



## ANALYSIS OF INDIGENOUS MAIZE PROCESSING INTO FLOUR AMONG WOMEN IN POST WAR ZONE OF PLATEAU STATE, NIGERIA

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### ABSTRACT

The study was carried out in the post war zone of Plateau State, Nigeria to analyse the determinants of indigenous maize processing into flour among women in the study area. A multistage sampling technique was employed to select 135 respondents from different processing communities. Structured questionnaire was used to elicit data from the respondents. The data were analysed using descriptive statistics, net margin analysis and Tobit regression model. The study showed a mean age distribution of 36.9 years and a mean household size of 5 persons. Majority (73.2%) of the respondents was widows and had an average of 14.7 years of processing experience. It was further revealed that more than half (60%) of the respondents did not have any formal education and had a mean monthly income of about ₦5, 000. The net margins per 100kg and benefit–cost ratio were found to be ₦8, 290; ₦7,875 and 1.49, respectively. The results of the Tobit model showed that all the included explanatory variables had the expected signs and that processing experience, household size, labour and monthly income were the major determinants of indigenous maize processing in the study area. The results further showed that inadequate funds for expansion and insufficient modern processing machines were among the major constraints to indigenous maize processing in the study area. The study therefore recommended that adult and non-formal education should be embraced in order to improve their understanding of modern and improved maize processing technologies. The study further recommended that government and non-governmental organisations (NGOs) should come to the aid of these women through empowerment programs such as the Tradermoni and Npower.

**Keywords:** Determinant, Indigenous, Maize, Processing and Women.

### INTRODUCTION

Maize is a domesticated grass that originated approximately 7000 years ago in what is now Mexico. It is the most important cereal in the world after wheat and rice with regard to cultivation areas and total production. The name maize is derived from the South American Indian Arawak-Carib word *mahiz* (Gwartz and Nieves, 2014). It is also known as Indian corn or corn in America (USDA, 2013). It was introduced into Nigeria probably in the 16th century by the Portuguese (Abdulrahman and Kolawole, 2006). In Nigeria, maize is known and called by different vernacular names depending on locality like *agbodo*, *igbado* or *yangon* (Yaruba); *masara* or *dawar masara* (Hausa); *ogbado* or *oka* (Igbo); *apaapa* (Ibira); *oka* (Bini and Isha); *ibokpot* or *ibokpot union* (Efik) and *igumapa* (Yala).

The global production of maize is estimated to about 300 million tonnes per year (Abdulrahman and Kolawole, 2006). Currently, the United State, Brazil, Mexico, Argentina, Indi, France, Indonesia, South Africa and Italy produce 79% of the world's maize production; with USA alone producing about 50%. In Nigeria, its production is quite common in all parts



of the country from the North to the South; with an annual production of about 5.6 million tonnes (Central Bank of Nigeria, 2015). The country's maize crop covers about 1 million hectare out of 9 million hectares it occupies in Africa (Abdulrahman and Kolawole, 2006).

Processing of agricultural products is generally accepted in the efficient method of maintaining the shelf – life of produce such processed products provide local foods for consumption among the rural populace (Zuberu *et al.*, 2013). Hence the importance of crop processing industries especially in Nigeria cannot be over emphasized. The crop processing industry of Nigeria like other African countries is dominated by the informal sector comprising mainly of small and median scale rural enterprises owned and operated by men and women who depend solely on indigenous technology (Asiedu, 2009).

In the past, women in this part of the world have been relegated to the background. In Northern Nigeria for instance, women were kept in Purdah and not allowed to work (not even allowed to go out except on special occasions). This trend is vastly changing due to modernization, awareness, globalization and other obvious reasons. Plateau State is one of the 19 Northern states. Although it has a Christian majority but there is also a handful percentage of Muslims. Thus, Plateau state is also more or less characterized to a larger extent by the same conservatism in this regards.

The ethno – religious genocide came and gone leaving most of these women widows and a number of young children (who were mostly under age and cannot cater for themselves). Thus, they were forced to go out and fend for themselves daring tradition, religion, and customs, among others.

The study intends to look at the indigenous processing activities engaged by these women in the post war zones of Plateau State, Nigeria in order to make their household food secured; the hardships they encounter in discharging this duty and possible solutions to their plight.

## **MATERIALS AND METHODS**

### **The Study Area**

The study area is located between Latitude 9<sup>o</sup>28' and 9<sup>o</sup>30' East and between Longitude 8<sup>o</sup>43' and 8<sup>o</sup>55' North covering a land area of over 2,477 square kilometres. The 2006 National Population Census puts the population of the inhabitants of the study area at 208,017 people consisting of 109,519 males and 98,498 females (NPC, 2006). The local government area is divided into four administrative districts of Shendam, Dorok, Derteng and DokanTafa with Gamai, Montol, Jukun, and Ngas as the major languages. The major occupation of the people is farming, trading, craftwork like pottery and weaving, wood carving, black-smiting, hunting and fishing (PADP, 2007).

### **Sampling Technique**

A multistage sampling technique was adopted for the study. Shendam LGA was selected from Plateau State because of the worst hit area of the 2004 ethno-religious crisis. In the second stage, Yelwa was chosen because it was the town that the crises occurred and in the third stage, 135 processors were randomly selected from different communities in the study areas.

### **Method of Data analysis**

Both descriptive and inferential statistics were utilized. Mean was analysed using the following formula:



$$\bar{X} = \frac{\sum fx}{n} \quad \dots(1)$$

where;

$\bar{X}$  = Mean

f = Number of values in an interval.

X = is the midpoint of the class interval

$\sum$  = Summation

n = number of values.

**Farm budgeting financial ratio**

$$TC = TVC + TFC \quad \dots(2)$$

where;

TC = total cost

TVC = total variable cost

TFC = total fixed cost

$$TR = Q \times Py \quad \dots(3)$$

where;

TR = total revenue or gross income

Q = quantities of cassava processed in kg

Py = unit price per kilogram

$$NI = GI - TC \quad \dots(4)$$

where;

NI = Net income

GI = gross income or total revenue

TC = total cost

**Model Specification**

Tobit model was used to estimate the determinants of indigenous maize processing into flour in the study area. It is a censored regression model helpful to measure the effect of changes in the explanatory variables (X) on the dependent variable (Y) (Ehirim, *et al.* 2018).

$$Y = a + b_1X_1 + b_2 X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7e \quad \dots(5)$$

where;

Y = Output

X<sub>1</sub> = Age (years).

X<sub>2</sub> = Marital status

X<sub>3</sub> = Years of processing experience (years)

X<sub>4</sub> = Household size (number)

X<sub>5</sub> = Educational attainment

X<sub>6</sub> = Monthly income (₦).

X<sub>7</sub> = Labour source

**RESULTS AND DISCUSSION**

**Socio-economic Characteristics of Respondents**

The result of the socio-economic characteristic presented in Table 1 shows the means age of 36.9 years implying that the processors are middle aged. Majority (73.3%) of the respondents were widows and they were left with the burden of taking care of their family members. This is in line with *apriori* expectation of the study. A mean years of 14.7 years of processing experience signifies that majority of the respondents took to groundnut processing immediately after the crisis, possibly because of lack of support. They had a mean household



size of 5 people who are either infants or too young to help in any meaningful way. Most (60%) lack the basic formal education, hence their inability to modernize their processing method despite its labourious nature. The study is in conformity with the findings of Ishaya *et al.* (2018). The study further shows a mean monthly household income of about ₦5,000 with more than half (57.78%) of them living between ₦1,000 and ₦5,000 monthly.

**Table 1:** Socio-economic Characteristics of the Respondents (n = 135)

Variable	Frequency	Percentage	Mean
<b>Age</b>			36.9
>20	13	9.63	
21 – 30	22	16.30	
31 – 40	58	42.96	
41 – 50	23	17.04	
51 and above	19	14.07	
<b>Marital Status</b>			
Single	24	17.78	
Married	12	8.89	
Widow	99	73.33	
<b>Years of experience</b>			14.7
1 – 5	16	11.85	
6 – 10	32	23.70	
11 – 15	47	34.82	
16 – 20	29	21.48	
21 and above	11	8.15	
<b>Household size</b>			5
1 – 3	14	10.37	
4 – 6	68	50.37	
7 – 9	33	24.44	
10 – 12	17	12.59	
13 and above	3	2.22	
<b>Educational Status</b>			
Non-informal education	81	60.00	
Primary	31	22.96	
Secondary	17	12.59	
Tertiary	6	4.44	
<b>Monthly Income</b>			5,450.00
1,000 – 5,000	78	57.78	
6,000 – 10,000	39	28.89	
11,000 – 15,000	11	8.14	
16,000 – 20,000	7	5.19	
<b>Labour Source</b>			
Family	48	35.56	
Hired	29	21.48	
Family and Labour	58	42.96	

Source: Field Survey, 2018



### Average Gross Margin Analysis of Indigenous Maize Processing

Table 2 shows gross or net profit of indigenous maize processing in the post war zone of Plateau State, Nigeria. The items of the variable costs include maize, labour hours and transport costs; among others. The total variable cost was found out to be ₦15,810:00. Depreciation on processing implements such as tapolene, polythene and basins; was found to be ₦415:00. Thus, total cost of processing per 100kg in the study area was calculated to be ₦16,225:00. Hence total revenue from the sales of maize flour and shaft was found to be 24,100. The average gross margin of indigenously processing 100kg of maize was found to be ₦ 8,290 while the net margin was ₦7,875.00; implying that indigenous maize processing in the study area was profitable. This is in line with the findings of Olurunfemi *et al.* (2014).

**Table 2:** Average Gross Margin Analysis of 100kg of Indigenous Maize Processing

<b>Variables</b>	<b>Value</b>	<b>Percentage</b>
<b>Variable Cost</b>		
Maize (kg)	12,000	75.90
Labour (hr)	1,500	9.49
Grinding (₦)	2,000	12.65
Transportation (₦)	100	0.63
Sun drying	200	1.27
Water (ltrs)	10	0.06
	<b>15,810</b>	<b>100.00</b>
<b>Total Variable Cost (TVC)</b>		
<b>Fixed Cost</b>		
Basin	165	39.76
Tapolene	150	36.14
Polythene	100	24.10
	<b>415</b>	<b>100.00</b>
<b>Total Fixed Cost (TFC)</b>		
<b>Revenue</b>		
Sales of maize flour	22,800	94.61
Sales of maize shaft	1,300	5.39
<b>Total Revenue (TR)</b>	<b>24,100</b>	<b>100.00</b>
Gross margin (GM)	8,290	
Net Margin (NM)	7,875	
Benefit – Cost Ratio (BCR)	1.49	

Source: Field Survey, 2018

### Tobit Regression of the Determinants of Indigenous Maize Processing

The determinants of indigenous maize processing in the post war zone of Plateau State, Nigeria was presented in Table 3. The results showed that sigma ( $\delta$ ) was 0.138 ( $p < 0.01$ ) with a t-value of 13.052, implying that the model has a good fit to the data and that the model as specified, explained significant non – zero variations in factors influencing indigenous maize processing.

It was observed that all included explanatory variables have expected signs with household size, years of processing experience, labour hours and monthly income; significant at various levels. Processing experience was found to be significant and positive; indicating



that as experience increases, the efficiency in maize processing will also increase. However household size (monthly income) were significant but negative implying that an increase in a unit of these variables, will significantly decrease the production of maize flour. This may be due to the fact that revenues from the sales of the shaft and flour will be used to feed other members of the family instead of ploughing it back into business. This agrees to the findings of Ehirim *et al.* (2018).

The coefficient of educational status was found to be negative and not significant. This may be due to the fact that most of the rural women who engage in the indigenous processing lacked the basic formal education to utilize modern processing machineries. It is believed that as they attain advance educational qualification, processing will be enhanced. Age was also found to be negative and not significant. This is in line with *apriori* expectation that as one gets old, the efficiency and productivity weakens. This is in line with similar studies conducted by Abdulrahman and Kolawole (2006); and Olurufemi *et al.* (2014).

**Table 3:** Determinants of Indigenous Maize Processing Among Women of Post War Zone of Plateau State, Nigeria

Variable	Marginal Effective	St. Error	t – Value
Age	14.498	12.133	1.195
Processing Experience	5.493	8.220	0.668 ***
Educational Status	2- 5.185	10.091	- 2.496
Household Size	- 31.887	11.332	- 2.816**
Labour	0.0070	0.0204	0.3910*
Quantity of Maize	0.045	0.010	4.320
Monthly Income	-3.504	10.563	- 332 ***
Constant	187.981	70.884	2.652
Sigma ( $\delta$ )	0.138	0.021	13.052***

\*, \*\* and \*\*\* indicate 10%, 5% and 1% level of significance, respectively;  
 Ns = not significant

**Constraints to Indigenous Women Maize Processors**

The results on constraints to indigenous maize processing in the study area in Table 4 indicates 98.52% of the women processors lacked sufficient funds that will enable them purchase more quantity of maize that can be stored against future rise in price. About 93% faced inadequate finance needed to buy modern processing machineries.

**Table 4: Constraints Faced by Indigenous Women Maize Processors**

Constraints	Frequency	Percentage
Inadequate funds	133	98.52
Insufficiency of modern processing machines	125	92.59
Epileptic power supply	128	94.15
Unstable produce prices	89	65.93
Inadequate modern storage facilities	46	34.07

Source: Field Survey, 2018



This is in accordance with the findings of Ishaya *et al.* (2018), whereas epileptic power supply was reported by 94.15% of the respondents. Unstable produce price was represented by 65.93% while 34.07% of the maize processors indicated that inadequate modern storage facilities was the major impediment to their indigenous processing activities. This is in conformity with the findings of Gwartz *et al.* (2014) and that of Lamba *et al.* (2016).

## CONCLUSION AND RECOMMENDATIONS

Indigenous maize processing in the study area was dominated by women who are mostly widowed. They take care of their families single handedly through indigenous maize processing and in the course of doing this; they encountered a number of problems. It is based on these that the study recommended that government and NGOs should come to the aid of these women through empowerment programs such as the Tradermoni and Npower. It is also recommended that adult and non-formal education should be embraced by the processors in order to improve their understanding of modern and improved maize processing technologies.

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