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EFFECTS OF AGRICULTURAL COMMERCIALIZATION ON POVERTY AMONG SWEET POTATO FARMERS IN KWARA AND OSUN STATES (CDSIMEQ APPROACH)

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Abstract

Smallholder farming remains the livelihood of rural farmers who constitute majority of poverty ridden population in the rural area. Commercialization of smallholder farms has the potential to enhance food security and takes farmers out of poverty. This study investigated the effects o f agricultural commercialization on poverty status among sweet potato farmers in Kwara and Osun states, Nigeria. Multistage sampling technique was used to select 485 sweet potato farmers. An interview guide was used to selecte 485 sample size through structured questionnaire to obtain primary data which were analysed using descriptive statistics, a nd CDSIMEQ regression. The result revealed that majority of the respondents were male (86%, 87.6%), wi th the overall mean age of 42, and 43 years in both States respectively. The result also, shown that poverty significantly influence commercialization in both states but not vice-versa in Kwara state. The study concl uded that multidimensional poverty status of the respondents influences the commercialization of sweet pot ato in the study area. Therefore, recommends that effort to encourage the commercial production of sweet potatoes as a competitive alternative to yam by reducing its postharvest losses should be given the needed attention.

Keywords: commercialization, multidimensional poverty status, farmer, transaction cost.

Introduction: Sweet potato (Ipomoea batatas L. Lam) is a climber and a perennial plant belonging to the Convolvulaceae family (Yan; Gu ; Tao; Lai.; Zhang.; Tan and Wang (2014)) sweet potato ranks as the fifth most important food crop in the tropics and the seventh in the world food production after wheat, rice, maize, potato, barley, and cassava (FAO 2019).in the world production of sweet potato, Asia accounts for closeto76%, followed by the African continent (19.5%). Among the top five producers are China, Nigeria, Uganda, Indonesia, and the United Republic of Tanzania. China is the highest producer, producing about 75.6 million tons, followed by Tanzania and Nigeria which produced 3.57 and 2.73 million tons, respectively (FAO 2019). Sweet potato takes important roles in the global food system, all of which have fundamental implications for meeting food requirements, reducing poverty, and increasing food security. Sweet potato is consumed without much processing in most parts of the tropical countries. It is either eaten boiled, roasted or fried. In countries like the United States, it is dehydrated into chips, canned, cooked and frozen, creamed and used as pie fillings. As a result of climate change, the reduction of arable land, increasing population, and frequent occurrence of natural disasters (Adewumi and Adebayo, 2016). It can potentially address issues including income generation, healthy food crop, nutritional deficit, poverty reduction, and food security in developing and less developed countries (Woolfe, 1992). Commercialization of smallholder

agriculture is a shift from subsistence to more market-oriented farming which can lead to productivity growth, income growth, employment growth, and poverty reduction (Carletto, Corral and Guelfi, A. (2017)) Agricultural commercialization also improves food supply in urban areas, with broader growth and welfare effects. Commercialization of smallholder farms from other African countries has the potential to enhance incomes and welfare outcomes and take smallholder farmers out of poverty. Global poverty rates have declined considerably over the last few decades, but the number of people still living in extreme poverty (below 1.90 US dollars a day) remains high (World Bank, 2016). Hence, eradication of poverty continues to be a top priority on the international development agenda (United Nations, 2016). The existence of a bi-causal relationship between household poverty status and the smallholder's level of commercialization was confirmed by Adepoju 2018, followed by Adekanye and Ajiboye, (2020) who established the existence of a bi-causal relationship between presumptive malaria and household poverty, suggesting that the endogeneity bias between malaria and household poverty status is attributable to reciprocal causation. This study examined the effects of agricultural commercialization on multidimensional poverty among sweet potato farmers in Kwara and Osun states using Cdsimeq method.

RESEARCH METHODOLOGY: The study Areas; The study was carried out in Kwara and Osun States of Nigeria. Kwara State is located in the North Central part of Nigeria and lies between latitude 8° 29' 48N of the equator and longitude 4° 32' 32E of the Greenwich meridian. It shares common internal boundary with Niger State in the north, Kogi State in the east, Oyo, Ekiti and Osun States in the south and an international boundary with the Republic of Benin in the west. Kwara State covers a land area of about 36,825 km² with a population 2,371,089 as at 2006 population census (National Population Census, 2007). While Osun State is just a neighbouring state to Kwara state, it is an inland state in south western Nigeria. its capital is Osogbo, bounded in the north by Kwara State, in the east partly by Ekiti State and partly by Ondo State, in the south by Ogun state and west by Oyo State. The state has a covering of tropical rain forest, and inhabited mainly by the Yoruba people. Her economy is based mainly on Agriculture. Major crops include: Yams, Cassava, Sweet Potato, Maize, Beans, Plantain, Cocoa, Palm Oil and Fruits. A population of 3,423,535 as at 2006 population census (National Population Census, 2007).

Sampling Procedure and Sample Size: Multistage sampling technique was used in the selection of the respondents, due to the population density of the study area and also, for the selection of major producers and processors of sweet potato. Firstly, two states were purposively selected, secondly, four Local Government Areas (LGAs) were selected purposively from each selected state that are major producers of sweet potatoes crop, making a total of eight LGAs. Thirdly, from each of the four LGAs per state, four sweet potatoes farming and processing villages were randomly selected making a total of 32 communities for the two states. Lastly, Krejcie and Morgan (1970) sample table was used to select 248 farmers for each of the two selected states respectively based on their population size of 700, making a total of 486 famers selected for this study.

Table 1 krecjie and Morgan (1970) Table for Sample Size

krecjie and Morgan (1970): Total number of respondents used was constructed using the following formula for calculating sample size.

$s = X^2NP(1-P) \div d^2(N-1) + X^2P(1-P)$.

s = required sample size.

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = The population size. = 700

P = the population proportion (assumed to be .50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (.05).

Farmer's population: N was selected to be 700

Sf = $3.841 \times 700 \times 0.50\ (1-0.05) / (0.05)^2(700-1) + 3.841 \times 0.5(1-0.5)$

Sf = $1344.35(0.5) / (0.0025)\ (699) + 1.9205(0.5)$

Sf = $672.175/1.7475+0.96025$

Sf = $672.17/2.70775$

Sf = 248.24

Sf = 248 Farmers Respondents per state.

Nature and Sources of Data: Primary data was used for this study and data was obtained through the administration of structured questionnaire to the respondents in selected study areas.

Table 1 krecjie and Morgan (1970) Table for Sample Size

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.
Source: Krejcie & Morgan, 1970

Analysis of data collected: Descriptive statistics was used to analyzed the socio-economics characteristics while Cdsimeq regression analysis was used for the analysis of effects of agricultural commercialization on multidimensional poverty of sweet potato farmers in Kwara and Osun States.

Results and Discussion :Socio Economic Characteristics of Agricultural Sweet Potato Farmers: The results in Table 2 showed the socio-economic characteristics of agricultural sweet potato farmers gender distribution of the respondents. It was revealed that majority of the sweet potato farmers were males in Kwara and Osun states 86.4% and 87.6% respectively. Similarly, this is in line with the present study, (Olagunju; Fakayode.; Babatunde and Ogunwole-Olapade (2013)) reportedly found out that majority of the sweet potato farmers were male in Osun state, and that male operate at the efficiency range lower than that of the females**.** The findings indicate most of the respondents from both states were males since agricultural activities are rigorous which require adequate strength implying that men have more strength to meet with vigorous task of agricultural activities and thereby engaging themselves beyond providing for their household.

Also, revealed the education status of the respondents, 6.0% of the sweet potato farmers in Kwara state were non-literate while other 94.0% were educated with at least primary school certificate, compare to that of Osun state where 48.0% were non-literate and 52.0% were educated with at least primary school certificate. This implies that there will be increase in the level of sweet potato production most especially in Kwara state. This corroborate with the findings of (Eric; Prince-Aboagye; Acquaye and Aku (2018)) opined that education open the mind of farmers to knowledge, and keeps them in abreast with changing innovations, ideas and allow them to share their experiences. It was obviously revealed that the sweet potato farmers in Osun state has almost equal number of literates and illiterates, compare to that Kwara state. This implies that there is more likely to be variation in the level of adoption of new innovations, commercialization practices and technologies especially on sweet potato production between the respondents in the two selected States since education is one of the major determinants of adoption of technologies. The present finding is in line with previous studies (Lavison 2013) which reiterated that educational level of farmers increases their ability to obtain; process and use information relevant to adoption of a new technology.

The distribution of marital status was showed that 64.6% and 47.5% of sweet potato farmers were married, 6.0%and 38.8% were single, 12.4% and 10.7% of the respondents were divorced/separated while 16.8% and 2.9% of the sweet potato farmers were widows/widowers in Kwara and Osun States respectively. For the pooled data, the result of marital status showed that 56.0% of the sweet potato farmers were married, 22.5%were single, 11.5% of the respondents were divorced/separated while 9.9% of the sweet potato farmers were widows/widowers. This result indicated that majority of the respondents in both States were married probably because farming generally is labour intensive so the need partner that can help in providing cheap labour especially through child bearing in the farming activities. It must be mentioned that most farmers in the rural often depend on family labour supply in whole or with assistance of hired labour. Also, being married could be a measure of level and determination of farmer's sense of belonging and responsibility which help them in contributing to commercialization of their products in the sense that if one is not available in participation other will be. The finding agreed with (Nwaobiala 2014) in the wor k titled "assessment of levels of participation am ong farmers in FAD/FGN/NDDC/Community-Based Natural Resource Management Programme in Abia and Cross River States were studied and assessed in 2012"" where the 75.0% of the respondents were married.

More so**,** it was discovered that household size having below 5 members have the highest representation for both Kwara and Osun states (62.0% and 66.0%) respectively, between 5 and 10 members had 37.5%and 29.7%while the remaining 0.41% and 4.13% had a household size greater than 10 respectively. For the pooled data, the household size result opined that household size having below 5 members have the highest representation of 64.0%, between 5 and 10 members had 36.3%, and household having between 5 and 10 members had 33.6% while the remaining 2.3% had a household size greater than 10. The average household size of the respondents were appropriately 4 members per household during the study which implies that the number of household size is moderate and cause reduction in cost of hired labour. However, this study recorded low household size compare to that of (Oke; Kareem; Bamigbade-Sanni; Oose and Olayode. (2022)) who found 6 persons in the households of their respondents.

The age distribution of sweet potato farmers in both Kwara and Osun States was shown in the table, revealing the mean age of the farmers in Kwara and Osun States to be approximately 46 years and 44 years respectively which fall-in the same class range with the modal age, that is, between 36 – 45y years for Kwara and Osun States respectively. For the pooled data, the mean age of the sweet potato farmers in the study areas was 45 years which also falls within the same class range with the modal age which is between 36 – 45 as it was in both States. The average age of the respondents was 45% which implies that the respondents were still within the productive age which will help boost sweet potato production especially for commercial purpose. These results were in line with the findings of (Oyebamiji; Oladeebo; Owojaiye; **Adetayo** and Aina (2019)) who reported an average age of 45 years in their respective study.

Table 2: **Distribution of Sweet Potato Farmers by Socio-Economic Characteristics**

Variable	Kwara farmers			Osun farmers			Pooled		
	Freq	**%**	**Mean**	**Freq**	**%**	**Mean**	**Freq**	**%**	**Mean**
Gender									
Female	33	13.58		30	12.40		63	12.99	
Male	210	86.42		212	87.60		422	87.01	
Level of Education									
Non-formal	15	6.17		116	47.93		131	27.01	
Primary	49	20.16		36	14.88		85	17.53	
Secondary	155	63.79		56	23.14		211	43.51	
Tertiary	24	9.88		34	14.05		58	11.96	
Marital Status									
Divorced	39	12.35		26	10.74		56	11.55	

Married	157	64.61		115	47.52		272	56.08	
Singled	15	6.17		94	38.84		109	22.47	
Widow/widowed	41	16.87		7	2.89		48	9.90	
Household Size									
<5	151	62.14		160	66.12		311	64.12	
5-10	91	37.45		72	29.75		163	33.61	
>10	1	0.41		10	4.13		11	2.27	
Age									
<25 years	3	1.23	45.63	13	5.37	43.49	16	3.30	44.56
25-35 years	39	16.05		52	21.49		91	18.76	
36-45 years	89	36.63		71	29.34		160	32.99	
46-55 years	72	29.63		68	28.10		140	28.87	
>55 years	40	16.46		38	15.70		78	16.08	
Total	243	100.00		242	100		485	100.00	

Source: Field Survey 2022.

3.4. Effect of Agricultural Commercialization on Multidimensional Poverty Among Sweet Potato Farmers.: The commercialization of sweet potato in the study areas is at a profit when other factors such as farm size, household size, transaction cost among others are considered. It is therefore of necessity to set apart the exogenous impact of commercialization on multidimensional poverty status of the respondents. The study tested for the existence of causality effect with the aid of instrumental variable using CDSIMEQ program for implementing two stage probit least square.

Table 3 below presents the second stage estimates of the OLS and the Probit regression with the corrected standard error. The stage two estimates results showed variance in the existence of a bi-causal relationship between multidimensional poverty status and the level of commercialization of sweet potato and addressed potential endogeneity issues and estimate the causal effects of agricultural commercialization on multi-dimensional poverty. It was shows that poverty of the farmers in Kwara state have a positive relationship with commercialization significant at 5% level. This implies that poor farmers are unable to go into commercialization. It suggests further that the endogeneity bias between commercialization of sweet potato and poverty status is attributable to non-reciprocal causation, this is at variance with the findings of (Adepoju, 2018, Adekanye and Ajiboye, 2020) who inveterate the existence of a bi-causal relationship between household poverty status and the smallholders level of commercialization. And Bi-causality relationship between presumptive malaria and household poverty.

Conversely, there exist an inverse relationship between credit access and commercialization significant at 10% level. The more access farmers in Kwara State have to credit the lesser they commercialize. Also, at 1% level of significant, there is a direct relationship Osun state farmers revenue and their commercialization. The more the revenue they make more they commercialization. This support (Negussie; Almaz and Azanaw (2022)) opined that an increase in household annual income generated by one Birr would lead to an increase in the intensity of bread wheat technology adoption. Likewise, the more their transaction cost, the more they commercialize, because transaction cost has a positive relationship with commercialization at 10% level of significant. This is in contradiction with the findings of (Pingali; Yasmeen and Madelon (2005)) that increased transactions costs deter entry of small farmers into the market.

At the second stage regression presents the probit estimates of the factors influencing Multi-dimensional poverty among the farmers. It was revealed that only household size and cooperative membership play a significant role in determining the multidimensional poverty status of the respondents most especially kwara farmers and cooperative membership in Osun state. regression estimate reveals that the larger the household size of Kwara State farmers, the higher the probability of their being poor, significant at 5% level. But being a member of cooperative society, reduces their chance of being poor significant at 5% level compared to Osun State farmers whose likelihood of being poor increases by a negative relationship exist between poverty status and cooperative membership in Osun state significant at 10%. This corroborates the

(Adepoju, 2018) opined that increase in household size will leads to an increase in commercialization. As well as (Abate *et al*, 2014) revealed that agricultural cooperatives are effective in providing support services that significantly contribute to members' technical efficiency.

Table 3: Distribution of Effect of Agricultural Commercialization on Multidimensional Poverty CDSIMEQ Second Stage with Corrected Standard Error

	Kwara Farmers			Osun Farmers			Pooled Farmers		
Commercialization	**Coeff.**	**Std. Err.**	**P>/t/**	**Coeff.**	**Std. Err.**	**P>/t/**	**Coeff.**	**Std. Err.**	**P>/t/**
Poverty status	0.0557**	0.0249	0.026	0.0907	0.0694	0.192	0.0836**	0.0394	0.035
Gender	0.0039	0.0238	0.870	-0.0486	0.0364	0.183	-0.0226	0.0223	0.311
Education	-0.0020	0.0019	0.290	-0.0019	0.0024	0.434	-0.0008	0.0014	0.545
Revenue	1.20e-08***	4.16e-09	0.004	3.32e-08***	7.29e-09	0.000	2.03e-08***	4.14e-09	0.000
Farmsizeha	-0.0007	0.0021	0.740	0.0038	0.0047	0.421	-0.0003	0.0024	0.912
Farming experience	0.0008	0.0006	0.165	-0.0003	0.0010	0.733	0.0001	0.0005	0.793
Extension agent	0.0298	0.0248	0.231	0.0609	0.0448	0.175	0.0575**	0.0284	0.044
Nearness	-0.0024	0.0025	0.346	-0.0006	0.0031	0.838	-0.0019	0.0022	0.387
Transaction cost	0.0001	0.0001	0.332	0.0001*	0.0001	0.056	0.0001	0.0000	0.134
Access credit	-0.0355*	0.0188	0.061	-0.0074	0.0283	0.794	-0.0061	0.0164	0.708
Cooperative membership	-0.0255	0.0188	0.168	0.0295	0.0396	0.458	0.0114	0.0162	0.481
_cons	0.6719	0.0825	0.000	0.3934***	0.1199	0.001	0.6012***	0.0612	0.000
Poverty status	**Coeff.**	**Std. Err.**	**P>/t/**	**Coeff.**	**Std. Err.**	**P>/t/**	**Coeff.**	**Std. Err.**	**P>/t/**
Commercialization index	1.8795	1.7370	0.279	2.2437	2.2667	0.322	1.1028	1.2767	0.388
Gender	0.2339	0.2522	0.354	0.3512	0.2814	0.212	0.1999	0.1767	0.258
Marital status	0.3385	0.2218	0.127	0.0556	0.1874	0.767	0.1916	0.1309	0.143
Household size	0.1131**	0.0480	0.018	0.0191	0.0427	0.655	0.0474	0.0301	0.116
Education	0.0156	0.0224	0.488	0.0229	0.0147	0.118	0.0115	0.0106	0.278
Dependent ratio	-0.8094	0.5510	0.142	-0.2107	0.5129	0.681	-0.4359	0.3593	0.225
Revenue	0.1793	0.3156	0.570	-0.2638	0.7767	0.734	0.2326	0.2905	0.423
Communication facility	0.0285	0.1961	0.884	-0.1030	0.1965	0.600	-0.0846	0.1345	0.529
Taxes	1.78e-07	1.14e-06	0.876	1.36e-06	1.40e-06	0.332	5.97e-07	8.61e-07	0.488
Cooperative membership	0.4036**	0.1778	0.023	-0.3430*	0.1942	0.077	0.0331	0.1269	0.794
_cons	-49874	4.7647	0.295	2.3233	10.6173	0.827	-4.6295	3.9940	0.246

Source: Field Survey 2022.

Conclusion: It is concluded that the mean age of the respondents was between 42 and 45years which implies that they were more responsive and alert strong and at their active age. More so, the result established the existence of one-way causality relationship between the level of commercialization ang multidimensional poverty status among the sweet potato farmers in only Kwara state Which implies that an increase in multidimensional poverty status of the respondents increased the probability of the l evel of commercialization of sweet potato. The study concluded that multidimensional poverty status of the respondents influenced the commercialization of sweet potato in the study area.

Recommendation: Commercialization of agricultural crops is one of the pathways towards economic growth that will cause drastic reduction in poverty status of the farmers and enhance food security to feed the ever-increasing populace. This study thereby recommends that:

- Researchers, Policy makers, Government and Non-Governmental Organizations involved in agricultural development should give more attention to these important variables in order to preserve this crop from extinction.
- Farmers should be encouraged to engage in commercializing their agricultural produce
- Also, effort to encourage the commercial production of sweet potatoes as a competitive alternative to yam by reducing its postharvest losses should be given the needed attention.

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