Innovations

Health Condition and Female Agricultural Productivity in Nigeria

Esther M. Folarin[1,2], Evans Osabuohien[1], Henry Okodua[1] and Romanus Osabohien[1,*]

[1] Department of Economics and Development Studies, and Centre for Economic Policy and Development Research (CEPDeR), Covenant University, Ota, Nigeria

[2] Ancho University, Ayobo, Lagos, Nigeria

Corresponding author: **Romanus Osabohien[1]**

Abstract:

The proportion of women's participation in agriculture differs by regions in developing countries. Nevertheless, this disparity notwithstanding, women actively participate in different nods of agricultural value chain. As at 2011, out of women labour, above 50% were agricultural workers and above 20% were observed to be cultivators. However, only about 13% of the operational holdings were owned by women, which shows gender asymmetry in resource ownership in agriculture. It has been argued that when women are given opportunities in agriculture, such as access to land, credit among others, it will enhance their productivity, which forms the basis of this studies. The aim of this study is to examine the impact of health conditions of female/women on their level of agricultural productivity. Therefore, the study aims to answer the research question 'what is the impact of women health condition on household agricultural productivity? The study engaged wave 4 (2018/2019) of the Living Stand Measurement Study, Integrated Survey on Agriculture (LSMS-ISA). The reason for using wave 4 is because, it is the more recent wave of the LSMS-ISA, at the point of writing this report. The LSMS-ISA data is a general household data by the World Bank in collaboration with National Bureau of Statistics (NBS) of Nigeria. From the pooled data, we disaggregated female-headed households, using the household identification (hhid). Therefore, this study is based on female-headed households, while the male-headed households were excluded from the analysis. The study engaged the descriptive statistics, t-test to examine the significant difference in productivity between household-heads who are healthy and those who are not, the legit regression to estimate the determinants of health condition, and the propensity score matching (PSM) technique to estimate the impact of health condition on female agricultural productivity. The result from the test of mean difference shows that there is a significant difference in productivity between household heads who are healthy and those who are not. It implies that, those who are healthier have higher level of productivity than their counterparts who are not. From the determinants of health condition, using the logit regression, the result shows that household income, education, ICT adoption, and location are significant determinants. From the impact analysis, using the PSM, the result shows that, access to healthcare by female headed households contributes 28.49% to the level of their productivity. The result informs the need to enhance women access to healthcare, especially, farming households in the rural areas, for higher agricultural productivity. Therefore, the study suggests that policies such as improved healthcare systems, among others, geared towards enhancing female engagement in agriculture and services alongside other concerned sectors should be promoted.

Keywords: 1.Agriculture, 2.Female farmers, 3.Productivity, 4.Economic growth
JEL Codes: O13, Q18, O43

1. Introduction

Agriculture is the mainstay of a large percentage of households in Nigeria. It is also a very significant sector in the Nigerian economy, which over the years, contributed significantly to the Gross Domestic Product of the country (Matthew et al., 2022; Osabohien et al., 2021;Osabohien et al., 2022a;   Udoh, 2000). Though, agriculture sector growth rate increased from 1.58%, in first quarter of 2020 (Q1 2020) to 2.2% in third quarter of 2021 (Q3 2021), however, this contribution declined to 2.2% in third quarter of 2021 (World Bank, 2022), showing a reduction in the performance of the sector. The decline in performance of the agricultural sector in terms of its contribution to GDP and growth, forms the rationale for to carry out this study. This is because, its findings will guide government and policymakers to propose and initiate agricultural schemes and programs to enhance agricultural productivity in Nigeria, towards improving productivity, food security, welfare and livelihood, as large proportion of its population depends on agriculture.

Different studies have focused on different factors to enhance agricultural performance, such as female and youth participation, investment, technology, value among others. Similarly, other studies have focused on factors to stimulate women agricultural participation to enhance productivity, because of the essential role occupied by women (Edafe et al., 2020; Edafe et al., 2023; Folarin et al., 2020; Ju et al., 2022; Osabohien et al., 202b;Osabohien et al., 2021; World Bank, 2020). The proportion of women's participation in agriculture differs by regions in developing countries. Nevertheless, this disparity notwithstanding, women actively participate in different nods of agricultural value chain. As at 2011, out of women labour, above 50% were agricultural workers and above 20% were observed to be cultivators (World Bank, 2020). However, only about 13% of the operational holdings were owned by women, which shows the gender asymmetry in resource ownership in agriculture.

Studies have argued that female or women access to useful resources or empowering them with such resources such as access to land (Aziz et al., 2020; Edafe et al., 2020; Elahi et al., 2020; Elahi et al., 2021; Folarin et al., 2021; Osabohien, 2022;Si & Aziz, 2021), education and health (Wei et al., 2020) credit (Osabohien et al., 2020), investment, social protection and insurance to mitigating risk (Elahi et al., 2021; Matthew et al., 2019; Osabohien et al., 2020), among others, may enhance productivity and food security. However, this study is one of the very few, using Wave 4 of the LSMS-ISA, applying the PSM model, to empirically examine the impact of female healthcare on agricultural productivity in Nigeria, to the best of author's knowledge. Therefore, this study is sets to answer the research question - what is the impact of women's health condition on household productivity? This study is structure into five sections. Following this introductory section is section two, which comprises of the review of empirical literature. Section three is the research methodology, results are presented and interpreted in section four, which the study ends with section five which comprises of summary and conclusion.

2. Literature Review

Asitik and Abu (2020) investigated the influence of women's empowerment in agriculture on household food security in Ghana. The study stated that the more women were actively involved in agriculture, the lesser their household will be disposed to forms of hunger, and there would be a better effect on food security. The empowerment of women in the process of decision-making will also help enhance their level of production and access to land (Elahi et al., 2020; Si et al., 2021). Aziz et al., (2020) found that women empowerment will enhance welfare, productivity and food security, especially, food rural households, whose primary occupation is farming.

Also, Elahi et al. (2020), finds that, empowering women such as providing effective policies for even land allotment will enhance productivity. In the same vein, for tangible agricultural output progress, Godfrey (2020) provided past records of handling land rights situations with rural women. The findings provided new ways by which women can usefully negotiate their claims in the land, generally owned by the communities at that era.

Alongside the preceding findings, Akter et al. (2020) affirms that introducing programmes that will help in encouraging and increasing women's passion and level of agricultural participation despite obvious discouraging factors in order to achieve designed national goals is needful. Their findings revealed that the level of access to extension women had changed the households' cropping pattern by increasing the cultivation of the number of major and minor crops and the plot size involved.

Methods and strategies that will help encourage more women to participate in the farming programmes were suggested to enhance their level of experience and production. Likewise, Fletschnerand Kenney (2014) stated that in the measurement of the level of positive impacts gotten from rural development programmes, the access of women in such areas to financial service plays a major role. This will also lead to the more efficient allocation of resources and improved health, nutrition, and education in their families, as women will be empowered to make some independent decisions that will be helpful. Akter *et al.* (2020) stated that despite several efforts put in place to increase women's level of participation in agricultural activities, especially within areas where they have been deprived in the past, minimal results have only been achieved on the contributions of women.

Ajadi *et al.* (2015) confirmed that culture is one major determinant of how agricultural resources are allocated to a different gender. The study affirms that there exists a level of connection between the prevailing culture, gender, and agrarian resources, using the Nupe and Yoruba culture in Nigeria as a case study. Finding reveals that male farmers have ownership at a level higher compared to women in areas such as access to productive resources. At the same time, it is vice versa in some other regions and cultures with favour to the women in terms of non-mechanized farm equipment.

Ulimwengu (2009) observed that production inefficiency increases significantly with the number of days lost to sickness. This paper further suggests that investing in the health sector in rural areas will not only improve farmers' agricultural performance but also increase their income. Policymakers should therefore devise strategies that will maximize the contribution of health investments to agricultural productivity and the overall rural economy. The study confirm the negative impact of health impediment on farmers' agricultural efficiency and simulation results show that improving farmers' agricultural efficiency by investing in farmers' health may not necessarily lead to poverty reduction. This study suggests that additional policy instruments may be needed to achieve simultaneous increase in agricultural productivity and reduction in poverty rate. Chiong-Javier (2009) reiterates the crucial role held by these women throughout the developing world in securing food for their families and communities, but then this role is not performed without adverse consequences to their health.

The necessity for addressing various identified gaps in the women's work-and-health paradigm was also implied from the study. Combary (2016) uses an instrumental variables method to evaluate the impact of the use of health services on the productivity of rural households' farming labour in Burkina Faso. The distance from a household's homestead to the Health and Social Promotion Centre (HSPC) is considered an instrumental variable. This project conducts research on the maximization of the impact of social services expenditures on agricultural labour productivity and incomes in African countries. The study further suggests that in terms of policy

implications for improving agricultural productivity, decision-makers should focus on the availability and quality of HSPC services in rural areas Asenso-Okyere et al. (2011)recommended that good health must be seen as both an investment and consumption asset, like agricultural production, in that it has compounding returns. Health problems, conversely, may trigger a cycle of lowered agricultural productivity and poor health. At the household level, the investment in health can improve resilience and enhance the ability to cope with emergencies, including ill health. But an investment in health in turn requires an adequate livelihood. Access to appropriate inputs (knowledge, land, tools, fertilizer, and seeds) and remunerative markets is necessary to improve the productivity, health, and resilience of farm households. Etowa, et al. (2015) demonstrated that households' agricultural productivity was adversely influenced by aftermaths of ill-health (funeral expenditures). Omonona et al. (2010) health-care access and utilisation among rural households in Nigeria. The study recommends that rural development policies should promote the creation of enabling environment to enhance participation and equitable accessibility in modern health care delivery across the rural areas in the country. Mumtaz et. al (2003) highlights the interconnectedness of women's public and private lives and the interplay of class and gender hierarchies in the patterning of women's employment experiences.The study's conclusions suggest ways in which the organizational functioning of the government health services might be modified to better facilitate the work of female staff.

3. Methodology

3.1 Data

This study engaged wave 4 (2018/2019) of the Living Standards Measurement Study Integrated Surveys on Agriculture (LSMS-ISA[1]). The Living Standards Measurement Study (LSMS) is the World Bank's flagship household survey program focused on strengthening household survey systems in client countries and on improving the quality of microdata to better inform development policies. The LSMS team is housed in the Data Production and Methods Unit of the World Bank's Development Data Group. Bridging data gaps and helping countries produce better data has been at the core of the LSMS mission. The data is collected by the World Bank in collaboration with National Bureau of Statistics (NBS).As a means of managing the data, we first identify the variables of interest in the LSMS-ISA database. After identifying the variables, we collapsed the variables of interest at the female-headed households' level using households' identification number (hhid). The study is based on female-headed household level, while the male-headed households were excluded from the data, given the study's objective. After disaggregating the data at female-headed household level, we were left with 4,950 households. This implies that the study focused on only female-headed households.

3.2 Model Specification

Following the studies by Omonona et al (2015), in order to draw a statistical inference, the estimated model is given in equation (1)

$$FAP_i = \vartheta + \varphi HEC_i + \psi X'_i + e_i \tag{1}$$

Where FAP_i represents female agricultural productivity of household i, HEC_i means health condition of household head i. Health condition is a dummy variable (1 if the household heads have stopped usual farm activities in the last 4 weeks due to illness or 0 otherwise otherwise). X'_i is a covariate of control variables with the coefficient, ψ $(\psi = 1,2 \dots N)$, while e is the stochastic term. The error term (e) is assumed to be normally distributed with zero mean value and constant variance (see Elahi et al., 2021).

Agricultural productivity is measured by output (value of all field crops in naira) per hectare, as used by Osabohien et al., (2020). The covariate of control variables include – education level of household head (years of schooling), access to a mobile phone by household heads (1 if the female headed household has access to a mobile phone, 0 otherwise[2]), age of household heads (in years), household size (total member of the household), marital status of household heads (married or never married), location of household heads (1 if the household heads live in rural community and 0 if the household heads live in urban area), access to improved seed (1 if the household head has access to improved seed, and 0 otherwise), total value of asset owned by household, access to credit (1 if household heads has access to credit, and 0 otherwise).

The measurement of variables is presented in table 1.

Variable	Nature	Measurement
Location of household heads	dummy	1 if household heads live in rural community, 0 if living in urban area
Education level of household heads	continuous	Total number of years of schooling
Female health	dummy	1 if the household head has stopped usual farm activities in the last 4 weeks due to illness, 0 otherwise
Access to a mobile phone	dummy	1 if the household heads have access to a mobile phone and 0 otherwise
Access to improved seed	dummy	1 if the household heads have access to an improved seed, and 0 otherwise
Age of household heads	continuous	Age of female household heads in year
Asset	Continuous	Total value of asset (in naira) owned by the household
Marital status	Dummy	1 if the household head is married, and zero if other otherwise
Household size	Continuous	Total member of household
Credit access	Continuous	Total value of credit received by the household

Source: Authors

---

[2]Note for all dummy variables, Yes is coded as 1, while No is codded as 0

4. Results and Discussion

4.1 Summary statistics of variables5

Table 2 shows the distribution of the respondents. The result shows that the mean age of the respondents is 51years with minimum and maximum values of 28 and 78years respectively. The findings further show that majority of the respondents 48.98% are between 41-60 years, 29.75% are between 21-40 years while only 21.27% of the respondents are between 61-80years. This finding implies that the majority of the respondents are still very active though not within reproductive-age but are still very active age of the economy. The Table also shows the distribution of respondents based on marital status.

Majority of the respondents 63.39% are married, followed by 19.24% that are single while 10.08% are separated with only 7.29% widowed. This result shows that the majority of the respondents are married, this might increase their total productivity. The result in Table 2 also shows the distribution of respondents based on educational level. Educational attainment of the respondents revealed that the majority (75.34%) had secondary education 19.15% had tertiary education level while, 3.22% had some primary education, and 1.27% had adult education, while only 1.02% had no education. It indicates that the majority of the respondents had one form of education or the other invariably it shows that the farmers are literate in the study. Oladuni, (2014), maintained that education is an essential element in all human endeavours, hence since a larger percentage of the farmers are educated, this is expected to have a positive effect on their agricultural productivity. The table shows the distribution of respondents based on access to phone. Results revealed that 79.41% had access to phone while few 20.59% had no access to phone. This indicates that whenever there is an intervention program and innovations available more farmers can be reached spontaneously.

Another section on assessed to health condition showed that 73.81% of the household heads had not stopped their usual farm activities in the last four weeks due to illness, which meant that they are health, while 26.19% stopped their usual farm activities as a result of illness. This revealed that majority of the female health households are healthy given the rationale that they did not stop their usual agricultural activities in the last four weeks due to illness. The table also reveals the distribution of respondents based on access to improved seed. The study shows that 23.56% had access to improved seed in the past one year, while 76.44% had not access to improved seed in the past one year.

The table also shows the distribution of respondents based on household size. Majority of the respondents (45.00%) had 4 to 7 members in their household; followed by (28.56%) with 4 to7 members in their household while the least households (26.44%) had 0-3 members in their household. This is in agreement with the findings of (Ogunwande and Akinrinola, 2017), where they affirmed the used of family labour in increasing agriculture productivity. The next section shows the distribution of respondents based on income. The mean farm income was ₦14872.44. The result revealed that many (79.66%) of the respondents had income of ₦20000 and below, 68.47 percent of the respondents' income is within the range of (₦20001-40000) while few (31.1%) of respondents had income within the range of (₦000-20000). It revealed that female farm income is very meagre and considered insignificant. It is in conformity with (Ogunwande and Akinrinola, 2017).

Table 2: Description of Variables at the Household Level

N =5,010			
Variable	Frequency	Percentage	Mean
Age			
21-40	351	29.75	
41-60	578	48.98	
61-80	251	21.27	51.9
Marital Status			
Single	227	19.24	
Married	748	63.39	
Separated	119	10.08	
Widowed	86	7.29	
Education Level			
None	12	1.02	
Primary	38	3.22	
Secondary	889	75.34	
Tertiary	226	19.15	
Access to phone			
Yes	937	79.41	
No	243	20.59	
Heath conditions			
No	871	73.81	
Yes	309	26.19	
Improved Seed			
Yes	278	23.56	
No	902	76.44	
Asset Value			
0-100000	945	80.08	
100001-200000	13	1.10	
200001-300000	219	18.56	
300001-400000	2	0.17	
400001-500000	1	0.08	104311.9
Household Size			
0-3	312	26.44	
4-7	531	45.00	
8-12	337	28.56	6.1
Area of land			
0-5	1116	94.57	
6-10	56	4.75	
11-15	0	0.00	
16-20	0	0.00	
21-25	8	0.68	5.38

Source: Authors

4.2 Mean Difference Between Treated and Untreated Groups

Table 3 shows the t-test values for the treated (those who have stopped usual farm activities due to illness) and untreated (those who have not stopped their usual farm activities due to illness). The table shows that age, marital status, household size, access to improved seed were statistically significant at 5%, while income, safety net, education level, access to credit, access to phone, remittance, and access to extension were significant at 10% with the only area of land cultivated significant at 1%.

Table 3: Mean Difference Between Treated and Untreated Groups

Variable	No	Mean	Yes	Mean	Mean /diff/	p-value
Age	871	49.92	309	57.83	-7.92	0.047**
Marital status	871	5.89	309	5.20	0.69	0.040**
Household size	871	6.36	309	5.58	0.78	0.042**
Income	871	21877.87	309	26482.13	-4604.25	0.060*
Safety net	871	1.61	309	1.97	-0.36	0.064*
Education	871	3.92	309	4.62	-0.71	0.052*
Credit access	871	0.05	309	0.039	0.01	0.072*
Health condition	871	1.70	309	1.95	-0.25	0.044**
Access to phone	871	1.27	309	1.04	0.23	0.062*
Remittance	871	1.61	309	1.95	-0.33	0.059*
Access to extension	871	1.63	309	1.97	-0.35	0.061*
Area of land	871	5.42	309	5.27	0.14	0.009***

Source: Researcher's Computation using LSMS 2018/2019

4.3 Factors affecting Household Heads Health Condition

The factors affecting household heads health condition was examined using the logit. The results further showed that age (significant at 5% with positive coefficient), household size, access to safety nets, education level, access to improved seeds and access to extension services were all (significant at 1% with positive coefficient), while marital status and area of land cultivated were (significant at 1% with negative coefficient).

Age has a negative relationship in determining health conditions. This implies that an increase in age of the household heads may weakens their health conditions. Marital status has a negative relationship in determining the effect of health care on female agricultural productivity, this implies that an increase in marital status of the respondent's will may weak health conditions and lead to decrease in female agricultural productivity. The negative coefficients indicate that there is gradual decline in family labour as most of the farmer's household

members are not helping in the farm activities, the children prefer taken up white collar jobs in the cities. This finding agrees with Okelola*et al.*, (2013) where it was fond a negative relation of married farmers with their productivity level in Nigeria.

Household size have a positive relationship in determining the effect of health condition on female agricultural productivity, this implies that an increase in household size of the respondents will lead to increase in female agricultural productivity. The outcome is due to the fact that large household size members will help in farm operations and reduce more expenses on hired labour. This study is in relation to Adikwu, (2013), where they found a positive relationship of household size with agricultural productivity, but in contrast to Ugressa*et al.*, (2015), where the study find a negative relationship with agricultural productivity. Access to extension have a positive relationship in determining the effect of health care on female agricultural productivity, this implies that an increase in the service of extension service of the respondents will lead to increase in female agricultural productivity. This finding is in agreement with Makama*et al.* (2018) and Elias *et al.*, (2013), where they found a positive relationship of access to extension services to the farmer's productivity.

Area of land have a negative relationship in determining the effect of health care on female agricultural productivity, this implies that an increase in area of land cultivated by the respondents will lead to decrease in female agricultural productivity. This is in line with Apata, (2018), where he found a negative relationship of farm size with agricultural productivity among rural farm households in Nigeria. Access to improved seed have a positive relationship in determining the effect of health care on female agricultural productivity, this implies that an increase in access to improved seed by the female farmers will lead to increase in female agricultural productivity. This finding is in agreement with Meughoyi (2018), who find a positive relationship of improved seed with agricultural productivity. Access to safety net have a positive relationship in determining the effect of health care on female agricultural productivity, this implies that an increase in the safety net by the female farmers will lead to increase in female agricultural productivity. Safety net has been also a significant area that increases the rate at which female farmers can get an improved access to healthcare. Hence, the provision of safety net can be encouraged and improved on, specifically vulnerable female farmers as a route to improve their healthcare and level of agricultural productivity in Nigeria.

Table 4 Female Healthcare and Female Agricultural Productivity

Variable	Coef.	Std. Err.	T-stat	P-value
location	-0.0367	0.0306	-1.20	0.232
Education	0.7559	0.3068	2.46	0.015 **
Health condition	0.0438	0.0116	3.76	0.000 *

Access to phone	2.2900	0.4897	4.68	0.000 *
Improved seed	-0.6167	0.5069	-1.22	0.226 ***
Age	-0.0104	0.0137	0.76	0.449
Asset	-0.1106	0.2584	-0.43	0.669
Marital Status	-0.7838	0.2190	-3.58	0.000 *
Household Size	0.0708	0.0380	1.86	0.065 ***
Credit Access	-0.1588	0.4998	-0.32	0.751
Constant	9.6974	2.2550	4.30	0.000
R-square				**0.508**

Source: Researcher's Computation Using LSMS 2018/2019

4.4 Impact of Household heads health condition Agricultural Productivity

This study employed the Propensity Scores Matching in determining the impact of household heads health conditions of productivity in Nigeria. Of all the matching methods used in PSM, the Kernel Based Matching KBM was used in this study, because of its sensitivity and robustness. The most interesting and relevant estimate to us in this study is the Average Treatment effect on the Treated (ATT), which provided the impact of health on the female farmers productivity. The result gotten from KBM shows that productivity (value of output (in naira) per hectare) of female farmers that have not stopped their usual farm activities due to illness by 38868.7031. Tt implied that the productivity of household heads who are health is higher in relation to those who stopped their usual farm activities due to illness. This is an indication that access to healthcare services has a way of impacting the agricultural productivity of the farmers.

The Average treatment effect of the program on the untreated (ATU) shows that if the farmers that stopped their usual activities due to illness had not stopped, the improvement in their agriculture productivity have been increased by -10013.8568 output/ha, while Average Treatment Effect (ATE) shows that if a respondent was to be picked randomly, the productivity would increase by 2951.5602 kg/ha. Since the ATT is smaller than both ATU and ATE then it implies that access to health facility or services has a negative impact on agricultural productivity in Nigeria. This result is plausible and justified by the poor state of basic amenities among rural households in Nigeria. Access to basic health services is one of the basic infrastructural facilities that are basically lacking in Nigeria, especially the rural areas (Combary& Traore, 2020 and Etowa*et al*., 2015), and Africa in general.

Table 5: Impact of household health condition on Productivity

Kernel Based Matching (KBM)

Sample	Treated	Controls	Difference	S.E.	t-stat
Unmatched	11.0576195	9.25007785	1.80754167	.099047182	18.25
ATT	11.0576195	9.2689686	1.78865091	.333975101	5.36*
ATU	9.25007785	9.00154521	.248532647		
ATE			.284933218		

Nearest Neighbor Matching (NNM)

Sample	Treated	Controls	Difference	S.E.	t-stat
Unmatched	11.0576195	9.25007785	1.80754167	.099047182	18.25
ATT	11.0576195	9.20409294	1.85352658	.664086263	2.79*
ATU	9.25007785	8.76418106	.485896793	-	-
ATE			.126714921	-	-

Source: Researchers' Computation

From Table 5 the results from kernel-based matching and the nearest neighbour matching were compared, using the average treatment on the treated (ATT), the values of the means difference which are 1.789 (yield/ha) and 1.854 (yield/ha), for KBM and NNM respectively, reflects consistently that females with access to healthcare we do much better in their level of agricultural production with respect to the respective values indicated, as compared to those with no access to healthcare.

5.   Conclusions

This study examined how household heads health condition (measured by 1 if household heads have stopped usual farm activities for the past four weeks, and 0 otherwise) affect productivity. The study focused of female-headed households, given the contribution of women to agriculture.

The study applied the propensity score matching (PSM) to achieve its objective. Looking at the impact of health condition on agricultural production, the results reflect a positive relationship with the level of female farmers' productivity. The result shows that better health condition of female farmers' significant impact agricultural productivity. The study found that household heads (female farmers) who stopped their usual farm activities due to illness have relatively, lower level of productivity compared to their counterparts who did not stop their usual farm activities due to illness. The study therefore, recommends that women should be empowered with better healthcare services to efficient productivity.

This is due to the fact that women's empowerment is widely perceived to be a key factor in closing gender gaps in agricultural productivity. In addition, the findings from this study aims towards the contribution of the United Nations (UN) sustainable Development Goals (SDGs), GDG-3 'Good Health and Well-Being'. The managerial implication of the findings is that the findings emanated from the study will aid policymakers in terms of propounding inclusive policies to drive productivity. However, this study is not without limitations; one of the limitations is that the study focused only on female-headed households. Therefore, recommendation for further study is that, further studies should focus on health conditions affect productivity of households headed by male and female and compare which of the household heads' productivity is mostly hindered by health conditions.

References

1. Ajadi, A. & Oladele, O.I., Ikegami, K. and Tsuruta, T. (2015). Rural women's farmers access to productive resources: The moderating effect of culture among Nupe and Yoruba in Nigeria. Agriculture & Food Security.

2. Akter, S., Erskine, W., Luc Spyckerelle, Lucia Viana Branco, and Imron, J. (2020). The impact of women's access to agricultural extension on cropping practices in Timor-Leste. Food Security, 12(2), 449–463.

3. Asenso-Okyere, K., Chiang, C., Thangata, P., &Mekonnen, D. A. (2011). Understanding the interaction between farm labor productivity, and health and nutrition: A survey of the evidence. Journal of development and agricultural economics, 3(3), 80-90.

4. Asitik A. J and Abu B. M. (2020). Women empowerment in agriculture and food security in Savannah Accelerated Development Authority zone of Ghana African Journal of Economic and Management Studies, 2020, vol. 11, issue 2, 253-270

5. Aziz, N., Nisar, Q. A., Koondhar, M. A., Meo, M. S., & Rong, K. (2020). Analyzing the women's empowerment and food security nexus in rural areas of Azad Jammu & Kashmir, Pakistan: By giving consideration to sense of land entitlement and infrastructural facilities. Land Use Policy, 94, 104529.

6. Chiong-Javier, M. (2009). Health consequences of rural women's productive role in agriculture in the Philippines and other developing countries. Journal of International Women's Studies, 10(4), 95-110.

7. Combary, O. and Traore, S., (2020). Impacts of Health Services on Agricultural Labor Productivity of Rural Households in Burkina Faso. Agricultural and Resource Economics Review. 50. 1-20. 10.1017/age.2020.19.

8. Edafe, O. D., Osabuohien, E., Matthew, O., Osabohien, R., & Khatoon, R. (2023). Large-scale agricultural investment and female employment in African communities: Quantitative and qualitative insights from Nigeria. Land Use Policy, 127, 106579.

9. Edafe, O. O., Osabuohien, E., &Osabohien, R. (2021, February). Large-scale Agricultural Investments and Female Employment in Nigerian Communities. In IOP Conference Series: Earth and Environmental Science (Vol. 655, No. 1, p. 012082). IOP Publishing.

10. Elahi, E., Khalid, Z., Weijun, C., & Zhang, H. (2020). The public policy of agricultural land allotment to agrarians and its impact on crop productivity in Punjab province of Pakistan. Land Use Policy, 90, 104324.

11. Elahi, E., Khalid, Z., Tauni, M. Z., Zhang, H., &Lirong, X. (2021). Extreme weather events risk to crop-production and the adaptation of innovative management strategies to mitigate the risk: A retrospective survey of rural Punjab, Pakistan. Technovation, 102255.

12. Elahi, E., Zhang, H., Lirong, X., Khalid, Z., & Xu, H. (2021). Understanding cognitive and socio-psychological factors determining farmers' intentions to use improved grassland: Implications of land use policy for sustainable pasture production. Land Use Policy, 102, 105250.

13. Etowa, E. B., Onovwie, O. D., Babatunde, S., &Etowa, J. B. (2015). Health Determinants of Agricultural Productivity: An Empirical Analysis Of Ughelli South In Nigeria. International Journal of Arts & Sciences, 8(4), 365.

14. Fletschner, D., & Kenney, L. (2014). Rural women's access to financial services: Credit, savings, and insurance. Gender in Agriculture: Closing the Knowledge Gap, 187–208.

15. Godfrey M. (2020). The struggles for land rights by rural women in sub-Saharan Africa: The case of Tanzania. African Journal of Economic and Management Studies, 11(2), 271–283.

16. Matthew, O., Osabohien, R., Lakhani, K. H., Aderounmu, B., Osadolor, N. E., Adediran, O., … &Igharo, A. E. (2022). Women engagement in agriculture and human capital development in developing countries: An African sub-regional analysis. Plos one, 17(12), e0277519.

17. Matthew, O. A., Osabohien, R., Ogunlusi, T. O., &Edafe, O. (2019). Agriculture and social protection for poverty reduction in ECOWAS. Cogent Arts & Humanities, 6(1), 1682107.

18. Mumtaz, Z., Salway, S., Waseem, M., &Umer, N. (2003). Gender-based barriers to primary health care provision in Pakistan: the experience of female providers. Health policy and planning, 18(3), 261-269.

19. Oluwatayo, I. B., &Ojo, A. O. (2016). Is Africa's dependence on agriculture the cause of poverty in the continent?: An empirical review. The Journal of Developing Areas, 50(1), 93–102.

20. Omonona, B. T., Lawal, J. O., &Oyinlana, A. O. (2010). Determinants of credit constraint conditions and production efficiency among farming households in Southwestern Nigeria (No. 308-2016-5022, pp. 1-14).

21. Osabohien, R. (2022). Soil technology and post-harvest losses in Nigeria. Journal of Agribusiness in Developing and Emerging Economies,.

22. Osabohien, R., Karakara, A. A. W, Ashraf, J., & Al-Faryan, M. A. S. (2022a). Green Environment-Social Protection Interaction and Food Security in Africa. Environmental Management, 1-12.

23. Osabohien, R., Olurinola, I., Matthew, O., &Ufua, D. E. (2020). Social protection intervention and agricultural participation in West Africa. African Journal of Science, Technology, Innovation and Development, 1-6.

24. Osabohien, R., Olurinola, I., Matthew, O., Azuh, D. &Aderounmu, B. (2021). Female participation in agriculture and economic development in 33 African Countries. African Journal of Reproductive Health, 25(5S), 106-115.

25. Osabohien, R., Matthew, O., & Maqsood, H. (2022b). Social protection policy and agricultural labour outcome in West Africa. Agrekon, 61(2), 229-238.

26. Osabohien, R. R., Olurinola, I. O., Matthew, O. A., &Edafe, O. D. (2021, March). Youth Farmers, Shocks and Food Security in Nigeria. In IOP Conference Series: Earth and Environmental Science (Vol. 665, No. 1, p. 012037). IOP Publishing.

27. Osabuohien E. (2020). Guest editorial: Labour issues in africa's agricultural and rural transformation. African Journal of Economic and Management Studies, 11(2), 185–191.

28. Si, R., Lu, Q., & Aziz, N. (2021). Does the stability of farmland rental contract & conservation tillage adoption improve family welfare? Empirical insights from Zhangye, China. Land Use Policy, 107, 105486.

29. Udoka, C.O., Mbat, D.O. and Duke, S.B. (2016) The Effect of Commercial Banks' Credit on Agricultural

Production in Nigeria. Journal of Finance and Accounting, 4, 1-10.

30. Ulimwengu, J. M. (2009). Farmers Health Status, Agricultural Efficiency, and Poverty in Rural Ethiopia: A Stochastic Production Frontier Approach (Vol. 868). Intl Food Policy Res Inst.

31. Wei, W., Sarker, T., Żukiewicz-Sobczak, W., Roy, R., Alam, G. M., Rabbany, M., ... & Aziz, N. (2021). The influence of women's empowerment on poverty reduction in the rural areas of Bangladesh: Focus on health, education and living standard. International journal of environmental research and public health, 18(13), 6909.

32. World Bank (2022). Agricultural sector growth in Nigeria from the 1st quarter of 2019 to the 3rd quarter of 2021. Sourced from   www.statista.com

Corresponding email: esther.folarinpgs@stu.cu.edu.ng romik247@gmail.com