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Gender Analysis in the Adoption of Sweetpotato Value Addition Technologies by Rural Farmers in Imo State, Nigeria

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ABSTRACT
The study assessed gender analysis in the adoption of sweetpotato value addition technologies in Imo State, Nigeria. Multi –stage random sampling technique was used in the selection of male and female sweetpotato farmers in the study area. A sample size of 96 sweetpotato farmers comprising of 48 male and 48 female farmers were involved in the study area. Data were collected with the aid of structured questionnaire. The result showed that, the mean (x) age of male and female sweetpotato post-harvest processors were (40.71) years and (38.00) years respectively. The result also showed that the most adopted sweetpotato value added products by male farmers were sweetpotato chips with mean score of (3.31), sweetpotato flour with mean score of (3.10) and sweetpotato meat pie with mean score of (3.35), while the female farmers also adopted sweet potato chips with mean score of (3.33), sweet potato flour with mean score of (3.21), sweet potato starch with mean score of (3.56), and sweetpotato meat pie with mean score of (3.64) respectively. The major constraints encountered by male and female sweetpotato farmers in the study area were inadequate finance, and high cost of sweetpotato processing equipment. The adoption of sweetpotato value addition technologies had a significant impact on the livelihood and income level of both male and female farmers in the study area. Therefore, policies aimed at empowering farmers through training and extension of new sweet potato value addition technologies should be made available to the rural farmers in the study area.
Keywords: Gender, Adoption, Sweetpotato, Value addition

INTRODUCTION

Sweetpotato has remained one root crop widely cultivated, traded on and consumed in Sub-Sahara Africa including Nigeria. Sweetpotato (*ipomea batata*) is among the World`s most important, versatile, but under-exploited food crops. It currently ranks as the World`s sixth most important root and tuber crops on the basis of fresh weight, more than 105 million metric tons of sweetpotato are produced globally each year, 95% of which is grown in developing countries (FAOSTAT, 2012). The crop was mostly seen growing in the

wild and not genetically cultivated and people regarded it as a crop with little economic importance, a volunteer or discard that children picked around refuse dump sites. Sweetpotato we know today play a very important role in food security strategy in Africa as it is a drought resistant, relatively short-term crop. The high nutritive value and performance under resource poor condition make sweetpotato attractive to farmers (Njoku, 2007). Sweetpotato is an excellent source of carbohydrates, vitamins A and can provide more edible energy per hectare than wheat and rice (CIP, 2003). Notable amongst the varieties is the orange fleshed which is rich in beta carotene, pro-vitamin A from which the human body synthesizes vitamin A (Kapinnga *et al*, 2001). The bulkiness and perish ability of the root with low shelf life after harvesting limits its economic viability (Abidin, 2004). Hence, it is most desirable and necessary to process sweetpotato into storable products forms to add value to it in other to contribute significantly to food security, nutrition, income generation and enhanced livelihood for the farmers (Ndunguru *et al,* 2008).

However, the limited range of ways and availability of adopted processing technologies in which sweetpotato is utilized in the study area and Nigeria in general seriously undermine the potential benefits of the crop to farmers, consumers, and other chain actors (Mmasa et al, 2013). Then, gender factors are issues related to gender roles, in sweetpotato production and processing roles are dynamic, varying across regions of the country and changing overtime. In Nigeria men and women play varied roles at various stages of the value chain. These roles could be differentiated into women only roles, men only roles, and collectively roles of the gender. Value addition is that process of changing or transforming a commodity from its original state to more valuable products. The uses of sweetpotato have been diversified considerably over the last four decades, having great potential as a source of local value–added products and as ingredients in other production processes. Value addition involves the post-harvest that is the primary cleaning which includes proper cleaning, sorting, grading and packaging of raw tubers for sale. This is the most value addition practices by most rural farmers. The secondary processing includes steaming, boiling, or roasting sweetpotato raw tubers. In addition, it takes the form of grinding sweetpotato into flour and packaging the flour into different sizes. Lastly is the high-end processing which involves activities like frying sliced root to obtain potato chips, noodles candy and desert. It also involves baking of breads, buns, cakes, and frying of doughnuts using sweetpotato flour, and making of sweetpotato juice. Therefore, the broad objective of this study, is to determine the extent of sweetpotato value addition technologies on the livelihood of both rural farmers, and increase food security in the study area.

METHODOLOGY

The study was carried out in Imo State Nigeria. Imo State has population of about 2,485,799 people, made up of 1,178,331males and 1,307,468 females, National population commission (NPC, 2006), with population density of 449 males and 256 females per square kilometer respectively. A multistage random sample procedure was used in the selection of respondents. The three agricultural zones (Orlu, Okigwe and Owerri) were chosen in the first stage. In the second stage 4 communities were purposively selected from each of the zones given a total of 12 communities. In the third stage 2 communities were selected from each f the selected LGAs to give a total of 24 communities. In the fourth stage 48 post-harvest farmers comprising of male and female were randomly selected to give a total of 96 respondents with the aid of structured questionnaire. The data collected were analyzed with the use of descriptive statistics such as frequency distribution tables,

percentages and means. To determine the level of adoption of sweet potato value addition of male/female respondents, mean score will be employed to realize this. The 5 – steps (aware to adoption) adopted as model by Ozor and Madukwe (2005) will be rated as follows; Aware = 1, Getting interested in value addition practices = 2, Evaluating the value addition practices = 3, Testing the value addition practices = 4, Adopted the value addition practices = 5. The mean score of 3.0 will be a bench mark for judging an individual's level of adoption of sweet potato value addition practices.

The mean Likert-type level is determined thus;

$$Xs = \sum Fn/N \qquad (2)$$

Where,
Xs = mean score
$\sum$ = summation
F = frequency
N = likert nominal value
N = number of respondents
Xs = 1+2+3+4+5 15/5 = 3.0
Xs = 15/5 = 3.0

RESULTS AND DISCUSSION

Socioeconomic and Institutional Variables of Sweetpotato Processors in Imo State, Nigeria.

The result in table 1 shows that mean ages of male and female sweetpotato post-harvest processors in Imo state were 40.71 years and 38.00 years respectively. This indicated that both farmers were in their productive age and were actively engaged in sweetpotato value addition technologies. The Table further showed that, 68.75% and 83.33% of male and female sweetpotato post-harvest processors respectively were married. This showed that married people were more involved in sweetpotato postharvest processing in the study area. Edumond (2006) married people who have children use them in accomplishing certain post-harvest activities especially where they are within the labor age. More so, the mean household sizes of the respondents were 4.13 persons for males and 4.08 persons for females. The result further showed that a good number of the respondents are (94 and 98%). Went to school. Education increases the ability of farmers to obtain, process, and use information relevant to the technology leading to greater use of new technologies (Olwande *et al.,* 2009). The table also showed that the mean sweetpotato post-harvest processing experience of males and females in Imo state were 9.30 years and 9.51 years. This indicated that both farmers stand better position to adopt new innovations in sweetpotato value addition, because the number of years spent in processing may give an indication of the practical knowledge acquired on how to overcome certain inherent problems in sweetpotato value addition (Omoare *et al*., 2014). The table further showed that 31.25% and 37.50% of male and female sweetpotato post-harvest processors in Imo state had access to credit, and 68.75% and 62.50% of them had no access to credit. Access to credit is regarded as one of the key elements in raising productivity. The table also showed that 41.67% and 45.83% of male and female post-harvest sweetpotato processors in Imo state had less regular extension contact, This indicated that the more the regularity of extension contact between the male and female sweetpotato post-harvest processors the more the awareness of recommended practices in sweetpotato value addition Also,

45.83% and 50.00% of male and female sweetpotato postharvest processors belonged to cooperative societies. Membership of association will not only enhance production also aid involvement in value addition activities, (Kwara State Ministry of Agriculture and Rural Resources, 2010).

Table 1: Respondents socioeconomic and institutional variables

	Male			Female		
Variables	**Frequency**	**percentage**	**Mean**	**frequency**	**percentage**	**Mean**
Age(years)						
21-30	9	18.75		11	22.92	
31-40	11	22.92		19	39.58	
41-50	14	29.17	40.71	7	14.58	38.00
51-60	10	20.83		8	16.67	
61 and above	4	8.33		3	6.25	
Sex	48	100		48	100	
Marital Status						
Single	10	20.83		5	10.42	
Married	33	68.75		40	83.33	
Separated	2	4.17		-	-	
Widowed	3	6.25		3	6.25	
Household Size	48	100		48	100	
1-3	10	20.83	4.13	11	22.92	4.08
4-6	30	62.50		28	58.33	
7 and above	8	16.67		9	18.75	
Education						
No education	3	6.25		1	1.25	
Primary	8	16.67		13	27.08	
Secondary	30	62.50		24	50.00	
Tertiary	7	14.56		10	20.83	
Processing Experience						
1-5	9	18.75	9.30	8	16.67	9.51
6-10	20	41.67		19	39.58	
11-15	6	12.50		9	18.75	
16-20	6	12.50		5	10.42	
21 and above	7	14.58		7	14.58	
Access to Credit						
Yes	15	31.35		18	37.50	
No	33	68.75		30	62.50	
Extension Contact						
Less regular contact	20	41.67		22	45.83	
Regular extension contact	17	35.42		16	33.33	
Very regular extension contact	11	22.92		10	20.83	
Membership of Cooperative						
Yes	22	45.83		24	50.00	
No	26	54.17		24	50.00	

Source: Field survey, 2018

Level of Involvement of Sweetpotato Processing Activities by Male and Female Sweetpotato Post- Harvest Processors in Imo State, Nigeria

Table 2 shows the level of involvement in processing activities of male and female postharvest sweetpotato processors in Imo State. The result shows that both farmers were involved in sweetpotato processing activities as shown by the following mean ($\bar{x}$) scores, washing (2.33 and 2.50), slicing (2.21 and 2.23), drying (2.50 and 2.17) and milling (2.42 and 2.27). The result also showed that the female groups were mostly involved in cleaning (2.47), and packing (2.42). These processing activities are intended to improve shelf life, increase incomes and improve food security of the rural poor (Nungo *et al*. 2007). The grand mean for the male post- harvest processors was 2.15, while that of the female was 2.34. The result implied that female post-harvest processors were more involved than their male counterpart. The result is in tandem with Olagunju (2008) who reported that compared to men, women especially those from small and marginal farm families perform over 60% of on -farm activities in sub- Sahara Africa and comprise a major driving force in agricultural and non-agricultural business enterprises.

Table 2: Distribution of Respondents according to Sweetpotato Processing Activities by Male and Female Sweetpotato Processors

Processing activities	**Male**				
	Often involved	**Occasionally involved**	**Not involved**	**Total**	**Mean score**
Cleaning and trimming	21(14.58)	20(20.83)	31(64.58)		1.50
Washing	60(41.7)	48(50.0)	4(8.3)	112	2.33
Slicing	54(37.5)	44(45.8)	8(16.7)	106	2.21
Drying	90(62.50)	24(25.00)	6(12.50)	120	2.50
Milling	69(47.9)	44(45.8)	3(6.3)	116	2.42
Packing	54(.37.50	24(25.00)	16(33.33)		1.96
Grand mean					**2.15**
Processing activities	**Female**				
	Often involved	**Occasionally Involved**	**Not involved**	**Total**	**Mean**
Cleaning and trimming	69(47.9)	50(52.1)	0	119	2.47
Washing	72(50.0)	48(50.0)	0	120	2.50
Slicing	57(39.5)	42(43.8)	8(16.7)	107	2.23
Drying	66(45.83)	46(47.92)	5(10.42)		2.17
Milling	57(39.6)	46(47.9)	6(12.5)	109	2.27
Packing	81(56.25)	28(29.12)	7(14.58)	116	2.24
Grand mean					**2.34**

Source: Field survey 2018. Decision rule: 2.0 and above =participation; <2.0 = non participation, Figure in parenthesis are percentages.

Level of Adoption of Value addition Products of Sweetpotato among Male and Female Post harvest Processors in Imo state

The result in table 3 shows the distribution of male and female postharvest sweetpotato processors according to level of adoption of value added products of sweetpotato in Imo state, The result shows that among these sweetpotato value addition products, in Imo State, the male post- harvest sweet potato processors adopted sweetpotato chips ($\bar{x}$ = 3.31), sweetpotato flour ($\bar{x}$ = 3.10) and sweetpotato meat pie ($\bar{x}$ = 3.35) while the female post-harvest sweetpotato processors adopted sweetpotato chips ($\bar{x}$ = 3.33), sweetpotato flour ($\bar{x}$ = 3.21), sweetpotato starch ($\bar{x}$ = 3.56) and sweetpotato meat pie ($\bar{x}$ = 3.64). Some of the male and female postharvest sweetpotato processors in Imo state were still at evaluation

and trial stages. This might be because they were not fully informed about the value addition products by the extension workers and this characterizes one extension worker to over a wide range of processors at a short time. High cost of processing equipment could also be the reason some of them did not reach trial stage. Inadequate extension services and high cost of processing equipment could as well be the reasons some did not reach trial stage (Udemezue *et al*, 2018).

Table 3: Distribution of Respondents According to their Level of Adoption of Value addition of Sweetpotato by Male and Female Post harvest Processors in Imo states

Male	**Unaware 0**	**Aware 1**	**Interest 2**	**Evaluation 3**	**Trial 4**	**Adopted 5**	**Reject 6**	**Total**	**Mean adoption score**
Sweet potato chips	0(0)	5(5)	10(10)	8(24)	6(24)	18(90)	1(6)	159	3.31
Sweet potato flour	3(0)	6(6)	10(20)	7(21)	10(40)	10(50)	2(12)	149	3.10
Sweet potato cake	15(0)	9(9)	6(12)	3(9)	4(16)	6(36)	5(30)	112	2.33
Sweet potato biscuit	5(0)	15(15)	12(24)	4(12)	4(16)	4(20)	4(24)	111	2.31
Sweet potato bread	10(0)	12(12)	7(14)	5(15)	5(20)	5(25)	3(18)	104	2.17
Sweet potato starch	3(0)	10(10)	10(20)	10(30)	6(24)	5(25)	4(24)	133	2.77
Sweet potato meat pie	0(0)	9(9)	6(12)	8(24)	9(36)	16(80)	0(0)	161	3.35
Grand mean									**2.76**
Female	**Unaware 0**	**Aware 1**	**Interest 2**	**Evaluation 3**	**Trial 4**	**Adopted 5**	**Reject 6**	**Total**	**Mean adoption score**
Sweet potato chips	0(0)	4(4)	10(10)	9(27)	6(24)	19(95)	0(0)	160	3.33
Sweet potato flour	0(0)	9(9)	9(18)	8(24)	10(40)	9(45)	3(18)	154	3.21
Sweet potato cake	5(0)	17(17)	8(16)	3(9)	5(20)	5(25)	5(30)	117	2.44
Sweet potato biscuit	3(0)	12(12)	10(20)	6(18)	5(20)	5(25)	4(24)	119	2.48
Sweet potato bread	5(0)	7(7)	7(14)	8(24)	7(28)	8(40)	3(18)	131	2.73
Sweet potato starch	0(0)	9(9)	6(12)	8(24)	9(36)	6(30)	10(60)	171	3.56
Sweet potato meat pie	0(0)	5(5)	5(10)	11(33)	8(32)	19(95)	0(6)	175	3.64
Grand mean									**3.06**

Source: Field survey, 2018. Figures in parenthesis = Likert nominal score
Decision Rule: 1.0 <= Unaware; 1.0-1.49 = Aware; 1.50-1.99 =Interest; 2.0-2.49 =Evaluation; 2.50-2.99 =Trial; 3.0 – 3.49 =Adoption; 3.5 and above = satisfaction.

Constraint Militating against Sweetpotato Value addition by Male and Female Sweetpotato Processors in Imo state

The result in table 4 shows that high cost of sweetpotato processing equipment (91.67%), low farmers knowledge on sweetpotato value addition (72.92%), inadequate finance (87.50%), inadequate extension service (62.50%) and inadequate credit access (68.75%) were the major problems militating against sweetpotato value addition by processors in the study area.

Table 4: Constraints Militating against Sweetpotato Value addition by Male and Female Sweetpotato Processors in Imo state, Nigeria.

Variables	**Male**		**Female**	
	Frequency	Percentage*	Frequency	Percentage*
Inadequate finance	33	68.67	42	87.50
Low farmers knowledge on sweetpotato value addition	35	72.92	33	72.92
High cost of sweetpotato processing equipment	44	91.67	44	91.67
Inadequate extension service support	35	72.92	30	62.50
Low consumer preference for sweetpotato	25	52.08	28	58.33
Inadequate credit access	30	62.50	33	68.75

Source: field survey, 2018. *Multiple responses recorded.

CONCLUSION

The study concluded that both farmers involved in sweetpotato processing activities, while female participated and adopted the technologies more than their male counterpart in the study area. The major problem encountered by both farmers in the study area was high cost of processing equipment and lack of readily market for the products. Therefore, since the adoption of the innovations had a significant impact on both farmers in the study area. Agriculture Policy making should geared towards providing credit facilities to famers, also training should be done from time to time so as to create more awareness on sweetpotato value addition technologies.

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