

Factors Influencing Adoption of Improved Groundnut Processing Technology among Rural Women in Kebbi State, Nigeria

Dawa Amina, Umar Sa'adu and Gona Ayuba

Department of Agricultural Economics and Extension, Kebbi State University of Science and Technology, Aliero

DOI: <https://doi.org/10.51244/IJRSI.2024.1108105>

Received: 08 August 2024; Accepted: 13 August 2024; Published: 17 September 2024

ABSTRACT

The study was carried out to determine the factors influencing adoption of improved groundnut processing technology among rural women in Kebbi State, Nigeria. Primary data were collected through the use of structured questionnaire. A multi-stage sampling procedure was used to select the respondents. First stage involved the purposive selection of 6 LGAs with highest concentration of women groundnut processors in the State. Purposive sampling was used in selecting the communities based on predominance in groundnut processing. Forty (40) respondents were randomly selected from each LGA to obtain a total of 240 respondents. Descriptive statistics such as mean, percentages, frequency distribution and regression analysis were employed used to achieve the objective of the study. The result showed that 32.5% of the respondents were between the ages of 41-50, 87% of the respondents were married, 55% of the respondents had secondary school education, 48% of the respondents had annual income of ₦501,000-₦1000,000, and 54% of the respondents indicated that groundnut processing was their major occupation. The result showed that most (95.8%) of the respondent had access to market and four (4) extension visits in a year. The result showed that majority (68.8%) of the respondents were members of association, while 64.2% of the respondents had access to credit. It was discovered that age, annual income, years of experience in groundnut processing, membership of cooperative society, compatibility and complexity significantly contributed to the model at 5% and 10% levels of probability.

Keywords: Factors, Adoption, Improved, Groundnut Processing Technology, Rural Women

BACKGROUND TO THE STUDY

Groundnut (*Arachis hypogaea* L.) is an ancient crop of the new World, which originated in South America. In Africa, groundnuts are grown in Western, Eastern and Southern parts of the continent. The major producers include: Nigeria, Senegal, Sudan, Argentina, Ghana among others. Nigeria is the third highest producer of groundnut in the World after China and India with a production of about 18.6, 6.6 and 4.3 million metric tonnes, respectively in 2023 (United State Department of Agriculture, 2023).

In Nigeria, the crop is presently grown throughout the country with the exception of the riverine and swampy areas. The leading producing states include Niger, Kano, Sokoto, Kastina, Kaduna, Adamawa, Yobe, Plateau, Borno, Taraba, Gombe and Nassarawa (Gona, Danmaigoro, Ishaya and Ezekiel, 2023). North-West have the highest percentage of about 39% follow by North-East and North-Central with 29% of groundnut production. Groundnut is processed into many local foods or included as an ingredient in a wide range of other products in the Northern part of Nigeria. These include groundnut paste, which is fried to obtain groundnut cake (*kulikuli*), salted groundnut (*gyada mai gishiri*), a gruel or porridge made with millet and groundnut (*kunun gyada*), groundnut candy (*kantun gyada*) and groundnut soup (*miyar gyada*) (United State Department of Agriculture, 2023).

Groundnut is important in the confectionary trade among the rural traders and the stable oil from it is preferred by the deep-frying industries since it has a smoke point of 229.40C compared to Soya oil (FAO, 2021). Groundnut as an important oil seed crop provides significant source of cash through the sales of seed, cakes, oil and haulms. It plays an important role in the diets of rural populations. The production and processing of the crop is one of the major activities of the rural people in Kebbi State. Hence it is a source of livelihood for many people such as processors, farmers, marketers, transporters, etc. Transformation of groundnut through

processing would enhance the overall economic development through the income and employment generation in the rural economy of Kebbi State.

Processing activities especially groundnut is widespread in the rural areas mostly among women in a form of business or rather a way of generating income. It has been seen as a way of reducing poverty, food security as well as employment generation. Nigeria is the third largest producers of groundnut in the World. It is also the first in Africa producing about 4.3 metric tonnes in 2023 (United State Department of Agriculture, 2023). Despite her rank and prominence, groundnut is majorly processed locally among women. Groundnut processing using improved technologies has the potential of improving living condition of rural women. Groundnut processing using the traditional methods is not too efficient because of tremendous losses during processing, time consuming and high labour inputs. These problems persist primarily due to the lack of appropriate postharvest facilities, acceptance of new technology practices among rural women. Despite the significance of groundnut processing in rural communities among women, there is no adequate study conducted to examine the adoption of improved groundnut processing technology by women in the study area.

Agricultural economy in Nigeria is still largely characterized by production and direct sale of agricultural products in its raw form with very little capability for transformation of produce from its raw form to other value-added products. This is as a result of inadequate capacity of primary producers to add value to their produce due to socio economic, environmental and technological constraints. This has manifested in the form of low production and processing efficiency and limitation in the diversity of goods produced. This perhaps has been responsible for poor wealth creation by farmers resulting in low farm and household incomes. It is against this backdrop that this study hopes to describe the socio-economic characteristics of rural women groundnut processors and determine the factors influencing the adoption of improved groundnut processing technology among rural women in the study area.

The study is imperatively justified due to the need to attain better understanding of women in improved groundnut processing activities. The rationale for improved processing technology is predicated on the need to reduce drudgery involved in traditional processing method, increase rural income, employment, increasing scale of production which is feasible and investment opportunities. It is believed therefore that the findings of the study would be useful to the manufacturers of the improved groundnut processing machines by identifying the areas that need improvement. This study will add to the existing knowledge in the area of food processing enterprise in Nigeria especially in the area of improved processing technology.

METHODOLOGY

Study Area

The study was conducted in Kebbi State which is located in the north-western part of Nigeria (Figure 3.1). Kebbi State is situated between latitudes $10^{\circ} 8' N$ and $13^{\circ} 15' N$ and longitudes $3^{\circ} 30' E$ and $6^{\circ} 02' E$. The State is bordered by Sokoto and Zamfara States to the East, Niger State to the South, Benin Republic to the West and Niger Republic to the North. Kebbi State occupies an area of about 37,699 square kilometers out of which 36.46% is made up of farmland (Kebbi State Government, 2018). The State has a projected population of about 5,563,900 people (NPC, 2022).



Figure 3.1: Map of Kebbi State showing the various Local Government Areas

METHOD OF DATA COLLECTION

Primary and secondary data were used for this study. The primary data were collected through the use of structured questionnaire while the secondary data were collected through journals, articles, seminar, ADPs. The questionnaire was administered with the help of well-trained enumerators. The data collected include; women's socio-economic characteristics e.g. age, years of schooling and processing experience, while the institutional characteristics also include extension contact, and membership of co-operative societies. Other data to be collected will be the technological attributes such as affordability, compatibility and complexity and problems encounter by the respondents during groundnut processing.

Sampling Procedure and Sample Size

A multi-stage sampling procedure was used to select the respondents. First stage involved the purposive selection of 6 LGAs with highest concentration of women groundnut processors in the State (Birnin Kebbi, Maiyama, Jega, Danko Wasagu, Dandi, and Zuru Local Government Areas). Purposive sampling was used in selecting the communities. Predominance of women groundnut processors in villages/communities served as the basis for the selection. The list of all the women that engaged in groundnut processing was compiled with the assistance of the ADP/Leaders of Groundnuts Processors Association. The total number of the compiled groundnut processors constituted the sampling frame. Forty (40) respondents were randomly selected from each LGA to obtain a total of 240 respondents. The total number of women groundnut farmers selected will serve as the sample size.

Analytical Techniques

Regression analysis was used to achieve objective iii and the hypotheses of the study. The general form of the regression equation is given as follows:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, U).$$

Explicitly specified, the equation becomes;

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + e.$$

Where;

Y = Technology adopted by the respondents.

X1 = Age (in years)

X2 = Years of schooling

X3 = Processing experience (in years)

X4 = Extension contacts (number of extension visits)

X5 = Membership of cooperative societies (number of years spent)

X6 = Affordability of technologies (not affordable = 1, fairly affordable = 2, affordable = 3, very affordable = 4 and highly affordable = 5)

X7 = compatibility of technologies (not compatible = 1, fairly compatible = 2, compatible = 3, very compatible = 4 and highly compatible = 5)

X8 = Complexity of technologies (not complex = 1, fairly complex = 2, complex = 3, very complex = 4 and highly complex = 5)

X1 to X8 = Independent variables as defined in the general and explicit equations above

b1 to b8 = Regression coefficients of X1 to X8

a = constant term

e = error term (explicit)

U = Error term (implicit)

The result of the regression analysis will yield R and R² where;

R = Mean correlation coefficient of the variables

R² = Coefficient of multiple determination which represents the degree of variability of the dependent variable as explained by the explanatory variables.

RESULTS AND DISCUSSION

Types of groundnut processing technologies available in the study area

Outcomes of discussion with the respondents revealed that Groundnut Sheller Machine was the most prominent type of groundnut processing technology available to the respondents. This was followed by Solvent-Extraction Technique, Groundnut Roaster and Oil Pressure Machine (manual). This implies that the respondents are only exposed to few groundnut processing technologies.

Socio-Economic Characteristic of the Respondents

The result in Table 1 shows that 32.5% of the respondents were between the ages of 41-50, 28.3% were between the ages of 51-60, while few (13.8% and 10%) were between the ages of 21-30 and 31-40 respectively. The mean age was 48, while the minimum and maximum ages were 22 and 68 respectively. This indicated that the respondents were in active ages, implying that they are productive economically.

Outcome of the findings in Table 1 indicated that 87% of the respondents were married, while 13% were single. This showed that the respondents had family responsibilities. It was found that 48% of the respondents had household size of 1-10, 22% had 11-20, while 18% had 21-30 household size. This shows that the respondents had family responsibilities. The number of a household could be used as a source of labor. The result also shows that majority (55%) of the respondents had secondary school education, while few (11%) had Diploma/NCE certificates. It was found that 13% of the respondents had annual income of <N500,000, 48% of the respondents had annual income of N501,000-N1000,000, 31% had annual income of N1,001,000-N2,000,000, while only few (8%) had annual income of >N2,000,000. This shows income variation among processors which could be attributed to scale of operation.

The result shows that 54% of the respondents indicated groundnut processing as their major occupation, while 46% of them indicated other occupations apart from groundnut processing. The result also showed that 45% of the respondents had <5 years of experience in groundnut processing, 25% of the respondents had 6-10 years of experience, while 23% had 11-15 years of experience in groundnut processing. This indicated that the respondents are experienced processors.

Table 1: Socio-economic characteristics of respondents (n = 240)

Variables	Items	Frequency	Percent	Mean	Min.	Max.
Age	21-30	33	13.8	48	22	68
	31-40	24	10.0			

	41-50	78	32.5			
	51-60	68	28.3			
	>60	37	15.4			
Marital Status	Single	28	13.0			
	Married	208	87.0			
Household Size	1-10	115	48.0	15	1	54
	11-20	53	22.0			
	21-30	44	18.3			
	31-40	13	5.4			
	>40	15	6.3			
Level of Education	Non formal	43	18.0			
	Primary	38	16.0			
	Secondary	132	55.0			
	Dip/NCE	27	11.0			
Annual Income	<500,000	30	13.0			
	501,000-1,000,000	116	48.0			
	1,001,000-2,000,000	74	31.0			
	>2,000,000	20	8.0			
Groundnut processing as major occupation	Yes	129	54.0			
	No	111	46.0			
Years of Experience	<5 Years	58	45.0			
	6-10 Years	32	25.0			
	11-15 Years	30	23.0			
	>15 Years	9	7.0			

Source: Field survey, 2023

Institutional Characteristic of the Respondents

The result in Table 2 shows that most (95.8%) of the respondent had access to market, while only few (4.2%) had no access to market. The implication is that having access to market could lead to sustainable groundnut processing which could also lead to adoption of the processing technology. It was found that 49.2% of the respondents had access to extension on groundnut processing, whereas more than half of the respondents (50.8%) had no access to extension services to boost groundnut processing. It was also discovered that 57.6% of those who had extension visits, had about 4 visits in a year, while few (9.3%) of the respondents had 5 visits a year. The extension visit was found to be low. The result also shows that majority (68.8%) of the respondents belong to agricultural associations, while some (31.3%) of the respondents did not belong to any association. It was also discovered that 45% of those who belonged to an association were found to be members of Groundnut Processing Association. Also, 51% of those who were members of association have been members

for about 6-10 years, 25% were members for less than (<5) years, while 24% of them were members for more than (>10) years.

Result of the study also indicated that 64.2% of the respondents had access to credit, while 35% had no access to credit. The result showed that 61% of those who had access to credit received it in form of cash, 26.6% received credit in form of input, whereas 12.3% received credit in other forms. Also, 48.7% percent of the respondents sourced their credits from family and friends, 28.6% from microfinance banks, while few (9.1% and 7.8%) of them sourced their credit from associations and commercial banks respectively. The amount of credit received by majority (82.1%) of the respondents was <N200,000. It was discovered that out of those who received input 31.7% of them was in the form of fertilizer, 36.6% was in the form of seed, and 24.4% was in the form of herbicide. According to Ishaya *et al.* (2018) who studied on profitability analysis of groundnut oil processing among women in Zuru Emirate of Kebbi State reported that 83.2% of women ground nut oil processors indicated difficulty in accessing credit as a major challenge faced by the processors. The finding of the study is in agreement with Adesope *et al.* (2010) who reported that level of education, income and years of experience were determinants of adoption of improved groundnut processing technology in the study area.

Table 2: Institutional factors influencing adoption of improved groundnut processing technology among rural women in the study area

Variables	Items	Frequency	Percentage
Access to Market	Access	230	95.8
	No Access	10	4.2
Extension Contact	Yes	118	49.2
	No	122	50.8
Number of Visits	1 Visit a year	26	22.0
	2 Visits a year	13	11.0
	4 Visits a year	68	57.6
	5 Visits a year	11	9.3
Membership of Association	Yes	165	68.8
	No	75	31.3
Name of Association	Groundnut Processing Association	74	45.0
	Women in Agriculture	45	27.0
	Political Association	46	28.0
Years of experience in Association	< 5 Years	42	25.0
	6-10 Years	84	51.0
	>10 Years	39	24.0
Access to Credit	Yes	154	64.2
	No	86	35.8
Form Credit	Inform of Cash	94	61.0
	Inform of Input	41	26.6
	Others	19	12.3

Source of Credit	Microfinance Bank	44	28.6
	Commercial Bank	12	7.8
	Family and Friends	75	48.7
	Association	14	9.1
	Agricultural Agencies	9	5.8
Amount of credit received	<N200,000	78	82.1
	N201,000-400,000	11	11.5
	>N400,000	6	6.3
Description of input received	Fertilizer	13	31.7
	Seed	15	36.6
	Herbicide	10	24.4
	Insecticide	3	7.3
Reasons for lack of access to credit	No credit facilities Around	10	11.6
	I don't belong to any Association	4	4.7
	Ignorance of the existence of Bank loan	2	2.3
	Cumbersome procedure in obtaining Bank loan	14	16.3
	Lack of collateral to obtain Bank loan	20	23.3
	High interest rate	36	41.9

Factors Influencing the Adoption of Improved Groundnut Processing Technology among Rural Women

The results of multiple regression analysis in Table 3 shows that the R-square value was 0.748 explaining that 74.8% of the variation in adoption of improved groundnut processing technology could be accounted for by the combined effect of the variables included in the model while the other 25.2% remained unexplained. It was discovered that age, annual income, years of experience in groundnut processing, membership of cooperative society, compatibility and complexity significantly contributed to the model at 1% 5% and 10% levels of probability. Age was negative ($\beta = -156.131$, T-value = 2.146) and significant at 5% level of probability. This indicated that the younger the women the more they adopt the improved groundnut processing technology. The implication is that older women could less likely adopt the improved groundnut processing technology. This result corroborated with that of Nasiru (2014) who found age to be significantly related to the adoption of improved rice processing technologies, and also has a negative influence among the respondents.

The result shows that annual income was positive ($\beta = 4281.114$, T-value = 2.009) and significant at 5% level of probability. The result indicated that adoption of improved groundnut processing technology increases with increase in income generated. The implication is that if processors obtain more income the adoption would be higher. This result is in line with Bashir *et al.*, (2020) who reported that income strongly influence farmers' adoption of groundnut production technologies. The regression coefficient for years of experience in groundnut processing was positive ($\beta = 295.082$, T-value = 1.027) and significant at 10% level of probability.

The result indicated that processors with higher processing experience were more likely to adopt the improved groundnut processing technology than those with less experience.

Membership of cooperative society was found to be positively and significantly influential to adoption of improved groundnut processing technology with regression coefficient of 5211.041 at 5% level of probability. This showed that processors who belong to one organization or the other were more likely to adopt improved groundnut processing technology. The implication is that being a member of an organization increases the chance of adopting the improved groundnut processing technology, as stated by Suleman (2012) that co-operative societies provide exposure to useful information and actual learning experience.

The regression coefficient for compatibility of groundnut processing technology was positive ($\beta = 4161.028$, T-value = 2.052) and significant at 5% level of probability. The result suggests that compatibility of the improved groundnut processing technology increases the chance of its adoption. Complexity of improved groundnut processing technology was found to be positively and significantly influential to adoption of improved groundnut processing technology with regression coefficient of 3218.102 at 1% level of probability. This showed that the simplicity of the improved groundnut processing technology leads to its adoption. The implication is that superiority of a technology to the existing technology paves more chances of its adoption. This result is also in corroboration with Kaine and Wright (2022) who reported that the perceived difficulty with which technologies and practices were integrated into farm systems was positively related to their novelty and complexity and negatively related to enjoyment of the adoption process, that is, affect towards means.

Table 4.3: Multiple Regression result of factors influencing the adoption of improved groundnut processing technology among rural women

Variables	B	Standard Error	T-Value
Constant	8211.24	4691.122	0.812
Age	-156.131	71.204	2.146**
Level of Education	170.016	1314.081	0.094
Annual income	4281.114	2221.026	2.009**
Years of experience in groundnut processing	295.082	211.108	1.027*
Membership of cooperative society	5211.041	182.201	2.798**
Affordability	744.211	1421.034	0.022
Compatibility	4161.028	2622.611	2.052**
Complexity	3218.102	2261.131	3.671***
Number of obs 240 R ² = 0.748 R ² Adju= 0.610 F = 10.88			

Note: *, ** and *** indicate statistical significance at 10%, 5% and 1% significance levels respectively.

β = Regression Coefficient; SE= Standard error.

CONCLUSION

The results of the study showed that the respondents were at their active and productive ages, majority were married and have attained different levels of education. Majority had access to market and about a half of the respondents had access to extension. It was concluded that socioeconomic and institutional factors,

compatibility, and complexity of the improved groundnut processing technology have significant effect on the adoption of the technology among women processors in the study area.

The research on factors influencing adoption of improved groundnuts processing technology among women in Kebbi State, Nigeria, can contribute to:

1. Increased income and economic independence for women
2. Improved groundnut processing efficiency and productivity
3. Enhanced food safety and quality
4. Increased market participation and access
5. Developing inclusive and gender-sensitive agricultural policies
6. Supporting environmental sustainability through improved processing practices

Promoting technology adoption requires a tailored approach considering the specific context, audience, and technology. The research hopes to provide valuable insights and recommendations for stakeholders, including policymakers, extension agents, and development organizations, to support the adoption of improved groundnuts processing technology among women in Kebbi State, Nigeria.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were drawn:

1. Kebbi State Government should create awareness on the benefits of improved groundnuts processing technology and organize training on the proper usage of the technology.
2. Kebbi State Government should offer incentives for early adopters and provide technical support to ensure sustainability of the technology.

REFERENCE

1. Adesope, O. M., Nwakwasi, R. N., Matthews-Njoku, E. C. and Chikaire, J. 2010. Extent of rural women's involvement in the Agro-processing enterprise of The National Special Programme for Food Security in Imo State, Nigeria. Report and Opinion, 2(7):69-73.
2. Bashir, M. B., Ndaghu, A. A., Nakwe, S, H. G., Kyaru, M.T. and Samuel, R. T. (2020). Factors Influencing Adoption of Groundnut Production Technologies Among Women Farmers in Gassol Local Government Area, Taraba State. Proceedings of the Annual Conference of the Agricultural Extension Society of Nigeria. 25th Annual Conference. 1595 – 1421
3. Bello, O. G., Orifah, M. O., Oladipo, F. O. and Ijeoma, M. C. (2016). The Use of Improved Groundnut Processing Technologies among Women Processors in Jigawa State, Nigeria. Nigerian Journal of Agriculture, Food and Environment. 12(4):62-67
4. FAO (2021). Faostat. Retrieved October 31, 2023 from <http://www.fao.org/faostat/en/#data/QC>
5. FAO (2022). Food and Agricultural Organization of the United Nations Database of Agricultural Production <http://www.fao.org/faostat>
6. Gona A., Danmaigoro A., T. Ishaya., Ezekiel V.N. (2023). Evaluation of Groundnut Value Chain in Kebbi State, Nigeria. International Journal of Integrative Research (IJIR). 1(9): 507-518
7. Ishaya, R., Ngaski, A. A., Maikasawa, A., Abubakar, B.Z. and Gona A. (2018). Profitability Analysis of Groundnut Oil Processing among Women in Zuru Emirate of Kebbi State. International Journal of Advanced Academic Research | Sciences, Technology & Engineering. 4(2): 14-27
8. Kaine, G. and Wright, V. (2022). Relative advantage and complexity: Predicting the rate of adoption of agricultural innovations. Agroecological Cropping Systems, a section of the journal Frontiers in Agronomy. DOI 10.3389/fagro.2022.967605 1-17
9. National Population Commission (NPC) (2006). NPC Data of Nigeria: Abuja, Nigeria.

11. Nasiru, A. (2014). Socio-Economic Factors Influencing the Adoption of Improved Rice Processing Technologies by Women, in Jigawa State, Nigeria. An Published Thesis Submitted to the School of Postgraduate Studies, Ahmadu Bello University, Zaria, in Partial Fulfillment of the Requirements for the Award of A Master of Science Degree in Agricultural Extension and Rural Sociology.
12. Suleman, A. (2012). Factors Influencing Adoption of Improved Cassava Processing Technologies by Women Processors in Akokoedo LGA, Edo State, Nigeria. A Published Thesis Submitted to the School of Postgraduate Studies, Ahmadu Bello University, Zaria, in Partial Fulfillments of the Requirements for the Award of Master of Science Degree in Agricultural Extension and Rural Sociology.
13. United State Department of Agriculture, (2023). Foreign Agricultural Service. Annual Report: Oilseeds and Products Annual 2023.