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Gender, Empowerment and Food Security Status of Households in Nigeria

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Abstract: Gender inequality in access to productive and economic resources has been a topical issue in sub-Saharan Africa. The restrictive access to resources, assets and decision making by women has been linked to food insecurity. Using a large cross-sectional dataset from the 2018/2019 Living Standard Measurement Survey, this paper examines the interrelationship among gender, empowerment and households' food security status in Nigeria. The analytical techniques adopted include the empowerment index, dietary diversity score and the Tobit and the ordered probit regression models. The findings suggest that the level of empowerment is generally low in Nigeria (21.63%) but much worse among the female gender (11.78%). The results also show that female gender and rural and North West residents were mostly in the food insecure and disempowered group. The study concludes that empowerment and food policy measures that would enhance access and control of productive and economic resources by the female gender and rural and North West residents should be formulated to ensure the achievement of the Sustainable Development Goals (SDGs) of ending hunger and promoting gender equality.

Keywords: gender; economic resources; dietary diversity; nutrition; ordered probit

Citation: Ashagidigbi, W.M.; Orilua, O.O.; Olagunju, K.A.; Omotayo, A.O. Gender, Empowerment and Food Security Status of Households in Nigeria. *Agriculture* **2022**, *12*, 956. https://doi.org/10.3390/agriculture12070956

Academic Editor: Gioacchino Pappalardo

Received: 16 April 2022
Accepted: 27 June 2022
Published: 2 July 2022

1. Introduction

Women occupy a central place in subsistence agricultural production and are accountable for 80% of agricultural production [1]. They are majorly involved in food production, processing, preparation and marketing; despite these activities, women's contributions to food and agricultural production are still largely undervalued. In many developing countries, women often face a range of obstacles to achieving their full potential, ranging from constricting cultural practices to biased laws and highly fragmented labour markets [2]. Gender discrepancies in access to agricultural resources and services adversely influence their productivity and, subsequently, the food and nutrition security of their households [3,4].

Several studies have established that women, particularly in sub-Saharan Africa, are limited compared to their male counterparts in channels through which they can have easy access to productive inputs such as improved seed varieties, extension services, and land input [2,3,5–7]. In addition, women are also limited in the level of participation in cooperatives and farmer groups, such as producers' organisations and marketing groups and labour-saving cooperatives, which may also contribute to reduced access to markets with implications on food and nutrition security [4,8]. Many programmes fail to offer credence to the multiplicity of women's life experiences. However, to understand and

address the many forms of discrimination and inequality that affect them concerning food security, an all-inclusive approach is required (Goetz, 2007).

The food security and nutritional requirements of women and those of their wards are neglected at the household level, where biased social and cultural values exist [9]. In Nigeria, women have suffered long-term discrimination in the allocation and control of productive resources, despite their essential roles in the maintenance of the family by guaranteeing food security at the household level and in general society [10,11]. Studies have shown that when women have access to or own land, they allocate much of their household income to food and have better-nourished children [12]. Promoting gender equality is widely recognised globally in contributing to agricultural productivity and food security [4,13]. Furthermore, ensuring greater gender equality makes households more food secure [14] and, therefore, enlisted as a significant theme within the global rural development policy agenda aiming at achieving the United Nation's first and second goals of no poverty and zero hunger [15,16].

The relationship between gender equity and food security has been well examined in the literature [17–21]. For example, Aryal, Mottaleb and Rahut [21] analysed the food security status between male-headed households and female-headed households using a nationally representative dataset of households from Bhutan. The study found that de jure female-headed households are more food insecure than male-headed households and de facto female-headed households. Using households in rural Kenya as a case study, Kassie, Ndiritu and Stage [20] applied the endogenous switching regression model to analyse the link between the gender of a household head and food security. The study found that female-headed households are less food secure compared to male-headed households after controlling for both observed and unobserved factors. There are also strands of studies that have examined the effects of women's empowerment on food security [22–25].

Sraboni, Malapit, Quisumbing and Ahmed [24] examined the impact of women's empowerment in agriculture, measured using the Women's Empowerment in Agriculture Index on food and nutrition security measured by per capita calorie availability, dietary diversity and adult body mass index. The study found that an increase in the women's empowerment index resulted in an increase in per capita calorie availability and dietary diversity levels in households in Bangladesh. Applying the ordered probit on household data from KwaZulu-Natal Province in South Africa, Sharaunga, Mudhara and Bogale [22] found that empowered women, in terms of access to physical assets, economic agency, psychological empowerment and farm financial management skills, were more food secure. All the aforementioned studies have been able to look at the one-to-one relationships between gender, empowerment and food security and have not been able to holistically consider the gender–empowerment–food security nexus within a single framework, leaving a gap in the literature.

To fill the aforementioned research gap, the present study examines the relationship between gender, empowerment and food security using a large cross-sectional dataset from Nigeria. This study highlights two main contributions to the literature and policy development. Firstly, this is the first study in the Nigerian context to analyse the gender–empowerment–food security relationship using a rich and large household-level dataset. Secondly, from a policy perspective, findings from this study will help contribute to enriching the contribution of gender equity and women's empowerment in enhancing a food security policy agenda, particularly in developing countries, which is key to achieving the United Nation's Sustainable Development Goals. This was achieved by testing the following research hypothesis:

- Gender has no significant effect on the empowerment and food security status of households in Nigeria.

2. Material and methods

2.1. Data Description

The dataset used for the study was obtained from the 2018/2019 Nigeria General Household Survey conducted by the World Bank Living Standard Measurement Survey-Integrated Surveys on Agriculture (LSMS-ISA) project. The data used for this study, consisting of 4979 households, were collected by the National Bureau of Statistics. The dataset collected a broad range of information including household characteristics, women's empowerment and food security variables.

Descriptive statistics was used to analyse the socioeconomic characteristics of the households. In analysing the level of empowerment, an empowerment index was constructed using the five domains of empowerment (5DE), which shows how empowered women are, capturing the roles and extent of women's engagement in the five domains, namely, decisions over agricultural production; access to and decision-making power over productive resources; control over use of income; leadership in the community; time use (See Table 1).

Table 1. Five domains of empowerment and their corresponding weights.

Domain	Indicator	Weight
Production	Input in productive decisions	(0.100)
	Autonomy in production	(0.100)
Resources	Ownership of assets	(0.067)
	Purchase, sale or transfer of assets	(0.067)
	Access to and decision on credit	(0.067)
Income	Control over use of income	(0.200)
Leadership	Group member	(0.100)
	Speaking in public	(0.100)
Time	Workload	(0.100)
	Leisure	(0.100)

The 5DE assesses the degree to which women are empowered in the domains. "Empowerment" within a domain means that the person has adequate achievements or has "achieved adequacy" in a particular domain. Building on the study of Alkire, et al. [26], an individual is identified as empowered in the 5DE if he or she has adequate achievements in half of the five domains or enjoys adequacy in some combination of the weighted indicators that sum to 50 percent or more.

The food insecurity status of households was measured using the dietary diversity score (DDS). The DDS was estimated by summing the number of the identified food items/groups consumed by each household within a seven-day period. Any household that consumed fewer than eight (66.67%) of the identified food items/groups within a 7 day period is termed to be food insecure [27]. The identified food groups include cereals, roots and tubers, vegetables, fruits, meats, eggs and fish. Others include legumes, milk products, fats and oils, sweets, spices, condiments and beverages.

2.2. Empirical Model Specification

To analyse the effects of gender and the women's empowerment index on the food and nutritional status of households in the study area, the study used the Tobit regression model following References [28,29]. The Tobit model is described as a hybrid model applicable when the dependent variable is continuous in nature and is censored either at or below zero. In our study, the dependent variable was the DDS (a measure of food and nutrition security) censored at or below zero. The model specification is as follows:

$$Y^* = \beta X_i' + u_i \quad (1)$$

Equation (1) can be explicitly respecified as follows:

$$Y^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots \beta_{13} X_{13} + u_i \quad (2)$$

where Y = Y* if Y* < 0.67 represents households that are below the 0.67 cut-off point (food insecure households). On the other hand, Y = 0 if Y* ≥ 0.67 represents households that are on or above the 0.67 cut-off point (food secure households). Since, we are interested in the food insecure households, the index of the food insecure households was inputted, while a zero value was assigned to households that were food secure. We also included a set of explanatory variables represented by X_1–X_{13}. These included the following: X_1 = gender (1 = male, 0 = female); X_2 = occupation (farming = 1, otherwise = 0), X_3 = empowerment index; X_4 = income (~~NGN~~); X_5 = education (formal = 1, no formal = 0); X_6 = household size; X_7 = age (years). In addition, zonal- and sector-specific variables were also included as explanatory variables. These variable were X_8 = north central (north central = 1, otherwise = 0); X_9 = north west (north west = 1, otherwise = 0); X_{10} = south east (south east = 1, otherwise = 0); X_{11} = south south (south south = 1, otherwise = 0); X_{12} = south west (south west = 1, otherwise = 0); X_{13} = sector (rural = 1, urban = 0). β_0 is the intercept, and β_1–β_{13} are the parameters to be estimated.

In this paper, we also examined the determinants of empowerment in relation to the food security of households in Nigeria. This was achieved using the ordered probit regression model. Following Lawson et al. [30,31], we identify four categories of households based on their level of empowerment and food security status, which included food secure and empowered households; food secure and disempowered households; food insecure and empowered households; food insecure and disempowered households. The choice to use the ordered probit regression model was premised on the fact that the dependent variable was categorical in nature and also followed sequential order [32]. Specifically, our dependent variable was a categorical variable with four groups, and they naturally followed a sequential order from the best (that is, food secure and empowered households) to the worst (i.e., food insecure and disempowered households). The empirical model is specified below:

$$P_1 = f(b_1 \boldsymbol{X}) \quad (3)$$

$$P_2 = [1 - f(b_1 \boldsymbol{X})]\, f(b_2 \boldsymbol{X}) \quad (4)$$

$$P_3 = [1 - f(b_1 \boldsymbol{X})]\, [1 - f(b_2 \boldsymbol{X})]\, f(b_3 \boldsymbol{X}) \quad (5)$$

$$P_3 = [1 - f(b_1 \boldsymbol{X})]\, [1 - f(b_2 \boldsymbol{X})]\, [1 - f(b_3 \boldsymbol{X})]\, f(b_4 \boldsymbol{X}) \quad (6)$$

where P_1 represents the probability of households being empowered and food secure (EMPFDSEC); P_2 is the probability of households being disempowered and food secure (DISEMPFDSEC); P_3 indicates the probability of households being empowered and food insecure (EMPFDINSEC); P_4 is the probability of households being disempowered and food insecure (DISEMPFDINSEC). $\boldsymbol{X}$ is the vector of explanatory variables hypothesised to influence the dependent variables. Similar explanatory variables used under the determinants of food insecurity status were also used to determine the probability of a household being in any of the four identified groups. b_1–b_4 are the unknown parameters to be estimated.

3. Results and Discussion

3.1. Household's Socioeconomic Characteristics

Table 2 presents the socioeconomic characteristics of the respondents in the study. Approximately 80% of the respondents constituted male-headed households. This is an indication that the majority of households in Nigeria are male-headed, corroborating the findings of Ashagidigbi [33] and Olagunju et al. [34], who reported that 84%–90% of the households in Nigeria are male-headed. Seven out of ten households in Nigeria can read and write in local and/or foreign language(s). Similarly, three-quarters of the respondents possessed one form of formal education or another. This shows a relatively high literacy level among households in Nigeria [35–37].

Table 2. Socioeconomic characteristics of households in Nigeria.

Sex	Frequency	Percentage
Male	3977	79.88
Female	1002	20.12
Literacy status		
Can you read and write in any language?		
Yes	3625	72.81
No	1354	27.19
Have you ever attended any school?		
Yes	3825	76.82
No	1154	23.18
Occupation		
Farming	3382	67.93
Non-farming	1597	32.07
Marital status		
Married	3667	73.65
Not married	272	5.46
Divorced	50	1.00
Separated	139	2.80
Widowed	851	17.09
Age		
17–20	21	0.43
21–65	4142	83.18
66–130	816	16.39
Mean	49.76	
Household size		
<5	1825	36.65
5–8	2113	42.44
>8	1041	20.91
Mean	6	
Household Income (NGN)		
<50,001 (USD 13.84)	1849	37.14
50,001 to 100,000 (USD 13.84–276.78)	620	12.45
100,001 to 200,000 (USD 276.78–553.57)	720	14.46
>200,000 (USD 553.57)	1790	35.95
Mean	335,249 (USD 927.92)	

Furthermore, 7 out of every 10 respondents were married [38], while the remaining 3 were either single, separated, divorced or widowed, implying a considerable level of responsibility among the male- and female-headed households in Nigeria. Approximately two-thirds of the population are involved in agricultural-related enterprises, implying households in Nigeria are mainly agrarian. The mean age of 49 years infers that the households' heads were still within a productive and active age and would be able to be actively involved in economic activities. Approximately 42% of households in Nigeria had between five and eight members with an average of six members per household in Nigeria. This reveals that the size of households in Nigeria is relatively high. On average, a household earned NGN 335,249 (USD 927.92) annually, representing USD 2.54 per day. The per capita income of households in Nigeria was USD 0.423, which falls short of the World Bank's recommended threshold of USD 1.90 per day. This is an indication that the majority of households in Nigeria live below the poverty line [39,40].

3.2. Households' Empowerment Domain

The distribution based on the five domains of empowerment is presented in Table 3. The majority of the households (59.61%) had access to at least one of the resource domains. This suggests that they had access to productive resources, which could be utilised to increase productivity, since the majority practiced agriculture as their major occupation. However, the greater percentage of households were significantly deficient in the leadership and income domains. This could be interpreted as households not having enough voice in the economic or social group(s) they belonged to and not having sole control of income and expenditures within the households.

Table 3. Distribution of households according to their empowerment domain.

Domains	Frequency	Percentage
	Yes	Yes
Resource	2968	59.61
Production	2439	48.99
Leadership	195	3.92
Income	313	6.29
Time	2222	44.63

3.3. Households' Empowerment Domain across Gender

As shown in Table 4, the domain of empowerment among households in Nigeria was generally low comparing each domain to the weighted score attached to it. However, female-headed households were at more of a disadvantage than their male contemporaries. The implication of this is that relative to male respondents, women have restrictive access to the empowerment domain in Nigeria. In other words, they have less access to productive and economic resources, have little or no voice in the groups they belong to and hardly have time for leisure.

Table 4. The mean empowerment domains across gender.

Variable	Pooled	Male	Female
Resource	0.0243	0.0261	0.0172
Production	0.0490	0.0523	0.0359
Leadership	0.0039	0.0040	0.0036
Income	0.0126	0.0127	0.0122
Time	0.0446	0.0455	0.0410

3.4. Empowered Households by Gender Categories

The level of empowerment, as depicted in Table 5, reveals a high level of disempowerment among households in Nigeria. Approximately three-quarters of male respondents were disempowered, while the situation was far worse for the female gender, where almost 9 out of 10 Nigerian women were disempowered. This is an indication that a significant proportion of households in Nigeria lack adequate access to productive resources, leisure time and decision making in social and economic groups.

Table 5. Distribution of empowered households by gender.

	Empowered		Disempowered	
Empowerment	Frequency	Percentage	Frequency	Percentage
Pooled	1077	21.63	3902	78.37
Male	959	24.11	3018	75.89
Female	118	11.78	884	88.22

3.5. Empowerment Index of Households by Gender

The mean empowerment index of households in Nigeria, as depicted in Table 6, was far below the threshold, an indication that by merging all the empowerment domains into one, households in Nigeria fell short of the minimum requirement of empowerment. This scenario was even worse among female-headed households compared to males. This finding is in consonance with that of Ayevbuomwan et al. [41], who submitted that a larger percentage of rural women are below the threshold of empowerment. This further affirms that women are less empowered in Nigeria, a situation that requires critical attention and focus.

Table 6. Mean empowerment index of households by gender.

Empowerment Index	Mean	Standard Deviation
Pooled	0.2877	0.2192
Male	0.3009	0.2182
Female	0.2353	0.2152

3.6. Households' Dietary Diversity Level

As shown in Table 7, the mostly consumed food groups by households in Nigeria were spices, condiments and beverages; cereals, fats and oil and vegetables, with over 90% of the households consuming the highlighted food groups. This corroborates the submission of a study carried out in [35,42], where it was reported that the majority of households in Nigeria consume mainly staple foods. However, very few consumed egg and milk products, 24.22% and 49.08%, respectively. It is obvious from the table that the Nigerian populace mainly consumes cereals, tubers, legumes, vegetables and fats.

Table 7. Percentage of households consuming different food groups.

Food Groups	Frequency	Percentage
Cereals	4918	98.83
Root tubers starch	4323	86.88
Vegetables	4850	97.47
Fruits	3588	72.11
Meat	3065	61.60
Eggs	1205	24.22
Fish	3545	71.24
Legumes nut seeds	4411	88.65
Milk products	2442	49.08
Fat and oil	4827	97.01
Sweets	3696	74.28
Spices and condiments beverage	4932	99.12

3.7. Household' Food Security Status

In Nigeria, generally, over one-third of entire households are food insecure (Table 8), which is a bit lower than the 42% recorded by Ashagidigbi, Yusuf and Omonona [38], where a similar result was observed for male-headed households. However, the level of food insecurity was lower among the female-headed households compared to the pooled and male-headed household data, aligning with the work of Adepoju et al. [43], where women are regarded as the main contributory factor to households' food security. This suffices to say that female-headed households are more food security conscious, probably due to the fact of their primary responsibility of being the households' caregivers and keepers. It is important to state that this is descriptive and is tested in the next section of the paper.

Table 8. Food insecurity status of households.

Food Security Status	Pooled	Male	Female
Food secure (%)	68.91	68.02	72.46
Food insecure (%)	31.09	31.98	27.54
Mean	9.0599	9.0269	9.1906

3.8. Household's Food Security and Empowerment Levels

In relating the empowerment level of households to their food security status, as shown in Table 9, four categories of households with varying levels of food security and empowerment were generated. They were food secure and empowered (FDSECEMP); food secure and disempowered (FDSECDISEMP); food insecure and empowered (FDINSECEMP); food insecure and disempowered (FDINSECDISEMP) households. The majority of households in Nigeria (54.95%) were in the FDSECDISEMP category. A similar trend was observed between male- and female-headed households. Less than one-sixth of the total male population belonged to the FDSECEMP category. However, 8% of the female respondents belonged to the most desired group. This finding clearly reveals that though a sizeable proportion of households in Nigeria were food secure, their level of empowerment was, however, below par. This scenario was worse among the female gender relative to the male.

Table 9. Distribution of households based on their food security and empowerment levels.

Category	Pooled (%)	Male (%)	Female (%)
Food secure and empowered	13.92	15.39	8.09
Food secure and disempowered	54.95	52.57	64.37
Food insecure and empowered	7.71	8.73	3.69
Food insecure and disempowered	23.42	23.31	23.85

3.9. Factors Influencing Households' Food Security in Nigeria

The determinants of households' food insecurity status, as reported in Table 10, include gender, empowerment index, income, education and household size. Others include the location variables (that is, the five zones and urban sector).

Table 10. Tobit regression model estimates of the determinants of food insecurity status of households in Nigeria.

Variable	Coefficient	T	P > |t|
Gender (1 = male, 0 = female)	−0.0816	−2.59 ***	0.010
Occupation (1 = farming, 0 = non-farming)	−0.0318	−0.91	0.365
Empowerment index	−0.3316	−3.76 ***	0.000
Income (Nigerian Naira)	−1.1288	−3.86 ***	0.000
Education (1 = literate, 0 = otherwise)	0.1820	6.71 ***	0.000
Household size (number)	−0.0190	−5.68 ***	0.000
Age (years)	−0.0001	−0.11	0.910
North Central (1 = resides in North Central, 0 = otherwise)	−0.2920	−8.41 ***	0.000
North West (1 = resides in North West, 0 = otherwise)	−0.1906	−5.73 ***	0.000
South East (1 = resides in South East, 0 = otherwise)	−0.9114	−19.68 ***	0.000
South South (1 = resides in South South, 0 = otherwise)	−0.8416	−18.49 ***	0.000
South West (1 = resides in South West, 0 = otherwise)	−0.4960	−11.47 ***	0.000
Urban sector (1 = urban, 0 = rural)	−0.2480	−7.95 ***	0.000
Constant	0.1383	2.05	0.041

*** indicates 1% significance level. Log likelihood = −2951.1252; Prob > chi2 = 0.0000.

The results show that the gender variable had a negative and significant relationship with food insecurity, suggesting that male-headed households were less food insecure and

may reflect male dominance in access to productive resources compared to their female counterparts, particularly in developing countries. This finding is in line with extensive existing studies that have analysed the gender–food security nexus [11,27,44,45]. The empowerment index had a negative and significant coefficient of 0.33, indicating that a one percent increase in the level of empowerment reduces the level of household food insecurity by 0.33. This implies that empowerment is directly related to households' food security [45]; that is, households that are empowered are not adversely affected by food insecurity. Furthermore, this finding affirms that empowerment is a necessary condition that could ensure households' attainment of the required level of food and nutritional security status. The income variable was negatively significant at 10%, indicating that a one percent increase in household income reduces the level of household food insecurity by 1.12, in line with the findings of Ashagidigbi, Yusuf and Omonona [38]; Ogunniyi, Omotoso, Salman, Omotayo, Olagunju and Aremu [11]; Oyetunde-Usman and Olagunju [27]. Expectedly, households belonging to the high-income group tended to be food secure relative to those with a low income. These results also show that the likelihood of educated respondents being food insecure increased by 0.18, with the relationship being statistically significant at the 1% level.

The household size variable was negative and had a significant relationship with food insecurity, implying that food insecurity status was reduced in households with more members. This may be attributed to the fact that the majority of households were involved in agricultural-related enterprises and oftentimes used their wards as family labour on their farmland, and this tends to reduce the cost of production which, in turn, increases productivity and ultimately food security [27].

With regards to location variables, the results revealed that compared to households in North East Nigeria, the level of food insecurity of households residing in the North Central, North West, South East, South South and South West zones tended to decrease by 0.29, 0.19, 0.91, 0.84 and 0.49, respectively. This finding corroborates that of Ashagidigbi, Yusuf and Omonona [41], who reported that food insecurity is most prevalent in the North East zone of the country. This brings to the fore that residents of those five zones were more food secure relative to residents in the North East. The reason for this is not farfetched, as northeastern residents had witnessed a period of instability due to the menace of insurgency in the region, which prevented the smooth flow of agricultural and economic activities.

Finally, the estimates show that the food insecurity status of households residing in the urban sector was reduced by 0.25 relative to those in the rural sector, supporting the work of Ashagidigbi, Yusuf and Omonona [38] and Ashagidigbi et al. [46], where greater levels of food insecurity among rural respondents were reported compared to the urban dwellers. This tends to reveal the prevalent and high level of food insecurity in the rural sector compared to urban sector.

3.10. Factors Influencing Household's Likelihood to Belong to Different Food Security and Empowerment Categories

Table 11 presents the ordered probit estimates of the factors influencing the likelihood of households to belong to either the FDSECEMP, FDSECDISEMP, FDINSECEMP or FDINSECDISEMP category. The probability that male-headed households would belong to the FDSECEMP and FDSECDISEMP group increased by 0.0314 and 0.0312, respectively, while their likelihood of being in the EMPFDINSEC and DISEMPFDINSEC alternatives was reduced by 0.009 and 0.053. This implies that male-headed households were in a more food secure and empowered group than their female counterparts. Thus, the null hypothesis that stated that gender has no significant effect on empowerment and food security status of households is rejected. As submitted by Ogunnaike, Shittu and Kehinde [45], they emphasised that in ensuring food security status within the households, the female gender should be adequately empowered.

Table 11. Ordered probit model estimates of the determinants of empowerment in relation to food security status of households in Nigeria.

	FDSECEMP		FDSECDISEMP		FDINSECEMP		FDINSECDISEMP	
Variables	**dy/dx**	**z-Value**	**dy/dx**	**z-Value**	**dy/dx**	**z-Value**	**dy/dx**	**z-Value**
Gender	0.03142	4.28 ***	0.0312	3.54 ***	−0.0099	−4.13 ***	−0.0527	−3.85 ***
Occupation	0.0594	8.55 ***	0.0601	6.89 ***	−0.0186	−7.95 ***	−0.1010	−7.71 ***
Income	1.0411	14.67 ***	0.8487	12.46 ***	−0.3222	−12.03 ***	−1.5676	−15.42 ***
Education	−0.0621	−7.64 ***	−0.0506	−7.21 ***	0.01923	7.12 ***	0.0936	7.72 ***
Household size	0.0068	7.19 ***	0.0055	6.82 ***	−0.0021	−6.75 ***	−0.0103	−7.25 ***
Age	0.0004	1.63	0.0003	1.63	−0.0001	−1.63	−0.0005	−1.63
North Central	0.1396	8.66 ***	0.0373	7.71 ***	−0.0367	−9.27 ***	−0.1402	−12.67 ***
North West	0.819	5.91 ***	0.0365	10.05 ***	−0.0232	−6.23 ***	−0.0953	−7.61 ***
South East	0.3484	16.14 ***	−0.0426	−2.95 ***	−0.0707	−16.01 ***	−0.2351	−28.38 ***
South South	0.3377	15.73 ***	−0.0375	−2.65 ***	−0.0693	−15.80 ***	−0.2308	−27.73 ***
South West	0.2175	10.56 ***	0.0182	1.95 *	−0.0518	−11.67 ***	−0.1839	−17.59 ***
Sector (Urban)	0.0369	4.29 ***	0.0260	4.86 ***	−0.0112	−4.28 ***	−0.0518	−4.62 ***

*, *** indicates 10% and 1% significance level. Log likelihood = −5145.5369; Prob > chi2 = 0.0000. FDSECEMP (food secure and empowered); FDSECDISEMP (food secure and disempowered); FDINSECEMP (food insecure and empowered); FDINSECDISEMP (food insecure and disempowered).

The likelihood that households engaging in agricultural-related activities would be in the FDSECEMP and FDSECDISEMP categories increased by 0.059 and 0.061, while their likelihood of being in the FDINSECEMP and FDINSECDISEMP alternatives was reduced by 0.019 and 0.101, correspondingly. The revelation here emphasises that farming households were more in the empowered and food secure groups. Thus, in ensuring food security among households in Nigeria, the empowerment of respondents, especially women via their involvement in agricultural enterprises, is of great importance [47]. Similarly, higher income earning households' likelihood of belonging to the FDSECEMP and DISEMPFDSEC options increased by 1.041 and 0.849, respectively, while it was reduced by 0.019 and 0.094 for being in the FDINSECEMP and FDINSECDISEMP groups, correspondingly. Thus, emphasising the prevalence of high-income earners in Nigeria in the food secure and empowered groups relative to the low-income earning households.

An additional member to a household increased its probability of being in the FDSECEMP and FDSECDISEMP categories by 0.007 and 0.006, while it reduced by 0.002 and 0.010 for households to be in the FDINSECEMP and FDINSECDISEMP groups. On the contrary, the likelihood of literate Nigerians belonging in the FDSECEMP and FDSECDISEMP options was reduced by 0.06 and 0.05, while it increased by 0.019 and 0.093 for them to be in the FDINSECEMP and FDINSECDISEMP groups. This affirms that being educated does not guarantee food security and empowerment, since the majority of the respondents are rural farming households. Table 11 further shows that the likelihood of residents of North Central, North West, South East, South South and South West zones to be in the FDSECEMP group increased by 0.139, 0.082, 0.348, 0.337 and 0.218, respectively.

However, their probability of being in the FDINSECDISEMP category was reduced by 0.140, 0.095, 0.235 and 0.231, respectively. Ashagidigbi et al. 2013 established that households in the northeastern part of the country experienced high levels of food insecurity. This reaffirms the submission that residents of the North West zone (base category) were more often in the FDINSECDISEMP group relative to other zones, probably due to the prevalence of the Boko Haram insurgency in the region, which has hampered agricultural, social and economic activities in the region. Lastly, the likelihood of urban dwellers falling into the FDSECEMP and FDSECDISEMP categories increased by 0.037 and 0.026, while their likelihood of being in the FDINSECEMP and FDINSECDISEMP options was reduced by 0.011 and 0.052, respectively. This asserts that households in the urban sector of the country were more food secure and empowered compared to those in the rural sector.

4. Conclusions and Recommendations

This study examined the effects of gender and empowerment on households' food insecurity status using the 2018/19 Living Standard Measurement Survey (LSMS) data, collected by the National Bureau of Statistics in Nigeria. The descriptive statistics showed that the empowerment level of households was generally low in Nigeria, but more pronounced among the female-headed households. Generally, households' consumption of egg and milk products was extremely low. Female-headed households were found to be relatively more food secure than the male ones. The inability of households to have access to productive and economic resources, make decisions in social and economic groups and have control over income tended to enhance the level of food insecurity in Nigeria. Furthermore, the level of food insecurity was high among households residing in the rural sector and North West zone of the country.

The results of the estimated models revealed that the population of female-headed households, rural and North West residents tended to be in the low food secure and empowered group. This finding offers important policy insights into national government and development parastatal seeking to promote food security and empowerment, particularly among females. Specifically, at the national level, gender-specific policy measures that would allow women to have access to productive and economic resources, control of income and have a voice in social and economic groups should be an option in ensuring adequate empowerment of women in Nigeria. Likewise, empowerment and food policy measures that would liberate the female respondents, residents in the rural sector and North West zone of the country from the trap of disempowerment and food insecurity should be formulated in order to fulfil SDGs 2 and 5 regarding ending hunger and promoting gender equality.

While the present study provided valuable insights into the relationship between gender, women's empowerment and food security, we acknowledge its main limitation. This study employed a cross-sectional dataset for the analysis; hence, it could not holistically capture relationships across observations over time. Therefore, future research may consider the use of longitudinal data as they become available.

Author Contributions: W.M.A., O.O.O., K.A.O. and A.O.O. conceptualised the project, wrote the draft manuscript with inputs from A.O.O.; K.A.O. and W.M.A. supervised and provided technical directives to improve the manuscript. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not Applicable.

Informed Consent Statement: Informed consent was obtained from all participants in the study.

Data Availability Statement: Publicly available datasets were analyzed in this study. This data can be found here: https://microdata.worldbank.org/index.php/catalog/3557, accessed on 15 April 2022.

Acknowledgments: All authors of this work appreciate their respective institutions for the enabling environment to conduct research.

Conflicts of Interest: We declare that there is no conflict of interest.

Compliance with Ethical Standards: The opinions, findings and conclusions/recommendations expressed in this work are that of the authors, and no funder accepts liability whatsoever in this regard.

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