



The Impact of Covid 19 Pandemic on the Food Security Status of Women Farmers in Southwest, Nigeria



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Submission: August 21, 2023; **Published:** August 30, 2023

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Abstract

The global impact of Covid-19 pandemic on the health and nutritional status of households was devastating, most especially in Sub-Saharan Africa where majority are women living in agrarian society, with only few having access to productive and financial support. This study was carried out to determine the impact of COVID-19 pandemic on the food security status of Women-in-Agriculture (WIA) and non-WIA Farmers. The study area was Oyo state southwest, Nigeria. Multi-stage sampling procedure was used to select 120 women farmers. Analytical techniques adopted are descriptive statistics, Dietary Diversity Index (DDI) Double Difference (DD) and Tobit regression model. The dietary diversity index of the two groups reduced during covid-19, but the non-WIA farmers were the worst hit. The impact of the pandemic on the food security status of the two groups was negative, but more pronounced among non-WIA farmers. Household income, educational attainment and farmers that belong to WIA group are the three important factors enhancing food security in the study area. Income smoothening measures, human capital development and enrolling women farmers in WIA programme are the policy options that could enhance the food security status of women farmers in southwest Nigeria.

Keywords: Women Farmers; Food Security; Coronavirus Diseases; Dietary Diversity; Tobit Regression

Abbreviations: WIA: Women-in-Agriculture; DDI: Dietary Diversity Index; DD: Double Difference; ADP: Agricultural Development project; DDS: Dietary Diversity Score

Introduction

The survival of human on earth requires the basic need of food, which is any edible substance consisting of nutritive components which, when consumed, sustains life, generates energy, and provides growth, maintenance, and health of the body [1,2,3] defined food security as a condition where all people always have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life. According to Maharjan and Chhetri [4], food security is always regarded as access by all people to enough food for an active life, Food is the basic need of life. By his definition, Maxwell, and Wiebe [5] by his definition, defined food security as the state of having secure and sustainable access to sufficient food for an active and healthy life. Adequate intake of quality food is a key requirement for a healthy and productive life.

Currently, there are four major elements in accessing food security namely: availability, accessibility, utilization, quality, and safety [6]. One important aspect of the wealth of a nation is the ability to make food available for the populace. In this context, food security therefore becomes an important factor in any consideration of sustaining the wealth of the nation's [7]. In Nigeria, percentage food insecure households were 18% in 1986, and more than 40% in 2005 [8]. However, about 9% of Nigerians was chronically undernourished between 2000 and 2002 [9].

The central role women play as producers of food, managers of natural resources, income earners and caretakers of household food security and nutrition has become increasingly recognized. Empirical evidence shows that women in developing countries play a crucial role in ensuring household food security [10]. Also,

they grow more than half of all the food in developing countries and up to 80% in parts of Africa, generally in the form of small-scale production for household consumption [11]. The Nigerian government concurs that women are vital to food security and family well-being. Similarly, the importance of women as agricultural workers and income earners has become increasingly recognized hence strategies have been directed towards eliminating the inequities and constraints affecting women's productive role. Giving women the same access to physical and natural resources as men, could enhance agricultural productivity [12].

In Nigeria, the establishment of the Agricultural Development project (ADP) in the different states of the federation has advanced the incorporation of all genders in agricultural extension by modifying the ADP system midstream to provide for women farmers through the creation of Women – In- Agriculture (WIA) programmes. Women– in- Agriculture is a department under the ADP system. This project was established to mobilize women in gender specific activities, which include farming and post-harvest activities like processing, utilization, storage, and marketing of agricultural products. It is through ADP that WIA extension agents transfer recommended technologies and innovations to women for adoption to improve their production and quality of food intake.

The novel coronavirus disease, also referred to as COVID-19, was first discovered in December 2019 in the city of Wuhan, province of China. Within a short time, the COVID-19 epidemic spread throughout the globe, becoming a true pandemic that has severely affected almost every country. The COVID-19 pandemic has a direct impact on public health [13]. SARS-CoV-2 was identified in December 2019, and approximately 3 months later, COVID-19 was declared by WHO as a pandemic [14]. On May 30th, 2020, the COVID-19 pandemic spread to over 5.9 million people in more than 188 countries, leading to over 365,000 deaths and lockdown of one-third of the world's population [15].

However, before the global outbreak of the COVID – 19 pandemic, food insecurity was a major concern in Africa [16]. The pandemic further affected the food systems and threatened people's access to food. People witnessed not only a major disruption to food supply chains but also a major global economic lockdown. These crises resulted in lower incomes and higher prices of some foods, putting food out of reach of many, thus affecting their food security status. A severe pandemic causing more than a 25% reduction in labor availability could generate significant food shortages across the globe [17].

The pandemic also had a negative impact on women and their prominent roles in food systems, especially as primary actors, ensuring household food security, as well as being food producers, farm managers, food traders and waged workers. Therefore, the purpose of this research is to study the impact of the pandemic on the food security status of the Women- in- Agriculture farmers and to develop policies that will enhance their food security status.

Methodology

Study Area

The study area was Oyo State, southwest Nigeria. Primary data were collected with the use of well-structured questionnaire, which was administered to selected women farmers in the study area. Data obtained includes information on the socio-economic characteristics of the respondents, food consumption and household income. Multistage sampling procedure was used in the collection of the data. The first stage was purposive selection of three Local Government Areas (LGAs): Ido, Ibarapa East and Akinyele where the Women in Agriculture (WIA) farmers were predominant. The Second stage was random selection of four (4) communities in each of the LGAs selected. Conclusively, random selection of five (5) WIA farmers and five (5) non-WIA farmers from each community constitutes the third stage. In all, a total number of 120 respondents were sampled. However, 117 respondents had the required information needed for the study. Descriptive Statistics such as frequency table, mean and percentage were used to describe the socio-economic characteristics of the women farmers.

Dietary Diversity Index (DDI)

Dietary diversity is defined as the number of different food groups consumed within a seven-day period by the households. Dietary Diversity Index (DDI) was used to determine and compare the food security status between WIA and non-WIA farmers in southwest, Nigeria before and during covid-19 pandemic. The information on the food security status of the women farmers before covid-19 pandemic was obtained via memory recall. DDI is calculated by summing the number of unique food groups consumed by the households in the last 7 days divided by the total number of the food groups identified for the study. Thirteen food groups identified are cereals, roots and tubers, legumes, vegetables, fruits, meat, egg, fish, fat and oil, milk (diary), spices, condiments, and beverages. Households that consume 0.67 (nine) or more of the 13 food groups identified are regarded as being food secure, while those that consume below this are termed to be food insecure.

Double Difference Estimator

Difference-in-Differences (DID) or Double Difference (DD) model is one of the most frequently used methods in impact evaluation studies. The DID method was used to examine the impact of COVID-19 on the outcome of two distinct groups, that is, the participants (treatment group, i.e., the WIA farmers) and non-participants (control group i.e., the non-WIA farmers). In this case, the food security status (outcome) of both groups were compared before and during the COVID-19 pandemic. Double difference model was used to determine the impact of COVID 19 pandemic on the food security status of women farmers in the study area. WIA farmers were the treatment group, while the non-WIA farmers were the control group. The two periods considered

were before and during COVID-19 pandemic.

$$DDI \text{ Impact} = [(Y_{pt2} - Y_{pt1})] - [(Y_{nt2} - Y_{nt1})]$$

DDI = Dietary Diversity Index

Y_{pt1} = food security index (Dietary Diversity Index) of participants before COVID-19 pandemic

Y_{pt2} = food security index (Dietary Diversity Index) of participants during COVID-19 pandemic

Y_{nt1} = food security index (Dietary Diversity Index) of non-participants before COVID-19 pandemic

Y_{nt2} = food security index (Dietary Diversity Index) of non-participants during COVID-19 pandemic

Tobit Regression Model

Tobit model, also called censored regression model, is designed to estimate linear relationships between variables when there is censoring in the dependent variable. For this study, the determinants of the food security status of the women farmers during the COVID 19 pandemic was examined using Tobit Regression model as stated.

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \dots + \beta_{12} X_{12} + U_i$$

Where:

$Y = 0$ if $Y < 0.67$ (food insecure households)

$Y = Y^*$ if $Y \geq 0.67$ (food secure households)

Y = food security status

$\beta_1 - \beta_{12}$ are the parameters to be estimated

$X_1 - X_{12}$ are the explanatory variables.

X_1 = Marital status (1= married, 0 otherwise)

X_2 = Educational qualification (years of schooling)

X_3 = Farming experience (years)

X_4 = Access to credit facilities (1= yes, 0= no)

X_6 = Household size (number)

X_5 = Income (₦)

X_7 = occupation (1 = farming, 0 otherwise)

X_8 = Source of Startup capital (personal savings =1, 0 otherwise)

X_9 = access to market information (1=yes, 0=no)

X_{10} = Farmers group (1=WIA Farmers, and 0= Non WIA Farmers)

U_i = disturbance term

Results

Socio-Economic Characteristics

Table 1 presents socio-economic characteristics of the women farmers. The mean age of the women farmers was 49.6years, a pointer to them being in productive age bracket, which may also influence their innovation adoption. The result is in line with the findings of Dercon and Krishnan [18] and Yusuf et. al., (2015) who claimed that at the active working age, farmers adopt innovations that positively affect their productivity and income. Majority (74.4%) of them were married and (52.1%) of the women farmers, had a household size within 6-10 persons with mean value of six persons. The relatively large size of the households might have a negative implication on their food security status, since the households will be spending more, most especially when the dependency ratio within the household is high. The finding is in tandem with that of Ashagidigbi et al, 2018 who submitted that the size of female-headed households is relatively high ranging between six and seven. The mean years of schooling of 8.5 years, a pointer to women farmers being educated and having the ability to read and write. According to [19,20] literacy level can improve food security status of households and the adoption of improved farming practices. Educated farmers adopt agricultural innovations easier, and this could improve their agricultural productivity and ensure food security attainment. Majority (76.1%) of the women farmers' startup capital was from personal savings. The years of farming experience of the women farmers was marginal with an average of 4.17 years. The mean monthly income of ₦91,761.11 was recorded for the women farmers, with the majority (72.6%) producing for both commercial and consumption purposes, while 58.1% uses family and hired labour.

Table 2 x-rayed the percentage of households consuming each of the food groups before and during covid-19 pandemic. Generally, there was a decline in the percentage of households that consumed all the food groups during the pandemic. The most consumed food groups during the two periods were cereals, roots, and tubers: condiments and spices. However, the reduction in the percentage of households that consumed the mentioned food groups was marginal during the pandemic. This aligns with the findings of Ashagidigbi [21], who reported that staples, spices, and condiments were the mostly consumed food groups in Nigeria, while beverages and milk were consumed the least. However, households experienced a sharp decline in the consumption of food such as milk, meat, and beverages during the pandemic. The households tend to focus more on consumption of staples (cereals, roots, tubers; and legumes) than beverages and milk during the pandemic, as these food groups became a luxury for the households during the covid-19 period.

Table 3 revealed the Dietary Diversity Score (DDS) and Dietary Diversity Index (DDI) for WIA and Non-WIA farmers before and

during COVID 19 pandemic. Before the advent of COVID -19, WIA farmers consumed 11 out of the 13 food groups identified, while it reduced to nine during the pandemic. On the other hand, non-WIA farmers consumed 10 food groups of food before the pandemic,

which later dropped by 20% during the pandemic. The implication of the finding is that both groups of farmers experienced a decline in the consumption of varieties of food items during the pandemic, however, non-WIA farmers were mostly affected by the pandemic.

Table1: Socioeconomic Characteristics of the Women Farmers

Socio-economic characteristics	Frequency	Percentage (%)	Mean
Age(years)			
20-39	23	19.7	
40-59	62	53	49.6
60-79	31	26.5	
≥80	1	0.9	
Total	117	100	
Marital Status			
Married	87	74.4	
Single	12	10.3	
Widowed	17	14.5	
Separated	1	0.9	
Total	117	100	
Educational level			
1	31	26.5	
6-Jan	19	16.2	8.5
12-Jul	36	30.8	
≥13	31	26.5	
Total	117	100	
Household size			
5-Jan	51	43.6	
10-Jun	61	52.1	6
15-Nov	1	0.9	
16-20	4	3.4	
Total	117	100	
Farming Experience (Years)			
0-3	57	48.7	
6-Apr	46	39.3	4.17
7 above	14	12	
Total	117	100	
Household Income (₦)			
≤49,999	42	35.9	
50,000 - 99,999	38	32.5	91,761.11
100,000 - 149,000	15	12.8	
150,000 - 199,999	13	11.1	
≥200,000	9	7.7	
Total	117	100	
Startup Capital source			

Savings	89	76.1	
Friends and relations	12	10.3	
Banks	5	4.3	
Cooperatives	11	9.4	
Total	117	100	
Purpose of Production			
Household	3	2.6	
Income	29	24.8	
Household and Income	85	72.6	
Total	117	100	
Labour used			
Family	17	14.5	
Hired	32	27.4	
Family and hired	68	58.1	
Total	117	100	

Table 2: Percentage Distribution of Households that Consume Different Food Groups

Food Groups	WIA		NON-WIA	
	Before	During	Before	During
	Percentage		Percentage	
Cereals	100	91.38	100	89.83
Roots and tubers	81.03	77.59	77.97	74.58
Legumes	75.86	70.69	81.36	72.88
Vegetables	82.76	65.52	71.19	40.68
Fruits	77.59	65.52	77.97	42.37
Meat	86.21	53.45	81.36	47.46
Egg	63.79	60.34	61.02	50.85
Fish	82.76	77.59	79.66	74.58
Fat	48.28	44.83	55.93	52.54
Milk (Dairy)	87.93	43.1	79.66	16.95
Spices	100	96.55	100	98.31
Condiments	100	96.55	96.61	94.92
Beverages	74.14	43.1	76.27	15.25

Table 3: Dietary Diversity of Women Farmers in Nigeria

Dietary Diversity	WIA Farmers		Non-WIA Farmers	
	DDS	DDI	DDS	DDI
Before	11	0.806	10	0.776
During	9	0.691	8	0.615

The mean DDI score for WIA farmers before and during COVID 19 pandemic were 0.806 and 0.691 respectively, an indication that there was a sharp decline in nutritional status of the group of women farmers during Covid-19 pandemic, although the

nutritional status of most of the households were still marginally better off. However, The DDI for non-WIA farmers decreased from 0.776 before COVID 19 to 0.615 during COVID 19, implying majority of the non-WIA farmers slid into food insecurity state

during the pandemic. This reveals that WIA farmers were more able to withstand food insecurity shocks during the pandemic than the non-WIA farmers were.

As x-rayed in Table 4, six out of every 10 WIA farmers were food secure during the pandemic, corroborating the findings of Ashagidigbi [22] who made a similar report that 52% of women were food secure in Nigeria. However, about three out of every

10 non-WIA farmers were food secure. The higher percentage of food security among the WIA farmers might be connected to the benefits they derived from being members of the WIA programme. Women under the programme usually have access to the supply of farm inputs at subsidized rates, improved varieties of seeds, agricultural credits, and training, which non-WIA farmers are deprived of.

Table 4: Food Security Status of the Women Farmers during COVID 19 Pandemic

Food Security Status	WIA Farmers	Non-WIA Farmers
	Percentage	
Food Secure	61.43	29.79
Food Insecure	38.57	70.21

The result in table 5 shows the impact of COVID 19 pandemic on the food security status of women farmers in the study area using the double difference model. A mean difference of -2.14 was obtained for non-WIA farmers, an indication of a negative difference in DDI of the farmers before and during COVID 19 pandemic. Similarly, for the WIA farmers a mean change of -1.46 was reported, implying a negative difference in DDI of WIA farmers between the two periods. The result revealed a negative impact of

the pandemic on both the WIA and non-WIA farmers. However, the non-WIA farmers were worst hit by the pandemic based on the greater decline in their nutritional status, relative to the non-WIA farmers. However, the Double Difference (DD) Estimate gave a positive value of 0.678, a pointer to the fact that the impact of the pandemic on food/nutritional status of WIA farmers was milder in comparison to the non-WIA farmers.

Table 5: Impact of COVID 19 Pandemic on the Food Security Status of Women Farmers

Mean difference (WIA)	Mean difference (Non WIA)	Double Difference
-1.46	-2.17	0.678

Table 6: Tobit results showing the determinants of food security among the respondents.

Food security status	Coefficient	Standard error	T ratio	P> t
Marital status	0.04534	0.060346	0.75	0.454
Educational qualification	0.023453	0.013896	1.69	0.094***
Household size	0.03084	0.224911	1.37	0.173
Years of experience	0.012827	0.014162	0.91	0.367
Access to credit	0.087639	0.144047	0.61	0.544
Farmers group	0.402446	0.134409	2.99	0.003*
Occupation	-0.04593	0.063997	-0.72	0.475
Access to market information	-5.3E-05	1.07E-06	-0.49	0.626
Household income	0.151646	0.084846	1.79	0.077***
Startup Capital Source	-0.16594	-0.0762	-2.18	0.032**
Constant	-0.88223	0.528685	-1.67	0.098*

Log likelihood = -93.031037 LR chi2 (12) = 22.49; Prob > chi2 = 0.032

*, **, *** represent level of significance at 1%, 5% and 10% respectively

The result of Tobit regression as presented in the table 6 shows the factors influencing food security status of households in southwest, Nigeria during the COVID-19 pandemic. Out of the

10 variables identified, four variables significantly influenced the food security status of the women farmers. The variables are farmers' group significant at 1%, startup capital at 5%,

educational qualification and income of households significant at 10% respectively. A unit increase in years of schooling and household income increased the food security status of the women farmers by 2.34% and 7.7% respectively. The finding revealed that educational attainment is a food security-promoting factor. This is in conformity with Mallick and Rafi [23], Ngema et al [24], Abdullah et al [25] and Ashagidigbi et al [26] who established that human capital development has positive effect on food security status of household heads and that of the children. Higher educational attainment improves household economic welfare as it influences the ability of individuals to earn wages or income required to access food, thereby resulting in improved food security of households. Likewise, women farmers that belong to higher income group are more nutritionally stable than those with low income are. This is in consonance with the findings of Wolfson and Leung [27], Shupler et al. [28] and Niles et al. [29] who submitted that low income earning households are prone to food insecurity as reduced income jeopardizes food security status of households during the pandemic.

Likewise, being a member of WIA farmers increased their food security status by 40.24% compared to the non-WIA farmers, indicating that WIA farmers are more food secure relative to the non-WIA farmers. This is expected as WIA farmers have access to credit, farm inputs at subsidized rate and capacity building. These opportunities increase their productivity and revenue, which ultimately enhance their nutritional status. This is in line with Olagunju et al [30] who established that farmers that were on drought tolerant maize adoption programme were more productive and much better off based on their welfare status, relative to the non-adopters.

Conversely, food security status of women farmers that obtained their startup capital from personal savings reduced by 2.34% relative to those that obtained theirs from banks and other source sources. This is expected as farmers, most especially the WIA farmers have access to loans from banks at very low interest, and this assists them to increase their production capacity and productivity, which in turn results in higher income and increased nutritional status.

Conclusion

In conclusion, the percentage of households that consumed each food group reduced during the pandemic relative to the pre-pandemic period, though the non-WIA farmers were more affected. The total number of food groups consumed by the two groups also reduced during the pandemic. However, the majority of non-WIA households were food insecure during the pandemic in comparison to the WIA farmers. In addition, it was revealed that the food security status of both the WIA and Non WIA farmers was higher before COVID 19 compared to during COVID 19 pandemic. The high level of food security among the WIA farmers may be attributed to the benefits they derive from being members of the

group. As policy options, income-enhancing policies, which will boost the income of the women farmers, should be formulated as majority of low-income earning women farmers were food insecure during the pandemic. This could be in the form of input subsidies and cash transfers. Non-WIA farmers should also be incorporated into the WIA programme, as this would afford them the opportunity to secure the benefits embedded in the programme with the aim of improving their food security and well-being.

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DOI: 10.19080/NFSIJ.2023.12.555839

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