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# UTILIZATION OF FOOD PROCESSING TECHNOLOGIES BY WOMEN FARMERS IN UMUAHIA AGRICULTURAL ZONE, ABIA STATE, NIGERIA

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## *ABSTRACT*

The study focused on the utilization of food processing technologies by women farmers in Umuahia Agricultural zone, Abia State, Nigeria. A multistage sampling technique was used in selecting 120 farmers that participated in the study. Information was obtained through structured questionnaire. Both descriptive and inferential statistics were used in analyzing the data. Major results showed that the mean age and years of farming experience of farmers were 42 years and 11 years respectively, the mean income of vegetable farmers per month was ₦23, 375.33. Furthermore, the result showed the respondents had a mean household size of 7persons with over 95% of them having one form of education or the other. About six different food processing technologies were disseminated to farmers, out of which, five were highly utilized with a grand mean score of 3.1 on a 4-point scale. The technology on processing cassava into odourless *fufu* was highly utilized with a mean score of 3.5 while the technology on processing tumeric into drink had low utilization ($\bar{x}$=2.3). Major factors that positively influenced effective utilization of food processing technologies include Easy understanding and application of technologies ($\bar{x}$=3.3), Frequency of extension contacts ($\bar{x}$=3.1), Availability of food crops ($\bar{x}$=3.1), Increased income from sales ($\bar{x}$=3.3) among others. The inferential result showed that there is a relationship between the women farmers' age and their level of utilization of the processing technologies in the study area. It is therefore recommended that government should assist the women to access credit facilities to boast their processing enterprise.

**Contribution/Originality:** The study is one of the very few studies that investigated utilization of food processing technologies by women and the findings will be of immense help to technology developers and development agencies to adequately plan and implement programmes that will better the lots of rural women for sustainable food security.

## 1. INTRODUCTION

Women constitute the backbone of any nation and the prosperity of the nation lies majorly upon them. Rural women are creative, dynamic and can easily adapt to change. As agents of economic development in all societies, women play essential and tremendous roles because they are resourceful and innovative not only in the informal but also in the formal sector. Women generally make up 68.8 percent of the agricultural labour and produce about 80 percent of the Nigerian food output (Oluwamimo, 2001). Nigerian women according to Onah (1998) form an indispensable part of human resources for development because without their contribution, the economy will be difficult to advance to a better level, therefore, women provide the back bone of rural economy which leads to the economic development of a nation as a whole. In addition, Ekong (2003) agreed that women contribute directly to

the Gross Domestic Products (GDP) of the nation and particularly to agricultural production and the overall national food security. Therefore, women are considered an important human resource of the nation and could also act as mediators of economic growth and development. According to Ezeibe, Diogu, Eze, Chiaha, and Nwokenna (2013) and Oluwamimo (2001) women make up more than 50 percent of Nigerian population, and women generally make up 68.8 percent of the agricultural labour force and produce about 80 percent of the Nigerian food output.

However, the Nairobi Declaration (2011) noted that the renewed interest and commitments for increasing investment in agriculture provides a timely opportunity to deliver extension and advisory services that are farmer-centered, participatory, well-funded, demand-driven and performance- oriented. This therefore, makes it necessary for agricultural extension services to equip rural women with the necessary skills that will help them withstand harsh economic situations. It was on this note that the Abia State Agricultural Development Programme (ADP) deemed it fit to transfer to women farmers in the State various processing technologies such as processing plantain into flour, processing turmeric into flour, processing turmeric into drink, processing cassava into odourless *fufu*, Soyabean processed into powder, making *kunu* drink from millet etc. Moreover, it is believed that adding value to farm products is very vital for rural growth as this will enhance farm income and provide employment in processing businesses. Yadav (2013) agreed also that there is a changing trend in agriculture, from subsistence agriculture to agribusiness, commodity driven market to product driven market, homogenous group of crops to crop diversification and cereals grains crops to fruits /vegetables and oilseed crops. Therefore, adding value is the process of changing or transforming a product from its original state to a more valuable state that is preferred in the market place and greater opportunities for adding value to raw commodities abound because of increased consumer demands regarding health, nutrition, and convenience as well as technological advances.

Hence, it is the role of extension to properly communicate these value addition technologies to these women in order to accord them the requisite skills needed to process and improve the quality of agro products. Since, majority of the women in Nigeria are involved in small scale enterprises as a way of solving problem of unemployment in the country through which they contribute their quota to national development; then, women must be empowered in order to make them relevant in contributing to food security in the nation and to their families in particular. These small scale enterprises as outlined by Ayogu and Agu (2015) include: crop farming (especially production of food crops), fish farming and poultry, mortar and pestle making, weaving of sweaters for school children, mat making and retail/wholesale trade. Extension empowers the women farmers by enhancing their awareness, knowledge, skills and technology-use efficiency, thereby, facilitating the overall development of the society. Similarly, Ukoha and Okonkwo (2017) noted that extension provides rural women the opportunity to participate in trainings that will enable them understand the processing technologies in order to contribute to the health and well-being of their families. Thus, having justified that women occupy a pride of place in the production and processing of food as was rightly observed by Food and Agricultural Organization (FAO) (2011) that women are responsible for over half of the world's food production, especially staple crops like rice, wheat, maize etc and provide most of the labour for post-harvest activities such as storage, handling and processing of grains, it therefore becomes imperative to carry out this study whose findings will be of immense help to technology developers, policy makers and other development agencies to adequately plan and implement programmes that will better the lots of rural women for sustainable food security. Therefore, the specific objectives were: (i) to describe the socio-economic-economic characteristics of the women farmers, (ii) identify the processing technologies available to them, (iii) determine the level of utilization of the various food processing technologies disseminated to them; and (iv) ascertain the factors that influenced effective utilization of the food processing technologies in the study area.

## 2. METHODOLOGY

The study was conducted in Umuahia Agricultural Zone, Abia State, Nigeria. Abia state is one of the thirty-six states of the Federal Republic of Nigeria. The state is located in the South East agro-ecological zones of Nigeria.

Abia State lies between longitudes 7°00E and 8°00E and latitude 4°45¹N and 6°17¹N of the equator. The climate is tropical and humid all the year round. The rainy season ranges from March to October. The dry season occurs from November to February. The mean annual rainfall ranges from 2000mm to 2500mm with the southern areas receiving more than the northern areas. The temperature ranges between 22℃ minimum to 31℃ (maximum). The vegetation is predominantly lowland rainforest. Primary data from structured questionnaire were used to elicit information with respect to realizing the objectives of the study. Six out of the eight blocks in the Zone were used for the study. These blocks include: Umuahia urban, Ohuhu, Ibeku, Ikwuano South, Ikwuano North and Olokoro – Ubakala. Twenty (20) women farmers were randomly drawn from six blocks in the Zone making a total of one hundred and twenty (120) respondents. Data collected for the study were analyzed using descriptive and inferential statistics. Objectives (i) and (ii) were analyzed using simple descriptive statistics such as frequency and percentages. A four point likert type scale of 4=highly utilized, 3=Utilized, 2= low utilization and 1= Not Utilized was used to analyze objective (iii). The mean was derived by summing $\frac{4+3+2+1}{4} = \frac{10}{4} = 2.50$. Also, Objective (iv) was analyzed using a 4-point likert type of rating scale namely: Strongly agreed = 4, Agreed = 3, Disagree = 2 and Strongly disagree = 1. The bench mark was obtained thus: 4+3+2+1 = 10, divided by 4 to give 2.50. This implies that any mean score responses above the benchmark mean score were adjudged to be positive factors influencing utilization by the respondents while any mean score responses lower than the benchmark mean score were viewed as otherwise. To test the hypothesis, Pearson Product Moment Correlation coefficient was used to measure the degree of association between level of utilization of food processing technologies and selected socio-economic characteristics of women farmers in the study area. The model is given thus:

Where:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - ((\sum x)^2 . n(\sum y^2) - (\sum y)^2}}$$

r = correlation coefficient.

$\Upsilon$ = level of utilization of food processing technologies (Mean Score).

$X$ = socio-economic characteristics of respondents.

n = Sample Size.

## 3. RESULTS AND DISCUSSION

### *3.1. Socio-Economic Characteristics of Women Farmers in the Study Area*

Data in Table 1 show that majority of the women (81%) were married while about 12% of the respondents were widowed. Farmers who are single and separated/divorce were 3% respectively. Marriage goes with a high sense of responsibility that could influence the respondents' level of involvement in utilizing processing packages. About 13% of the women farmers were within the age bracket of 20 – 30 years while about 27% were in the age range of 31 – 40 years. Forty-two percent of the women were between 41 to 50 years old whereas about 18% of them were 51 years old and 60 years. The average mean age of the respondents is approximately 42 years. This implies that majority of the respondents were in their productive years, where their energies could be harnessed and utilized for productive ventures in agriculture. This agrees with the findings of Ukoha and Okonkwo (2019) that found out that, most farmers in the study area are middle aged farmers who are still very active in carrying out farm activities. In addition, age has been described as an important factor that influences the probability of adoption of new technologies (Akudugu, Guo, & Dadzie, 2012). For level of education, few women (6.67%) never went to school,

10.83% did not complete primary school, 3% had primary school education, 15.00% did not complete secondary school education, 21.67% had secondary school education and 12.50% received post secondary education. This implies that the farmers have the tendency of utilizing improved technology if properly disseminated as was observed by Akpabio (2005) that the extent of education received by farmers account for much in understanding and adopting recommended practices. Furthermore, the women farmers have a mean household size of 7 persons. This has implication on the labour supply to the processing activities that the women are involved in, by reducing the cost of labour and creating avenues for improved production within the enterprise (Effiong, 2012).

**Table-1.** Distribution of respondents according to their socio-economic characteristics.

n = 120

| Variables | Frequency | Percentage | Mean |
|---|---|---|---|
| Marital Status | | | |
| Single | 4 | 3.33 | |
| Married | 97 | 80.83 | |
| Separated / divorced | 4 | 3.33 | |
| Widowed | 15 | 12.50 | |
| Age (years) | | | |
| 21 – 30 | 16 | 13.33 | |
| 31 – 40 | 32 | 26.67 | |
| 41 – 50 | 51 | 42.50 | 41.90 |
| 51 – 6o | 21 | 17.5 | |
| Household size | | | |
| 1-4 | 21 | 13.3 | |
| 5-8 | 59 | 45.0 | 7.10 |
| 9-12 | 40 | 27.5 | |
| Level of Education | | | |
| No Formal education | 8 | 6.67 | |
| Primary School uncompleted | 13 | 10.83 | |
| Primary School completed | 40 | 33.33 | |
| Secondary School Uncompleted | 18 | 15.00 | |
| Secondary School Completed | 26 | 21. 67 | |
| Post Secondary School Attended | 15 | 12.50 | |
| Monthly Income | | | |
| 15000 - 24000 | 29 | 24.20 | |
| 25,000 - 34000 | 63 | 52.50 | ₦23, 375.33 |
| 35,000 - 44,000 | 20 | 16.70 | |
| 45,000 - 54,000 | 18 | 15.00 | |
| Farming experience (in years) | | | |
| 1- 5 years | 19 | 15.83 | |
| 6 – 10 years | 35 | 29.17 | |
| 11 – 15 years | 33 | 27.50 | 11.30 |
| 16 – 20 years | 33 | 27.50 | |
| Contact with Extension Agents | | | |
| Once in two weeks | 56 | 46.67 | |
| Once in a month | 39 | 32.50 | |
| Once after many months | 25 | 20.83 | |
| Membership of Cooperative | | | |
| Member | 114 | 95.00 | |
| Non-member | 6 | 05.00 | |

**Source:** Field Survey, 2019.

The mean years of farming experience of the farmers is approximately 11 years. This shows that the women farmers have garnered an appreciable level of experience in farming. Experienced farmers are expected to have learnt through several years of trials and errors (Nsikan, Aniekan, & Udoro, 2014). Also, the findings of Nwaobiala and Onumadu (2010) reported that farming experience enhances the participation and adoption of improved technologies. The respondents mean income per month is ₦23, 375.33 which is not high. This could be due to the fact that most of the farmers are small scale farmers. However, this finding is line with that of Obinna and Ukoha (2017) who reported that the mean monthly income of farmers in Umuahia zone was ₦ 23, 645.83. Similarly, over 46% of the women farmers have contact with the extension agents at two weeks interval while about 21% of them

have contact with extension once after many months. Owonso, Akinola, Ayodele, and Koladoye (2011) opined that frequent extension contacts will enhance exposure of farmers to improved technologies thereby agreeing with the findings of Odoemelam, Onuekwusi, and Alaocha (2016) that extension contact is expected to have a positive influence on farmers' investment decisions on agricultural technologies. From the result also, majority (95%) of the women belonged to one cooperative society or the other. Bamire, Fabiyi, and Manyong (2002) stated that membership of an association has been found to influence the interaction and exchange of ideals among farmers. Equally, Odoemelam et al. (2016) posited that farmers who are not members of associations are expected to have lower probabilities of adoption and lower level of adoption of technologies.

### *3.2. Food Processing Technologies Disseminated to Women Farmers by Abia State ADP*

The result of the six (6) processing technologies investigated in this study that were disseminated to the women farmers in Umuahia Agricultural Zone by Abia State Agricultural Development Programme (ABIA ADP) is presented in Table 2. About 78% % and 88% of the respondents agreed that the technology on processing plantain into flour and processing turmeric into powder respectively were among the processing technologies disseminated to them by ABIA ADP. Also, over 59% affirmed that the technology on processing turmeric into drink was transferred to them while 97.50% of the respondents accepted that processing cassava into odourless *fufu* technology was disseminated to them as well. Other processing technologies disseminated to the respondents with positive responses are processing soya bean into powder (91.67%) and making *kunu* drink from millet (85%). This implied that greater percentage of the respondents in the study area attested and affirmed that the processing technologies were disseminated to them by ABIA ADP.

**Table-2.** Distribution of respondents according to Food processing technologies disseminated.

n = 120

| Processing technologies | Frequency | Percentage (%) |
|---|---|---|
| Processing plantain into flour | 94 | 78.33 |
| Processing turmeric into powder | 106 | 88.33 |
| Processing turmeric into drink | 71 | 59.17 |
| Processing cassava into odourless *fufu* | 117 | 97.50 |
| Soyabean processed into powder | 110 | 91.67 |
| *Kunu* drink from millet | 102 | 85.00 |

**Note:** Multiple Responses Recorded.
**Source:** Field Survey, 2019.

### *3.3. Level of Utilization of Processing Technologies Disseminated to the Respondents*

The result as presented on Table 3 shows that out of the six processing technologies, five of them namely: processing plantain into flour ($\bar{x}$=2.9), processing turmeric into powder ($\bar{x}$=3.0), processing cassava into odourless *fufu* ($\bar{x}$=3.5), processing soya bean into powder ($\bar{x}$=3.3) and making of *kunu* drink from millet ($\bar{x}$=3.3) were highly utilized by the respondents in the study area because their mean scores were greater than the bench mark mean ($\bar{x}$) score of 2.50 on a 4-point scale. This therefore, indicates high level of utilization of the food processing packages especially the technology on processing cassava into odourless *fufu* with a mean score of 3.50. However, the technology on processing tumeric into drink had low utilization ($\bar{x}$=2.3) as the mean score was lower than the bench mark mean score of 2.50. This could be attributed to the level of awareness created by the change agents on the health and economic importance of processing turmeric into drink and the level of patronage the women received from their customers, that is, the level of quantity sold and the level of income that could be generated from sales afterwards. Unamma (2002) noted that farmers will obviously utilize recommended innovations that are technically feasible, economically viable and socio-culturally acceptable to them.

**Table-3.** Distribution of respondents according to level of utilization of processing technologies.

n = 120

| Processing Technologies | HU | U | LU | NU | Total | Mean($\bar{x}$) | Remark |
|---|---|---|---|---|---|---|---|
| Processing plantain into Flour | 54(216) | 36(108) | 4(8) | 26(26) | 358 | 2.9 | High |
| Processing turmeric into Powder | 41(164) | 53(159) | 12(24) | 14(14) | 361 | 3.0 | High |
| Processing turmeric into Drink | 26(104) | 30(90) | 15(30) | 49(49) | 273 | 2.3 | Low |
| Processing Cassava into Odourless *Fufu* | 75(300) | 35(105) | 07(14) | 03(03) | 422 | 3.5 | High |
| Soyabean processed into Powder | 59(236) | 44(132) | 07(14) | 10(10) | 392 | 3.3 | High |
| Making *Kunu* Drink from Millet | 68(272) | 32(96) | 02(04) | 18(18) | 390 | 3.3 | High |
| Grand mean | | | | | | 3.1 | |

**Note:** HU=Highly Utilized, U=Utilized, LU=Low Utilization, NU=Not Utilized.
**Source:** Field Survey, 2019.

### *3.4. Factors That Influenced Effective Utilization of Food Processing Technologies*

The result presented in Table 4 shows the mean distribution of respondents' responses on the factors that influenced effective utilization of food processing technologies in the study area. The findings showed that the following variables: Easy understanding and application of technologies ($\bar{x}$=3.3), Access to processing facilities ($\bar{x}$=2.7), Frequency of extension contacts ($\bar{x}$=3.1), Lower cost of production ($\bar{x}$=2.7), Availability of raw materials (Food) ($\bar{x}$=3.1), Increased income from sales ($\bar{x}$=3.3) and Adequate market information and linkage ($\bar{x}$=2.7) were all considered as factors that positively influenced effective utilization of the food processing technologies. This is because the grand mean score obtained was 2.80, greater than the bench mark mean score of 2.50. However, Access to credit facilities from financial Institutions with a mean ($\bar{x}$=2.1) and Initial capital for setting up business ($\bar{x}$=2.4) were lower than the bench mark ($\bar{x}$=2.5) and therefore were negative factors that influenced effective utilization of food processing technologies in the study area.

**Table-4.** Distribution of Respondents according to Factors that influenced Utilization of Technologies.

n = 120

| Variables | SA | A | D | SD | Total | Mean $\bar{x}$ | Remark |
|---|---|---|---|---|---|---|---|
| Easy understanding and application of technologies | 56 (224) | 47 (141) | 12 (24) | 5 (5) | 394 | 3.3 | Positive Factor |
| Access to processing facilities | 36 (144) | 35 (105) | 29 (58) | 20 (20) | 327 | 2.7 | Positive Factor |
| Access to credit facilities from financial Institutions | 11 (44) | 33 (99) | 33 (66) | 43 (43) | 252 | 2.1 | Negative Factor |
| Frequency of extension contacts | 30 (120) | 80 (240) | 4 (8) | 6 (6) | 374 | 3.1 | Positive Factor |
| Lower cost of production | 28 (112) | 46 (138) | 27 (54) | 19 (19) | 323 | 2.7 | Positive Factor |
| Availability of food crops for processing | 59 (236) | 32 (96) | 10 (20) | 19 (19) | 371 | 3.1 | Positive Factor |
| Initial capital for setting up business | 23 (92) | 29 (87) | 37 (74) | 31 (31) | 284 | 2.4 | Negative Factor |
| Increased income from sales | 53 (212) | 51 (153) | 13 (26) | 3 (3) | 394 | 3.3 | Positive Factor |
| Adequate market information and linkage | 21 (84) | 66 (198) | 8 (16) | 25 (25) | 323 | 2.7 | Positive Factor |
| Grand mean score = | | | | | | 2.8 | |

**Note:** Mean Score ≥ 2.5 = Positive Factor; Mean Score ≤ 2.5 = Negative Factor; SA =Strongly Agree, A = Agree, SD = Strongly Disagree, D = Strongly.
**Source:** Field Survey, 2019.

### *3.5. Relationship between the Socio-Economic Characteristics of the Women Farmers and their Level of Utilization of the Processing Technologies*

Data in Table 5 show that age of the women farmers was positively and significantly related (r = 0.21) with their level of utilization of the food processing technologies. This showed that an increase in age, led to an increase in the level of utilization of the technologies. This has a significant influence on the decision making process of the women farmers with respect to experience the farmers have garnered over the years. Age through experience enhances ones skills and accumulates needed resources that can contribute positively to the utilization of the

processing packages. However, there was a negative relationship (r.-0.29) between age of the women farmers and their level of income. So also was the level of education that related inversely (r = -0.32) with the age of the women.

Furthermore, there was a strong positive correlation (r = 0.52) between the household size and women farmers' age. This means that when there is an increase in household size, there is equally an increase in age of the women farmers. The age of the women strongly and positively related (r = 0.64) with years of farming experience. This also means that, the older the age of the women farmers, the higher the farming experience gathered. Similarly, there was a positive relationship between the level of income (r = 0.45) and their level of education, showing that the higher the level of income, the higher the level of education of the respondents. Nevertheless, a significant but negative relationship (r = -0.23) existed between the level of education and the women's household size, indicating that the higher the level of education, the lower the household size of the respondents. Therefore, all the interactions between and among the variables contributed in one way or the other to the high level of utilization of the food processing technologies observed in the study area.

**Table-5.** The Relationship between the Socio-economic characteristics of the Women Farmers and their level of Utilization of the processing technologies.

| | Y | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ |
|---|---|---|---|---|---|---|
| Y (Level of utilization of processing technologies) | 1.000 | .214* | -.117 | -.124 | .004 | .122 |
| $X_1$ (Age) | .214* | 1.000 | -.288** | -.319** | 512** | .641** |
| $X_2$ (Level of income) | -.117 | -.288** | 1.000 | .452** | -.286** | -.261** |
| $X_3$ (Level of education) | -.124 | -.319** | .452** | 1.000 | -.233* | -.369** |
| $X_4$ (Household Size) | .004 | .521** | -.286** | -.233* | 1.000 | .339** |
| $X_5$ (Years of farming experience) | .122 | .641** | -.261** | -.369** | .339** | 1.000 |

**Note:** *Correlation is significant at 0.05 level; **Correlation is significant at 0.01 level.
**Source:** Field Survey, 2019.

## 4. CONCLUSION AND RECOMMENDATION

Findings from the study show that the level of utilization of the food processing technologies by the women farmers in Umuahia Agricultural Zone, Abia State, Nigeria was high. Also, out of the six processing technologies investigated, five of them were highly utilized by the respondents in the study area especially the technology on processing cassava into odourless *fufu* with a mean score of 3.5. However, the technology on processing tumeric into drink had low utilization ($\bar{x}$=2.3). It was also observed that factors that positively influenced effective utilization of food processing technologies in the study area were: Easy understanding and application of technologies, Access to processing facilities, Frequency of extension contacts, Lower cost of production, Availability of food crop for processing, Increased income from sales and Adequate market information and linkage. However, Access to credit facilities from financial Institutions and Initial capital for setting up business were the variables that did not positively influence utilization of the processing packages.

Therefore, it is recommended that government should assist the women farmers to access credit facilities from financial institutions; so as to enable them raise capital to start up the business of processing thereby adding value to their harvested food crops. This, no doubt, will also lead to creation of multiple sources of income in the family.

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