phi (X_i \beta)$$

where, $\varepsilon_i \sim N(0, 1)$ is the error term expected to be identically normally distributed, X_i (i = 1, 2…..*N*) is the household characteristics, while B_j (j = 1, 2…..*N*) represent the slope coefficients for individual variables in the probit function. The independent variables used in the probit and tobit regression models estimations are reported in Table 4. Thus, the equations to be estimated are given below:

$$\Pr obit(P) = \alpha_0 + \alpha_1 HH\_Gender_t + \alpha_2 HH\_Agric_t + \alpha_3 HH\_Ysch_t + \alpha_4 HH\_size_t + \alpha_5 HH\_Exp_t + \alpha_6 \Pr oxM_t + \alpha_7 Child<15_t + \alpha_8 Child>15_t + \alpha_9 Urbar_t + \alpha_{10} Own\_Home_t + \sum D_t + \varepsilon_t \quad (2)$$

$$Tobit(T) = \alpha_0 + \alpha_1 HH\_Gender_t + \alpha_2 HH\_Agric_t + \alpha_3 HH\_Ysch_t + \alpha_4 HH\_size_t + \alpha_5 HH\_Exp_t + \alpha_6 \Pr oxM_t + \alpha_7 Child<15_t + \alpha_8 Child>15_t + \alpha_9 Urbar_t + \alpha_{10} Own\_Home_t + \sum D_t + \varepsilon_t \quad (3)$$

where, P represent the likelihood of respondent report satisfied with food consumption, T is a censored distribution to no day of food insecurity, while "HH_Gender_t" is the household head gender dummy; "HH_Agric_t" represent household heads that engage in agricultural as primary occupation, "HH_Ysch_t" is the educational attainment of the household head; HH_size_t is the household size; "HH_Exp_t" is the per capita household expenditure; "$\Pr oxM_t$" depict proximity to market; "$Child<15_t$" and "$Child>15_t$" is the number of children less than and above 15; $Urban_{i,t}$ represent households living within the urban areas; "Own_Home_t" depict the household that owns their residence; $\sum D_t$ is the regional or geopolitical dummy; $\varepsilon_{i,t}$ is the error term, while α_i is the parameter to be estimated cross-sectionally. Table A1 in the appendix summarizes the variables used in the estimations.

Table 4: Descriptive Statistics for Ethiopia and Nigeria

	ETHIOPIA				NIGERIA			
	MHH		FHH		MHH		FHH	
VARIABLES	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Food lim. (days)	0.638	1.555	0.831	1.773	1.003	1.636	1.704	1.807
Food red (days)	0.404	1.198	0.590	1.498	0.616	1.343	1.371	1.853
Food rest (days)	0.278	1.044	0.330	1.172	0.376	1.088	0.705	1.414
Food Security	0.721	0.448	0.670	0.470	0.253	0.435	0.420	0.494
Prox. Mkt	0.531	0.499	0.521	0.500	0.601	0.490	0.670	0.470
HH_Ysch	2.774	3.898	1.944	3.736	8.862	4.336	8.100	4.250
HH_Agric	0.828	0.378	0.606	0.489	0.547	0.498	0.456	0.498
HHsize	6.883	4.059	4.990	3.144	7.909	3.458	5.189	2.793
Urban	0.178	0.382	0.329	0.470	0.268	0.443	0.333	0.471
Children 0 - 10	0.533	0.499	0.421	0.494	0.595	0.491	0.425	0.495
Children < 15	0.256	0.436	0.289	0.453	0.220	0.414	0.262	0.440
Children > 15	0.211	0.408	0.290	0.454	0.186	0.389	0.313	0.464
HH_Exp (USD)	142.977	1198	38.380	55.466	140.116	647.590	65.749	142.164
Tigray	0.0936	0.291	0.152	0.359				
Afar	0.0307	0.173	0.0267	0.161				
Amhara	0.188	0.391	0.197	0.398				
Oromia	0.227	0.419	0.203	0.402				
Somali	0.0558	0.230	0.0635	0.244				
Benshagul Gumuz	0.0298	0.170	0.0201	0.140				
SNNPR	0.263	0.440	0.194	0.395				
Gambelia	0.0264	0.160	0.0415	0.200				
Harari	0.0301	0.171	0.0256	0.158				
Addis Ababa	0.0197	0.139	0.0462	0.210				
Diredwa	0.0365	0.188	0.0313	0.174				
North Central					0.172	0.377	0.117	0.322
North East					0.201	0.401	0.039	0.192
North West					0.232	0.422	0.026	0.160
South East					0.127	0.333	0.395	0.489
South South					0.138	0.345	0.265	0.441
South West					0.130	0.336	0.158	0.365
No of Obs.	12283		3808		27628		3407	

5. Empirical results and discussion

The probit and tobit panel estimation results for determinants of food security for MHHs and FHHs combined are reported in Table 5A and 5B for Ethiopia and Nigeria. This is done to examine whether the sampled countries share common determinants of food security among male-and female household heads. Table 5A and 5B results for Ethiopia and Nigeria show that, under both probit and tobit models, household gender, occupation of the household heads, particularly those that are engaged in agriculture as primary occupation, household heads year of schooling, household size, household expenditure (including food), proximity to market, children below and above age of 15, urbanization and household own residence all have significant impact on household heads self-evaluation of food (in)security at ($p < 0.01$), ($p < 0.05$) and ($p < 0.10$) significance levels respectively. Thus, we conclude that, despite the difference in the level of economic activity (i.e., oil and non-oil dependent) which the study assume would influence their respective level of income, Ethiopia and Nigeria shares common determinants of food (in)security measures and indicators.

Furthermore, empirical results under the probit models in both countries show that the male households are more food secure than their female counterparts. Holding other factors constant (ceteris paribus), MHHs presents cases of relatively higher levels of food security compared to the FHHs. Thus, MHHs are more food secured by 14.5[3]% and 62.3% for Ethiopia and Nigeria at ($p < 0.01$) significance level relative to the FHHs. Additional year of schooling is also associated with higher levels of food security across the households. With one more year of education attainment, the likelihood of being less food secured increases by 4.7% and 2.6% percentage points for Ethiopia and Nigeria at ($p < 0.01$) significance level. In addition, household heads and households that are engaged in agriculture as a primary occupation, live around the market, have children above 15 and own their residences have a higher probability of being food secure relative to non-agriculturally employed heads, households that are far from the market or have children below 11 including the non-home owners for both countries. Especially, the magnitude of the coefficients is relatively higher in Nigeria by about 3% (15.7%) than Ethiopia (12 .6%). The result resonates several concerns, given that Ethiopia's agricultural productivity may not be sufficiently improved compared to Nigeria which ensures adequate food availability. More household sizes or household

[3] Exponent of (0.135) – 1)*100

heads' income is associated with higher probability of being food secured for both countries. Similar study (Maitra and Rao, 2015) also confirms that increasing household sizes is associated with higher probability of being food secure in India. Also, higher household head's income raises the probability of being food secured at about 1.6% and 4.1% in Ethiopia and Nigeria respectively. This derives from the already observed income difference where the per-capita[4] income in Nigeria is almost six time that of Ethiopia. Urban households have a higher likely of being food secure than the rural ones. The probability of being food secured is higher among at ($p < 0.01$), ($p < 0.05$) and ($p < 0.10$) significance level respectively[5].

Table 5A: Determinants of Food Security in Ethiopia-MHHs and FHHs combined.

Variables	Probit Model Food security	Tobit Model Days of Food Limitations	Tobit Model Days of Food Reduction	Tobit Model Days of Restrictive Food
HH_Gender (M=1, F=0)	0.135*** (0.030)	-0.450*** (0.168)	-1.114*** (0.193)	-1.194*** (0.255)
HH_Agric	0.119** (0.046)	-0.770*** (0.244)	-0.001 (0.265)	0.699* (0.699)
HH_Ysch	0.047*** (0.003)	-0.127*** (0.020)	-0.256*** (0.023)	-0.251*** (0.031)
Hhsize	0.001*** (0.003)	-0.086*** (0.020)	0.019 (0.022)	0.066** (0.027)
Prox to Makt	0.044* (0.024)	-0.536*** (0.135)	-0.398** (0.155)	-0.725*** (0.205)
HH_Exp (USD)	0.016*** (0.002)	-0.019*** (0.006)	-0.036*** (0.013)	-0.044** (0.019)
Children < 15	-0.002 (0.029)	0.119 (0.162)	-0.263 (0.190)	-1.102*** (0.249)
Children > 15	0.109*** (0.109)	-0.543*** (0.174)	-0.421** (0.195)	-2.351*** (0.284)
Urban	0.227*** (0.043)	-0.694*** (0.236)	-1.412*** (0.254)	-1.648*** (0.328)
Own-Home	0.002*** (0.039)	-1.174*** (0.196)	-1.495*** (0.222)	-1.121*** (0.298)
Constant	0.233*** (0.059)	-1.541*** (0.321)	-3.653*** (0.355)	-6.637*** (0.481)
Observations	12,778	12,806	12,790	12,806

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The tobit results also provide similar results as the tobit except for the effects of household size under the tobit model for Ethiopia. In addition, under the tobit models, proxies for experiential food (in)security indicators, we found that, male household heads with the above discussed self-

[4] World Bank data reports the per capita income of both countries for 2013 to be $470 and $2980 for Ethiopia and Nigeria respectively

[5] We report the probit and tobit estimation results with their robust standard errors which account for heteroscedasticity issues in the models. We report the actual probit coefficients. Marginal effects will be provided on request.

evaluation of food security have statistical significant less day of food limitations, days of food reduction and days of restrictive food for Ethiopia and Nigeria at ($p < 0.01$), ($p < 0.05$) and ($p < 0.10$) levels respectively. Similarly, the results indicates that household heads and households that are engaged in agriculture as a primary occupation, live around the market and own their own homes in both countries experience less days of food limitations, days of food restriction, days of restrictive relative to non-agriculturally employed heads, households that are far from the market including the non-home owners for both countries. Additional years of schooling is also statistically significant implying lower days of experiential food security (days of food limitation, restriction and reduction) for both countries. While household size is associated with lower days of experiential food security in Nigeria, the case is slightly different for Ethiopia where household sizes decreases days of food limitation and increases days of food restriction. Thus, number of day's adults in the household had to restrict meals consumed to allow smaller children eat increases per additional household member. Additional household's total expenditure is statistically and significantly associated with lower days households had to: limit the variety of meals eaten, reduce the quantity of consumed meals and restrict the meals so as to allow younger children feed in Ethiopia. For, Nigeria, total household expenditure is marginally associated with lower days of restriction and significant at only 10% level of significance. For Ethiopia and Nigeria, the presence of children between 11 and 15 years is associated with fewer days food had to be restricted to allow other children feed relative to those who are at most 10 years. This might therefore imply that the presence of children who are at most 10 years old can lead to more days of food restrictions.

Table 5B: Determinants of Food Security in Nigeria-MHH and FHHs combined.

Variables	Probit Model Food security	Tobit Model Days of Food Limitations	Tobit Model Days of Food Reduction	Tobit Model Days of Restrictive Food
HH_Gender	0.484*** (0.039)	-1.449*** (0.101)	-2.208*** (0.125)	-2.264*** (0.158)
HH_Agric	0.146*** (0.027)	-0.687*** (0.074)	-0.613*** (0.095)	-0.102* (0.122)
HH_Ysch	0.026*** (0.002)	-0.090*** (0.007)	-0.083*** (0.009)	-0.083*** (0.012)
Hhsize	0.003*** (0.003)	-0.054*** (0.011)	-0.029*** (0.013)	-0.037*** (0.017)
Prox to Makt	0.140*** (0.024)	-0.723*** (0.069)	-1.079*** (0.086)	-1.085*** (0.110)
HH_Exp (USD)	0.041*** (0.000)	-0.001 (0.000)	-0.013 (0.000)	-0.001* (0.000)
Children < 15	-0.031 (0.028)	-0.006 (0.081)	0.026 (0.101)	-0.366*** (0.129)
Children > 15	0.080*** (0.029)	-0.256*** (0.083)	-0.395*** (0.102)	-0.216 (0.134)
Urban	0.003 (0.030)	-0.134 (0.082)	-0.231** (0.106)	0.208*** (0.133)
Own-Home	0.173*** (0.030)	-0.681*** (0.086)	-0.920*** (0.109)	-1.188*** (0.137)
Constant	0.073 (0.058)	2.172*** (0.154)	0.905*** (0.191)	-1.158*** (0.250)
Observations	14,675	14,687	14,691	14,691

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6A: Determinants of Food Security in Nigeria-MHH and FHH combined with zones.

Variables	Probit Model Food security	Tobit Model Days of Food Limitations	Tobit Model Days of Food Reduction	Tobit Model Days of Restrictive Food
HH_Gender	0.266*** (0.041)	-0.389*** (0.096)	-0.760*** (0.116)	-0.674*** (0.148)
HH_Agric	0.056** (0.028)	-0.276*** (0.070)	-0.004 (0.086)	-0.417*** (0.116)
HH_Ysch	0.023*** (0.002)	-0.065*** (0.007)	-0.044*** (0.008)	-0.041*** (0.011)
Hhsize	0.031*** (0.003)	-0.036*** (0.010)	-0.089*** (0.012)	-0.165*** (0.016)
Prox to Makt	0.085*** (0.024)	-0.372*** (0.067)	-0.470*** (0.080)	-0.344*** (0.103)
HH_Exp (USD)	0.002** (0.139)	-0.001*** (0.056)	-0.001* (0.061)	-0.003** (0.001)
Children < 15	0.004 (0.029)	-0.174** (0.076)	-0.207** (0.092)	-0.591*** (0.121)
Children > 15	-0.036 (0.030)	0.015 (0.079)	0.048 (0.094)	-0.583*** (0.126)
Urban	-0.030 (0.032)	0.194** (0.080)	0.287*** (0.098)	0.899*** (0.125)
Own-Home	0.214*** (0.032)	-0.406*** (0.080)	-0.464*** (0.096)	-0.708*** (0.121)
Zones(Rel. North-Central)				
North-East	-0.088** (0.041)	1.633*** (0.121)	1.688*** (0.153)	3.212*** (0.209)
North-West	-0.308*** (0.038)	0.242** (0.111)	1.108*** (0.136)	2.043*** (0.170)
South-East	-1.166*** (0.042)	3.029*** (0.098)	3.800*** (0.120)	3.444*** (0.141)
South-South	-0.376*** (0.044)	1.039*** (0.112)	1.586*** (0.133)	0.792*** (0.168)
South-West	-0.384*** (0.049)	0.374*** (0.134)	0.745*** (0.156)	0.735*** (0.204)
Constant	0.716*** (0.068)	-0.174 (0.173)	-2.200*** (0.210)	-3.581*** (0.272)
Observations	14,707	14,719	14,723	14,723

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As discussed in section 1, Nigeria and Ethiopia is made up of 6 geopolitical zones and 10 geographical regions respectively. These geopolitical zones and geographical regions are made up of different culture, tradition, beliefs and religion which has been argued to have and play significant role in the self-evaluation of the household's heads food (in)security levels. We employ these geopolitical zones and geographical regions of the sampled countries in order to examine whether the common factors, that are inherent with geopolitical zones and geographical regions of most of the countries of the world, especially of the sampled countries, such as culture, tradition, beliefs and/or religion have significant impact on the household heads food (in)security measures aside agriculture, years of education, household size proximity to the market among others.

Table 6B: Determinants of Food Security in Ethiopia-MHH and FHH combined with Regions.

Variables	Probit Model Food security	Tobit Model Days of Food Limitations	Tobit Model Days of Food Reduction	Tobit Model Days of Restrictive Food
HH_Gender	0.170*** (0.031)	-0.575*** (0.169)	-1.113*** (0.191)	-1.167*** (0.253)
HH_Agric	0.104** (0.047)	-0.617** (0.254)	-0.270 (0.266)	0.371 (0.361)
HH_Ysch	0.047*** (0.003)	-0.134*** (0.020)	-0.285*** (0.023)	-0.264*** (0.031)
Hhsize	0.001 (0.003)	-0.073*** (0.021)	-0.019 (0.023)	0.035 (0.027)
Prox to Makt	0.002 (0.005)	0.410*** (0.140)	0.211 (0.160)	0.418** (0.212)
Children 0 -10 (base group)				
Children < 15	-0.006 (0.029)	0.077 (0.161)	-0.242 (0.188)	-1.085*** (0.247)
Children > 15	0.085*** (0.031)	-0.475*** (0.174)	-0.335* (0.195)	-2.303*** (0.283)
Urban	0.277*** (0.043)	0.399* (0.239)	1.387*** (0.253)	1.614*** (0.324)
Own-Home	0.056 (0.040)	-1.352*** (0.199)	-1.447*** (0.225)	-1.124*** (0.305)
HH_Income (USD)	0.014*** (0.003)	-0.019*** (0.006)	-0.043*** (0.015)	-0.042** (0.018)
Regions (Rel. Tigray)				
Afar	-0.023 (0.082)	-0.315 (0.490)	4.368*** (0.469)	2.248*** (0.618)
Amhara	-0.149*** (0.046)	-0.358 (0.264)	1.383*** (0.325)	0.066 (0.392)
Oromia	-0.166*** (0.045)	0.734*** (0.256)	2.512*** (0.303)	1.225*** (0.365)
Somali	-0.494*** (0.060)	-0.213 (0.353)	1.542*** (0.427)	0.636 (0.508)
Benshagul Gumuz	-0.284*** (0.079)	1.674*** (0.511)	1.905** (0.816)	3.151*** (0.921)
SNNPR	-0.359*** (0.044)	1.030*** (0.241)	2.765*** (0.302)	1.122*** (0.364)
Gambelia	0.344*** (0.094)	-2.047*** (0.555)	2.219*** (0.493)	-0.494 (0.777)
Harari	0.449*** (0.092)	-5.296*** (0.711)	-4.069*** (1.019)	-5.417*** (1.203)
Addis Ababa	0.202** (0.103)	-0.926** (0.390)	-1.659*** (0.500)	-1.393* (0.762)
Diredwa	-0.533*** (0.071)	1.842*** (0.363)	0.203 (0.570)	-1.147 (0.739)
Constant	0.428*** (0.068)	-2.049*** (0.380)	-5.302*** (0.441)	-7.134*** (0.550)
Observations	12,778	12,806	12,790	12,806

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6A and 6B results shows the determinants of food security for the male- and female household heads combined, factoring in geopolitical zones and geographical regions for Nigeria and Ethiopia. Results obtained can well be compared and similar to Tables 6A and B. However, we the household size variable lost its significance level in Ethiopia while household head's income became significance when we consider the experiential food security variables. Thus, for

Nigeria MHH and FHH combined in Table 6A, we observed that, inclusion of geopolitical zones, have a significant impact on household gender, households that are engaged in agricultural sector, year of schooling, household size, proximity to the market, children above the age of 15, own-home and household expenditure respectively. Results show that, there is a statistical significant reduction and/or increase in food security indicators coefficient estimates (see Table 5B), due to the geopolitical zones impacts on the household's heads food security measures. The negative statistical significant food (in)security indicators coefficient estimates reported in Table 6A across the 5 geopolitical zones, i.e., North-East, North-West, South-East, South-South and South-West at ($p < 0.01$) and ($p < 0.05$) indicates that, MHHs living in and within these zones are less food secured and have more days of food limitations, food reduction and days of food restrictive compare to the MHHs in the North-Central. This outcome is expected as the North-Central zone which comprises 6 states, such as, Kogi, Niger, Benue, Kwara, Plateau, Nasarawa and Federal Capital Territory, have within them, Benue State with a slogan "the food basket of the nation". The zone is richer in agricultural productivities, with states such as Kogi, Plateau, Benue and Nasarawa as leading states in agriculture than any other states in Nigeria. In addition, farmers and individuals across the other geopolitical zones do sale most of their agricultural outputs into the Federal Capital Territory (Capital City of Nigeria, Abuja) for monetary exchange to make a living.

Similarly, the geographical regions of Ethiopia also display a significant impact on the male- and female household heads food (in)security measures. Akin to Nigeria household heads, we also observed statistical significant reduction and increase in the food security indicators estimated coefficients for Ethiopia (see Table 6B). In addition, we found that, negative statistical significant estimated coefficients for household heads living within the regions of Amhara, Oromia, Somali, Benshagul Gumuz, Diredwa and SNNPR and a positive statistical significant estimated coefficients for household heads living within the regions of Gambelia, Harari and Addis Ababa respectively. This indicates that, households within Amhara, Oromia, Somali, Benshagul Gumuz, Diredwa and SNNPR regions are less food secured, while those within the regions of Gambelia, Harari and Addis Ababa are more food secured than ones living within Tigray region (base group). One common feature of the former regions compared to latter is shortage of potable water. According to the Central Statistical Agency (CSA, 2005) less than 40% of the total population in these regions had access to safe drinking water and they are mostly nomadic inhabitants. The latter

regions comprises the Capital City of Ethiopia (Addis Ababa), commercial heart of the city (Gamelia) with about 55% urban inhabitants and farmers (Harari). Unlike the former regions, about 75% of the total population in this region had access to portable water and mostly urban inhabitants (CSA, 2005). These factors explain and confirm the disparities and the geographical regions impact on the household heads level of food (in)security in Ethiopia.

Using the male household heads as household gender dummy and through sound empirical analysis, we are of the opinion, differences in the sampled countries' economy activities do not determine household heads level of food (in)security. Nigeria being oil dependent and Ethiopia non-oil dependent share seemingly similar food security determinants, under both perceptive and experiential food security measures. Empirical results show that, the male household heads are more food secured, and have less days of food limitations, days of food restriction and days of restrictive food than their female counterpart. This results resonate with the works of Fuwa (2000), Gangopadhyay *et al* (2004), Mallick and Rafi (2010), Adeola and Doppler (2014) and Kassie *et al* (2015). In addition, it also appears that geopolitical and geographical differences had a major role to play in household heads food (in)security levels. However, the gender of the household head is just a "dummy" which does not explain how these determinants of food security can affect the each of the MHHs or FHHs separately, thus we further disaggregate the analysis by considering the household head's gender separately.

5.1 Self-evaluation and influencing factors disaggregated

In this section, we disaggregate the household heads into MHHs and FHHs, then conduct a separate empirical estimations on the subject. The context of disaggregating the male and female household heads stem from the fact that, their perceptive (response) and experience to food (in)security issues may be different, taken into account food (in)security indicators and geopolitical/geographical differences (Adeola and Doppler, 2014). Table 7A and 7B report results for MHHs, while Table 8A and 8B report the results for FHHs for Nigeria and Ethiopia respectively.

For Ethiopia, the MHHs results reported in Table 7A remain unchanged in terms of positive and negative statistical significance when compared to results displayed in Table 5A or 6A, with a little differences in estimated coefficients under perceptive and experiential food (in)security measures. Although, household size and proximity to market become statistically insignificant. Similarly, the

results reported in Table 7B for Nigeria's MHHs remain unchanged (see Table 5B or 6B). These similarities, in terms of the positive and negative significant estimated coefficients under perceptive and experiential food (in)security measures indicates that, the male household heads self-evaluation in terms of their perception and experience to food (in)security issues are consistent with the several food security indicators measures and geopolitical/geographical differences.

Table 7A: Determinants of Food Security in Ethiopia- Male Headed Households.

Variables	Probit Model Food security	Tobit Model Days of Food Limitations	Tobit Model Days of Food Reduction	Tobit Model Days of Restrictive Food
HH_Agric	0.121** (0.059)	-1.408*** (0.309)	-0.960*** (0.328)	0.361 (0.428)
HH_Ysch	0.037*** (0.004)	-0.111*** (0.023)	-0.254*** (0.026)	-0.284*** (0.035)
Hhsize	-0.002 (0.004)	-0.038 (0.023)	-0.101*** (0.026)	-0.044 (0.030)
Prox to Makt	-0.014 (0.028)	-0.497*** (0.162)	-0.080 (0.180)	-0.586** (0.243)
HH_Exp (USD)	0.026*** (.004)	-0.023*** (0.007)	-0.038*** (0.013)	-0.033** (0.016)
Children < 15	-0.024 (0.033)	0.181(0.190)	-0.066 (0.216)	-0.661** (0.285)
Children > 15	0.082** (0.036)	-0.116 (0.204)	0.071 (0.225)	-1.580*** (0.324)
Urban	0.170*** (0.051)	0.351 (0.292)	1.358*** (0.311)	1.968*** (0.371)
Own-Home	0.087* (0.050)	-1.294*** (0.237)	-1.144*** (0.263)	-1.065*** (0.367)
Regions (Rel. Tigray)				
Afar	-0.094 (0.093)	-0.194 (0.568)	5.028*** (0.524)	2.042*** (0.698)
Amhara	-0.146*** (0.054)	0.673** (0.316)	1.537*** (0.390)	0.288 (0.464)
Oromia	-0.175*** (0.053)	0.969*** (0.309)	2.964*** (0.371)	1.749*** (0.438)
Somali	-0.607*** (0.071)	-0.385 (0.440)	1.297** (0.543)	0.770 (0.609)
Benshagul Gumuz	-0.295*** (0.088)	1.290** (0.556)	-1.112 (0.870)	-2.060** (0.949)
SNNP	-0.333*** (0.052)	0.942*** (0.291)	2.945*** (0.369)	1.626*** (0.433)
Gambelia	0.565*** (0.130)	-2.834*** (0.689)	0.963 (0.727)	-1.915* (1.070)
Harari	0.516*** (0.109)	-7.846*** (1.425)	-2.982*** (1.000)	-4.176*** (1.215)
Addis Ababa	0.465*** (0.157)	0.758 (0.491)	-1.546** (0.652)	-1.399 (1.036)
Diredwa	-0.543*** (0.081)	1.219*** (0.441)	0.092 (0.662)	-1.109 (0.858)
Constant	0.723*** (0.085)	-1.467*** (0.458)	-5.242*** (0.520)	-7.843*** (0.605)
Observations	10,012	10,041	10,031	10,041

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

However, the reverse in the case for the female household heads in Ethiopia and Nigeria. Table 8A and 8B results show that, most of the food security determinants, especially under the

perceptive food security measures are statistically insignificant. For Ethiopia, only female headed household's size and expenditure (food inclusive) out of several food (in)security measures employed with few geographical regions are statistically significant. This results is consistent for Nigeria female household heads. It appears that, African countries doctrines in terms of culture, belief and tradition that prevent women from owning personal residence and/or have access to land, especially for agricultural purposes have eroded and worsen their perception and experiences to food (in)security issues. In the light of the above, the study infer that, the female household heads are less food secured than their male household heads across geopolitical zones and geographical regions of Nigeria and Ethiopia.

Table 7B: Determinants of Food Security in Nigeria- Male Headed Households.

Variables	Probit Model Food security	Tobit Model Days of Food Limitations	Tobit Model Days of Food Reduction	Tobit Model Days of Restrictive Food
HH_Agric	0.075** (0.030)	-0.329*** (0.077)	-0.022 (0.094)	0.503*** (0.127)
HH_Ysch	0.023*** (0.003)	-0.070*** (0.008)	-0.043*** (0.009)	-0.039** (0.012)
Hhsize	0.020*** (0.004)	-0.032*** (0.011)	-0.080*** (0.013)	-0.157*** (0.017)
Prox to Makt	0.073*** (0.026)	-0.391*** (0.073)	-0.562*** (0.087)	-0.345*** (0.111)
HH_Exp (USD)	0.003*** (0.000)	-0.001** (0.000)	-0.009 (0.006)	-0.001** (0.000)
Children < 15	-0.012 (0.030)	-0.151* (0.083)	-0.097 (0.100)	-0.419*** (0.131)
Children > 15	-0.041 (0.032)	0.034 (0.087)	0.102 (0.105)	-0.359*** (0.138)
Urban	0.048 (0.034)	-0.167* (0.089)	-0.286*** (0.108)	-1.012*** (0.137)
Own-Home	0.215*** (0.035)	-0.457*** (0.089)	-0.521*** (0.105)	-0.838*** (0.131)
Zones(Rel. North-Central)				
North-East	-0.145*** (0.043)	-1.584*** (0.127)	-1.652*** (0.161)	-3.255*** (0.220)
North-West	-0.353*** (0.040)	-0.192* (0.116)	-1.013*** (0.142)	-2.015*** (0.176)
South-East	-1.150*** (0.046)	3.169*** (0.106)	3.950*** (0.128)	3.534*** (0.149)
South-South	-0.405*** (0.047)	1.126*** (0.123)	1.730*** (0.145)	0.926*** (0.181)
South-West	-0.372*** (0.053)	0.439*** (0.144)	0.812*** (0.166)	-0.731*** (0.216)
Constant	0.756*** (0.071)	-0.559*** (0.170)	-3.079*** (0.202)	-4.393*** (0.264)
Observations	13,413	13,453	13,453	13,453

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8A: Determinants of Food Security in Ethiopia- Female Headed Households.

Variables	Probit Model Food security	Tobit Model Days of Food Limitations	Tobit Model Days of Food Reduction	Tobit Model Days of Restrictive Food
HH_Agric	-0.053 (0.082)	0.532 (0.431)	-0.917** (0.445)	0.540 (0.607)
HH_Ysch	0.093*** (0.009)	-0.194*** (0.042)	-0.405*** (0.052)	-0.243*** (0.068)
Hhsize	0.008 (0.009)	0.191*** (0.046)	0.216*** (0.051)	0.183*** (0.060)
Prox to Makt	0.032 (0.057)	-0.226 (0.290)	-0.880*** (0.335)	-0.090 (0.419)
HH_Exp (USD)	0.004*** (0.092)	-0.015 (0.010)	-0.344*** (0.126)	-0.175** (0.068)
Children < 15	0.043 (0.063)	-0.347 (0.303)	-0.527 (0.364)	-2.144*** (0.465)
Children > 15	0.059 (0.063)	-1.405*** (0.321)	-1.175*** (0.356)	-3.961*** (0.521)
Urban	0.420*** (0.081)	0.441 (0.436)	-1.697*** (0.474)	0.793 (0.607)
Own-Home	0.345*** (0.074)	-1.442*** (0.343)	-2.240*** (0.424)	-1.437*** (0.541)
Regions (Rel. Tigray)				
Afar	-0.255 (0.180)	-0.094 (0.943)	2.225** (1.094)	2.371* (1.247)
Amhara	-0.083 (0.093)	-0.146 (0.478)	1.120* (0.592)	-0.337 (0.717)
Oromia	-0.060 (0.090)	-0.749 (0.460)	0.983* (0.539)	0.010 (0.656)
Somali	-0.549*** (0.121)	0.886 (0.640)	2.560*** (0.731)	0.450 (0.956)
Benshagul Gumuz	-0.262 (0.183)	-5.429*** (1.654)	-4.919** (2.162)	-32.99 (0.090)
SNNP	-0.370*** (0.090)	0.572 (0.434)	2.178*** (0.538)	-0.066 (0.678)
Gambelia	-0.054 (0.164)	-0.576 (0.926)	2.383*** (0.755)	0.072 (1.181)
Harari	0.116 (0.185)	-2.566*** (0.929)	-28.22 (0.090)	-31.98 (0.970)
Addis Ababa	-0.109 (0.152)	1.359** (0.641)	2.063*** (0.777)	-1.515 (1.122)
Diredwa	-0.565*** (0.159)	3.444*** (0.642)	1.187 (1.114)	-0.702 (1.458)
Constant	-0.051 (0.125)	-1.001 (0.662)	-5.410*** (0.755)	-5.836*** (0.975)
Observations	2,766	2,765	2,759	2,765

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8B: Determinants of Food Security in Nigeria- Female Headed Households.

Variables	Probit Model Food security	Tobit Model Days of Food Limitations	Tobit Model Days of Food Reduction	Tobit Model Days of Restrictive Food
HH_Agric	0.075 (0.092)	-0.099(0.193)	0.194 (0.228)	-0.0685 (0.300)
HH_Ysch	-0.007 (0.009)	-0.007(0.019)	-0.024 (0.023)	-0.0469 (0.031)

Hhsize	-0.044** (0.017)	0.120*** (0.030)	0.217*** (0.037)	0.255*** (0.046)
Prox to Makt	-0.131 (0.083)	0.156 (0.172)	-0.0797 (0.207)	-0.553*** (0.266)
HH_Exp (USD)	0.001*** (0.000)	-0.003*** (0.000)	-0.004*** (0.000)	-0.004*** (0.001)
Children < 15	0.033 (0.094)	-0.229(0.186)	-0.728*** (0.241)	-1.425*** (0.306)
Children > 15	-0.027 (0.089)	-0.079 (0.172)	-0.207 (0.213)	-1.600*** (0.280)
Urban	-0.049 (0.090)	0.274 (0.184)	0.333 (0.245)	0.284 (0.296)
Own-Home	0.057 (0.092)	-0.230 (0.202)	-0.371 (0.254)	-0.040 (0.331)
Zones(Rel. North-Central)				
North-East	0.352 (0.225)	-2.650*** (0.564)	-0.873 (0.607)	-1.668** (0.702)
North-West	0.119 (0.268)	-0.356 (0.693)	-1.887*** (0.956)	-1.649 (1.064)
South-East	-0.948*** (0.124)	2.165*** (0.278)	2.963*** (0.352)	2.699*** (0.427)
South-South	-0.017 (0.132)	0.435 (0.296)	0.776** (0.372)	-0.104 (0.476)
South-West	-0.516*** (0.153)	0.219 (0.380)	0.581 (0.480)	-0.728 (0.637)
Constant	0.655*** (0.216)	-0.093 (0.382)	-1.620*** (0.502)	-2.694*** (0.635)
Observations	1,266	1,266	1,270	1,270

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

From the foregoing, it would be theoretically right to assume that, improvement in food availability, accessibility, utilization for female household heads will be hindered, if African long-standing doctrines, be it economically and non-economically, that prevent women from basic necessities of life and thereby hinder their access to required and sufficient food fails to be eradicated or lessen accordingly. Consequently, under the combined and disaggregated estimations based on perceptive and experiential food (in)security measures, and incorporating regional differences for household heads, we found that, the MHHs are likely to be less food insecure. This results resonate with the findings of Barros, Fox and Mendonca (1997), Mwabu and Thorbecke, (2001), Duflo and Udry (2004) Olutayo (2007) and Mallick and Rafi (2009).

6. Conclusion

In this study, we investigate whether the female-headed households are more food secure than the male-headed households and whether they have common food security determinants using Nigeria and Ethiopia as a case study. In our current study, food insecurity indicators are based on respondent's self-evaluations and perception of the households. Using the Ethiopia Socioeconomic

Survey and General Household Survey (GHS) cross-sectional panel data for Nigeria while equally applying the probit and tobit models, we found significant differences in the determinants of food security between male and female-headed households and with significant differences across regions in both countries. In addition, the empirical results show that there are common determinants of food security between the two countries, via combined and disaggregated analysis, other than the gender of the family heads. The increase in income and educational attainment increases the likelihood of food security for the male households than their female counterpart. Therefore, educational attainment, household income, proximity to market, resident in the urban and household assets have a significant varying impact on household's food security. The general findings, however, show that female-headed families are less food secure than the male headed households.

From the foregoing, the introduction of social justice in the area of food security should be canvased for. Social justice allows for good governance including equality and equity in the utilization, access and availability of food. For instance, good governance policies will that meets the needs of the agriculturally employed citizens of various countries. Such policies that will strengthen the availability of food will also allow small holder farmers to achieving a more resilient food production.

Also, regional/geopolitical divide in food accessibility should be checked. Thus, policies directed towards targeting the regions/zones with the limited opportunities to having sufficient access to food. Thus, regional specific policies should be worthwhile.

Equity and inequality in food utilization should also be canvased for through improving social relations and gender equality. This can help champion policies that curbs discrimination through the implementation of skills that equally allows women to fully utilize their productivities while ensuring food security.

This study, therefore, further suggests improvement in income earning measure, educational level, aggressively addressing the issue of poverty, and improving the agricultural productivity with a view of producing sufficient food that can guarantee all-time food security among female household in a typical developing countries of Ethiopia and Nigeria.

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APPENDIX

Table A1: Variable Definitions

Variables	Variable Description
Experiential Food security Measures	Various experiences of food shortages due to inadequacy or shortages.
Food-Lim	Number of days any household had to limit on the varieties of consumed food (0 to 7 days)
Food-Red	Number of days household had to reduce the number of meals eaten per day (0 to 7 days)
Food-Rest	Number of days adults in the household had to restrict meals consumed to allow smaller children eat (0 to 7 days)
Perceptive Food Security Measure	
Food Sec	1=Food secured (situation of enough food availability over the past 12 months) and 0=Food Insecured (situation of enough food shortages over the past 12 months
Independent Variables	
HH_Gender	1=MHH and 0 otherwise
Prox. Mkt	1= households's proximity to the market and 0 otherwise
HH_Ysch	Years of schooling of Household Head
HH_Agric	1=Household heads in Agriculture and 0 otherwise
HHsize	Total Household size
HH_Exp.	Per-capita household expenditure (Total food expenditure/HHsize)
Own_home	1=Home Ownership and 0 otherwise
Head_age	1=Household Heads<=45 and 0 otherwise
Children in the household	
Children1<11	Households with children<=10 years (Base Category)
Children < 15	1=Households with children between 11 – 15 years and 0=Otherwise
Children > 15	1=Households with children between 16 – 20 years and 0=Otherwise
Urban	1=Urban, and 0 = Rural
Regions - Ethiopia	
Tigray	0=Households located in Tigray (base category)
Afar	1=Households located in Afar (0=otherwise)
Amhara	1=Households located in Amhara (0=otherwise)
Oromia	1=Households located in Oromia (0=otherwise)

Somalie	1=Households located in Somalie (0=otherwise)
Benshagul Gumuz	1=Households located in Benshagul Gumuz (0=otherwise)
SNNP	1=Households located in SNNP (0=otherwise)
Gambelia	1=Households located in Gambelia (0=otherwise)
Harari	1=Households located in Harari (0=otherwise)
Addis Ababa	1=Households located in Addis Ababa (0=otherwise)
Diredwa	1=Households located in Diredwa (0=otherwise)
Geopolitical Zones – Nigeria	
North-Central	0=Households located in North-Central (base category)
North-East	1=Households located in North-East (0=otherwise)
North-West	1=Households located in North-West (0=otherwise)
South-East	1=Households located in South-East (0=otherwise)
South-South	1=Households located in South-South (0=otherwise)
South-West	1=Households located in South-West (0=otherwise)