

# Households' Demand for Pap Flour in Ibadan Metropolis (Research Article)

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## ABSTRACT

### Keywords

*Agricultural product,  
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*The needs to create time utility and present pap in a form that will enhance its preservation have led to pap flour gradually becoming an important processed agricultural product. The study showed that among respondents, the awareness on pap flour was high. Majority of the respondents (62.0%) was female while the average age was 33.7years. The respondents' average monthly income was ₦137, 753 and 0.53% of the monthly income was spent on pap flour. The average amount spent on pap flour per month was ₦553.50. The study revealed that occupation influenced respondents' perception on pap flour. Household size, monthly income, years of schooling and marital status were factors that influenced consumers' choice of pap flour. The probability of resident consuming pap flour in the study area was 0.83. Market segmentation based on income earnings will enhance the sales revenue.*

## 1. INTRODUCTION

Processing of agricultural products into readily consumable form is one of the ways through which losses to crop farmers are reduced. The crop subsector of the Nigerian agriculture is generally populated by small scale farmers who cultivate less than 2ha and characterized by low productivity (Ibeawuchi et al., 2009; Lowder et al., 2014) and the use of simple farm tools (cutlass and hoe) as well as adoption of old farming methods. According to IFAD report (2016), about 90 per cent of Nigeria's food crops (maize, cassava, yam, rice millet, sorghum, vegetables, cowpea and potato among others) are produced by small-scale farmers who cultivate small plots of land and depend on rainfall rather than irrigation systems. According to Federal Ministry of Agriculture and Rural Development (2017), Nigeria loses over 60 per

cent of farm produce annually to lack of storage and agro-processing facilities. Over the years there has been improvement in processing techniques from traditional to modern method that addresses the issue of hygiene and packaging. Processed food crops are more durable and attractive; this goes a long way in mitigating food insecurity (Adiaha, 2017). Farmers are faced with the challenge of storage most especially during harvest and the best way to avoid losses is to process these farm products into the form that can prevent spoilage associated with most agricultural products.

Among other food crops produced in Nigeria, Maize is one of the important staple crops that are widely consumed in different forms. It is eaten in various dishes and forms the basis of most meals prepared by the average Nigerian family. It can be consumed in various forms as roasted fresh maize, boiled maize, tuwo, donkunnu, maasa, akple, gwate, nakia, whole corn, corn flour, cornstarch, corn gluten, corn syrup, cornmeal, corn oil, cornflakes, quaker oats, pop corn, golden morn, 'egbo', 'abari', 'donkwa', 'ajepasi', 'aadun', 'kokoro', 'elekute', 'eko' and 'ogi' among others (Abdulrahman and Kolawole, 2006).

Pap (ogi) is a starchy fermented paste traditionally made from maize, whose colour could either be white or yellow depending on the corresponding colour of maize used (Akingbala et al., 1987). It is consumed in almost all parts of Nigeria. Ogi is often marketed as a wet cake wrapped in leaves or transparent polythene bags and hawked early in the mornings or late in the evenings as 'eko'. It is diluted to a solid content of 8 to 10% and boiled into a pap, or cooked and turned into a stiff gel called "agidi" or "eko" prior to consumption. According to Igbedioh et al. (2006), it is the most important weaning food for infants in West Africa and a common delicacy among the Hausas especially the malas, among the Igbos and Yorubas who take it along with steamed bean cake (moinmoin), fried bean cake (akara), groundnut cake (kulikuli) among others. Wet pap is produced using the conventional (traditional) method which is mostly unhygienic, takes a lot of time and energy thereby discouraging its consumption among the urban population. Therefore adding value to pap provides a suitable and more hygienic alternative as it helps ease its time of preparation, storage in the face of unreliable power supply, mitigate wastage (due to post harvest losses), preserve the product by increasing the shelf life and even provide employment opportunities since more people are engaged in the value chain (Ekwuet al., 2005; Shajeela et al., 2011). Pap flour in particular therefore provides an easy and stress free way to make the delicious local delicacy of pap and can be transformed into pap in few minutes. Pap flour is made from 100% maize, contains no preservative and contains all the nutrients needed in the body.

There have been a number of previous studies that examined household demand for processed agricultural products in Nigeria. Many authors (Jeffrey and Maria, 2013; Edema et al., 2005; Olorunfemi et al., 2005; Aderiye and Laleye, 2003; Oke, 2006; Adeniji and Potter, 2014; Igbedioh et al., 2006; Oluseyi et al., 2013) have worked on maize bread, corn flour, wet pap and nutritional qualities. This study is aimed at examining household demand on new processed product (pap flour) from maize as its processing is modern compared wet pap. The need to add to the existing literature on the demand for processed agricultural products prompted this study. It is expected that the study will help to create more awareness among the consumers as well as stimulating interest for those who may be interested in pap flour production. To achieve these, the following research questions are raised, viz: (i) Are households in Ibadan metropolis aware of pap flour? (ii) What is the perception of respondents on pap flour in the study area? (iii) What was the percentage of monthly spent on pap flour by respondents in the study area? (iv) What are the factors influencing consumer

preference for pap flour in the study area? (v) What factors influence monthly household expenditure on pap flour in the study area?

## 2. THEORETICAL FRAMEWORK and LITERATURE REVIEW

The theory of consumer behavior is the fundamental theory on which this study is conducted. According to Oyinbo (2014), the principal assumption on which the theory of consumer behavior and demand is built is that a consumer attempts to allocate his limited resources (money income) among available goods and services (brands of pap flour) so as to maximize his or her satisfaction. The usefulness of the theory lies in the fact that it helps to understand how consumer demand for a commodity responds to income. However, consumer behavior is best understood in three distinct steps which are: consumer preferences, budget constraints and consumer's choice (Agboola, 2014). The law of demand states that, price and demand are inversely related; all things being equal. That is, at lower prices, consumers demand for more quantities. This means that, the lower the price of pap flour, the higher the quantity demanded. According to Koutsoyiannis (1979), willingness to pay for a good is therefore inherent in the definition of demand. Essentially, demand is a multivariate relationship which means that it is affected by various factors at the same time (simultaneously). Commodity's own price, consumers' income, prices of other commodities (wet pap, pap gel etc), consumers' taste, preferences, psychological factors (perception of the product, his knowledge, motivation, needs, and attitudes.) and socio-economic characteristics (age, sex, education, occupation etc.), culture, income distribution, total population, consumers' wealth, credit availability and government policies amongst others; are factors that will determine consumer's demand for a commodity (Adebayo, 2008).

Literature shows that various analytical tools have been to measure household food demand for processed (yam flour, cassava flour, garri, bean flour, palm oil, tobacco and rice among others) and unprocessed agricultural products (maize, yam, sorghum, millet, sweet/irish potato and beans among others) as well as non-agricultural commodities (petrol and alcohol). These analytical tools included: Almost Ideal Demand System (Edun and Adamu, 2013; Wogbe, 2000; Abdul, 2006; Odusina, 2008; Halbrendt et al., 1994; Fan et al., 1995 and Ogunniyi, 2011). However, other several studies (Sheng et al., 2005; Udoh et al., 2006; Oyinbo and Abdulsalam, 2013; Xia, 2015 and Wadud, 2006) have used the linearized version of the AIDS (LA/AIDS). However, the locally flexible functional form of the AIDS model exhibits small regular regions consistent with micro-economic theory. Secondly, even where non-linear models such as Almost Ideal Demand System (AIDS) model were used there was no allowance for a non-monotonic relationship between the marginal budget share and total expenditure. Quadratic Almost Ideal Demand System has been used in several food demand studies (Olorunfemi, 2013; Kibrom and Worku, 2012; Abiodun et al., 2009; Gould and Vilarreal, 2006; Molina and Gill, 2005; Jing et al., 2004; Abdullahi and Aubert, 2004; Abdulai, 2002; Fisher et al., 2001; Moro and Sekokai, 2000; Banks et al., 1997; Blundell and Robin, 1999; Meenkashi and Ray, 1999). The limitation of the QUAIDS model is that it does not allow for positive or negative externalities from expenditure on certain goods, for instance fuel, alcohol and tobacco. The assumption of no externalities can neither be altered nor tested and is a limitation on the usefulness of QUAIDS. Past studies (Direk and Amnat, 1988; Suchart, 1989; Prasarn, 1983; Mason et al., 1987; Lau et al., 1978) have utilized Linear Expenditure System (LES). LES has some limitation of not allowing inferior goods and necessity goods to become luxury goods at higher incomes and if equations are to be used for predictions, only short term predictions can be made and therefore these systems are more suited for the analysis of broad aggregate groups.

Generally, all the aforementioned analytical tools do not consider factors influencing consumers' decision to purchase a food item. The study utilized double hurdle model which is premised on the fact that the decisions to purchase and how much to consume are not governed by the same process. Specifically, double hurdle model tackles the problem of too many zeros (no consumption) in the survey data by giving special treatment to the participation decision. The model postulates that individual passes two separate hurdles before they are observed with a positive level of consumption of pap flour. The first hurdle corresponds to factors influencing participation in the demand for a commodity and the second hurdle examines the level of consumption of the commodity. Studies have reported that participation and consumption may be determined by different sets of factors (Moon et al., 2002; Huang et al., 1999; Lin and Milon, 1993). Many studies (Duy, 2012; Asteri et al., 2005; Ground and Koch, 2007; Moshoeshoe, 2012 Garcia and Labeage, 1996; Yen and Jones, 1996; Ogundari and Arifalo, 2013; Keeler et al., 2006; Bai et al., 2012; Atkinson et al., 1984; Pudney and Jones, 1989) on demand for food and non-food commodities have used double hurdle model.

**2.1. Analytical framework of double hurdle**

Yen and Jones (1996) argued that the double hurdle model allows for the possibility of zero observations in the second stage by recognizing the fact that zero expenditures is observed and could be due to any or combination of the following factors: (1) random effect (or data reporting problem), (2) the fact that the respondents are simply not interested in consuming pap flour (3) when the survey period is too short to allow consumers to report any purchase of the commodity of interest (infrequency of purchase). Double hurdle model contains two equations: The participation and consumption equation are given as:

$$d_i^* = Z_i' \alpha + u_i \dots\dots\dots (1)$$

$$y_i^* = X_i' \beta + v_i \dots\dots\dots (2)$$

$$\begin{bmatrix} \varepsilon \\ \mu \end{bmatrix} \sim N \left[ \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 10 & \\ & 0\sigma^2 \end{pmatrix} \right]$$

Where:

- $d_i^*$  = latent participation indicator,
- $y_i^*$  = latent consumption,
- $Z_i$  and  $X_i$  = vectors of explanatory variables

$\alpha$  and  $\beta$  = comfortable vectors of parameters

$u_i$  and  $v_i$  = the error terms are independently and normally distributed.

From the diagonality of the covariance matrix that the two error terms are assumed to be independently distributed. The first hurdle is then represented by:

$$d_i = 1 \text{ if } d_i^* > 0$$

$$d_i = 0 \text{ if } d_i^* \leq 0$$

The second hurdle closely resembles the Tobit model:

$$y_i^* = \max(y_i^{**}, 0)$$

Finally, the observed variable,  $y_i$ , is determined by the interaction of both hurdles as follows:

$$y = d_i y_i^*$$

The decisions of whether to participate in the demand for pap flour and about the size of  $Y$  (level of consumption of pap flour) can be jointly modeled, if they are made simultaneously by the individual; independently, if they are made separately; or sequentially, if one decision is made first and affects the other one (this is the dominance model). If the independence model applies (which was the initial position of Gragg (1971), the error terms are distributed as follows:

$$u_i = N(0,1)$$

$$v_i = N(0, \sigma^2)$$

If both decisions are made jointly (the dependent double hurdle) the error term can be assumed to have a bi-variate normal distribution defined as:

$$(u_i, v_i) \sim BVN(0, \psi)$$

Where:

$$\psi = \begin{bmatrix} 1 & \rho\sigma \\ \rho\sigma & \sigma^2 \end{bmatrix} \dots\dots\dots(3)$$

According to Shittu (2008), on the assumption that  $u_i \sim BVN(0, 1)$  and  $u_2 \sim N(0, \sigma_2)$ , it can be shown that:

$$\psi = \begin{bmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{bmatrix} = \begin{bmatrix} \sigma_1^2 & \frac{\sigma_{21}}{\sigma_1\sigma_2} \\ \frac{\sigma_{21}}{\sigma_1\sigma_2} \sigma_1\sigma_2 & \sigma_2^2 \end{bmatrix} = \begin{bmatrix} 1 & \rho\sigma \\ \rho\sigma & \sigma^2 \end{bmatrix}$$

The model is a dependent model if there is a relationship between the decision to consume pap flour and the amount consumed by households ( $Y$ ), that is:

$$\rho = \frac{\text{cov}(u_i, v_i)}{\sqrt{\text{var}(u_i, v_i) \text{var } v_i}}$$

If  $\rho = 0$  and there is dominance (the zeros are only associated to non-participation, not standard corner solutions) then the model decomposes into a Probit for participation and standard OLS for  $Y$  (consumption). When  $\rho = 0$ , the double-hurdle model reduces to Cragg's Independent Double-Hurdle model. According to Zhang et al. (2006), when  $\rho = 0$ ,  $x = z$  and  $\alpha = \beta/\sigma$ , it leads the Tobit model.

The log-likelihood function for the double hurdle model is:

$$\text{Log } L = \sum_0 \ln \left[ 1 - \Phi \left( Z_i' \alpha \right) \Phi \left( \frac{x_i' \beta}{\sigma} \right) \right] + \sum_+ \ln \left[ \Phi \left( Z_i' \alpha \right) \frac{1}{\sigma} \phi \left( \frac{y_i - x_i' \beta}{\sigma} \right) \right] \dots\dots (4)$$

**3. METHODOLOGY**

The study area was conducted in two out of eleven local government areas that make up Ibadan Metropolis in 2017. The two contiguous local government areas were Ibadan North and Ibadan North West with headquarters at Agodi and Dugbe respectively. The choice of the two local government areas was based on their metropolitan nature which accommodates the segmented market required for pap flour marketing. Many housing estates whose residents may have preference for pap flour (long shelf life) and supermarkets and markets with large stocks of pap flour were located in the LGAs.

Multistage sampling technique was adopted in the study. The first stage involved purposive selection of two out of eleven Local Government Areas in Ibadan metropolis based on the reasons enunciated above. The second stage involved the random selection of four housing estates and five supermarkets from each of the two local government areas. The third stage involved the random selection respondents based on proportionate to size (5%) from each of the housing estates and customers of supermarkets. The highly populated housing estates and supermarkets with larger customers had more representatives. Data were collected using structured questionnaires. Two hundred and seventy (270) questionnaires were administered at the estates and the supermarkets where different brands of pap flour were sold; two hundred and forty two (242) completed questionnaires were returned to time for the analysis.

Descriptive statistics, chi-square test and double hurdle model were employed to achieve the objective of the study. Specifically, descriptive statistics was used to analyze the socioeconomic characteristics of respondents while chi-square investigated whether perception of respondents on pap flour is influenced by occupation or not. The chi-square formula is given below:

$$\chi^2 = \sum \frac{(O - E)^2}{E} \dots\dots\dots (1)$$

$$E = \frac{\text{Row}_{\text{Total}} \times \text{Column}_{\text{Total}}}{\text{Grand}_{\text{Total}}} \dots\dots\dots (2)$$

Where:  $\chi^2$  represents the chi square

*O* represents the observed frequency

*E* represents the expected frequency

*v* represents the degree of freedom = (r-1) (c-1)

Double hurdle model was used to determine the factors influencing household preference for pap flour as well as factors influencing amount spent on pap flour per month by respondents in the study area. This model is made up of two steps (first and second hurdles). In the first hurdle, the factors influencing household (represented by the head) preference for pap flour was determined while in the second hurdle, factors influencing average amount spent on pap

flour was determined. The first hurdle needs to be crossed in order to be a potential consumer of pap flour. The two equations are:

The first hurdle shows the explicit form of the probit model as:

$$Y^* = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + e_i \dots\dots(3)$$

Where:

$Y^*$  represents respondents decision to buy or not to buy pap flour

$Y = 1$  means respondent has preference for pap flour

$Y = 0$  means respondent has no preference for pap flour

$X_1$  represents age (in years) of respondent

$X_2$  represents household size of respondent

$X_3$  represents monthly income of respondent (₺)

$X_4$  represents years of schooling of respondent

$X_5$  represents sex of respondent (Male = 1, Female = 0)

$X_6$  represents marital status of respondent (Married = 1, others = 0)

$X_7$  represents educational status

$e_i$  represents the error term

$B_i$  represents the coefficients,  $i$  runs from 1 to 7

The second hurdle is a Tobit model given as:

$$P^* = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + e_i$$

Where:

$P^*$  represents the amount spent on pap flour by respondent per month

$X_1$  represents age (in years) of respondent

$X_2$  represents household size of respondent

$X_3$  represents monthly income of respondent (₺)

$X_4$  represents years of schooling of respondent

$X_5$  represents duration of consumption of a pack of pap flour (in weeks)

$X_6$  represents sex of respondents (Male = 1, Female = 0)

$X_7$  represents educational status of respondent (Yes = 1, No = 0)

$X_8$  represents marital status (Married = 1, Single = 0)

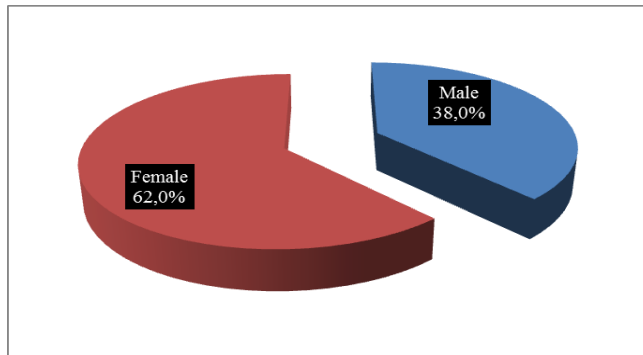
$e_i$  represents the error term

$B_i$  represents the coefficients,  $i$  runs from 1 to 8

#### 4. RESULTS and DISCUSSION

#### 4.1. Socioeconomic characteristics and perception of respondents on pap flour

The study revealed that majority of the respondents (62.0%) were female (see Figure 1). This is in line with the studies by Gideon et al. (2014); Basorun (2008); Opoku and Akorli (2009) and Kassali et al. (2010) that women are mostly household decision makers with regard to food consumption. Also, most of the respondents (42.6%) were between ages 18 and 27 years. This implies that most of the respondents were in their active working which is in agreement with the findings of Adejumo (2015).



**Figure 1. Sex distribution of respondents**

Table 1 shows that most respondents (52.9%) were single. This is in agreement with similar study by Sowunmi et al. (2009) which showed that 66.7% of their respondents were single. The average household size was 5.4 while most respondents (57.4%) had a household size of 4 - 6 persons. The positive skewness affirmed that most of the respondents had household size less than 5.4. Generally, urban dwellers are compelled to have small family size due to socioeconomic factors. The study revealed that 89.6% of the respondents possessed at least highest OND/NCE certificates while 38.4% of the respondents had B.Sc/HND certificates (see Table 1). Also, 38.8% of the respondents were private workers or employees. The respondents' average monthly income was ₦137, 753 while most respondents earned less than the average monthly income (positive skewness). The average monthly expenditure on pap flour was ₦553.50 while 0.53% of respondents' monthly income was spent on pap flour.

**Table 1. Socioeconomic characteristics of respondents**

| Age (years)    | Frequency  | Percentage |
|----------------|------------|------------|
| 18 – 27        | 103        | 42.6       |
| 28 – 36        | 51         | 21.1       |
| 37 – 45        | 38         | 15.7       |
| 46 – 54        | 37         | 15.3       |
| 55 – 63        | 10         | 4.1        |
| 64 and above   | 3          | 1.2        |
| <b>Total</b>   | <b>242</b> | <b>100</b> |
| Mean           | 33.7       |            |
| Skewness       | 0.8        |            |
| Household size | Frequency  | Percentage |
| 1 – 3          | 47         | 19.4       |
| 4 – 6          | 139        | 57.4       |
| 7 – 9          | 42         | 17.4       |



|                           |                  |                   |
|---------------------------|------------------|-------------------|
| 10 and above              | 14               | 5.8               |
| <b>Total</b>              | <b>242</b>       | <b>100</b>        |
| Mean                      | 5.4              |                   |
| Std. Deviation            | 2.5              |                   |
| Skewness                  | 1.6              |                   |
| <b>Educational status</b> | <b>Frequency</b> | <b>Percentage</b> |
| No formal education       | 1                | 0.4               |
| Primary school            | 3                | 1.2               |
| Secondary school          | 21               | 8.7               |
| OND/NCE                   | 36               | 14.9              |
| B.Sc/HND                  | 93               | 38.4              |
| Postgraduate              | 86               | 35.5              |
| Others (specify)          | 2                | 0.8               |
| <b>Total</b>              | <b>242</b>       | <b>100</b>        |
| <b>Monthly income (₺)</b> | <b>Frequency</b> | <b>Percentage</b> |
| Less than 50,000          | 67               | 27.7              |
| 50,001 – 150,000          | 77               | 31.8              |
| 150,001 – 250,000         | 22               | 9.1               |
| 250,001 – 350,000         | 13               | 5.4               |
| 350,001 – 450,000         | 8                | 3.3               |
| 450,001 – 550,000         | 5                | 2.1               |
| 550,001 – 650,000         | 3                | 1.2               |
| Above 650,000             | 3                | 1.2               |
| Mean                      | ₺137753.0        |                   |
| Skewness                  | 1.9              |                   |

Source: Field survey (2017)

Most respondents (74.8%) were aware of pap flour out of which 48.1% got to know about pap flour through friends and relatives. It was further revealed that more than half of the respondents in the study area (56.2%) consumed pap flour (see Table 3). The frequency of consumption of pap flour by 41.2% of the respondents was once a week. Most respondents (30.9%) claimed that they consumed pap flour because it saves time. The study revealed that 44.3% of the respondents did not consume pap flour because they disliked it. The study affirmed that respondents' occupation influenced perception on pap flour consumption ( $p < 0.05$ ) (see Table 2).

**Table 2. Chi-Square tests result**

|                    | Value               | Df | Asymptotic Significance (two-sided) |
|--------------------|---------------------|----|-------------------------------------|
| Pearson Chi-Square | 16.741 <sup>a</sup> | 6  | .010                                |
| Likelihood Ratio   | 17.367              | 6  | .008                                |
| N of Valid Cases   | 242                 |    |                                     |

Source: Field survey (2017).

**Table 3. Respondents' perception on pap flour**

| <b>Awareness</b>                           | <b>Frequency</b> | <b>Percentage</b> |
|--|------------------|-------------------|
| Aware                                      | 181              | 74.8              |
| Not aware                                  | 61               | 25.2              |
| <b>Source of Awareness</b>                 | <b>Frequency</b> | <b>Percentage</b> |
| In the market                              | 66               | 36.5              |
| Through friends and relatives              | 87               | 48.1              |
| Advertisement on radio/TV                  | 18               | 9.9               |
| Internet                                   | 9                | 5                 |
| Others                                     | 1                | 0.5               |
| Total                                      | 181              | 100               |
| <b>Reasons for consuming pap flour</b>     | <b>Frequency</b> | <b>Percentage</b> |
| Saves time                                 | 42               | 30.9              |
| Tastes better                              | 9                | 6.6               |
| Convenience                                | 20               | 14.7              |
| Less stress                                | 39               | 28.7              |
| More hygienic                              | 24               | 17.6              |
| Others (specify)                           | 2                | 1.5               |
| <b>Total</b>                               | 136              | 100               |
| <b>Reasons for not consuming pap flour</b> | <b>Frequency</b> | <b>Percentage</b> |
| Price                                      | 3                | 2.8               |
| Availability                               | 12               | 11.3              |
| Don't like pap flour                       | 47               | 44.3              |
| I don't know about it                      | 40               | 37.7              |
| Others                                     | 4                | 3.9               |
| <b>Total</b>                               | 106              | 100               |

Source: Field survey (2017)

#### 4.2. Determinants of households' decision to consume pap flour in the study area

The probit regression result (see Table 4) shows a negative log likelihood (-150.79) which indicated how quickly the model converged. The significance of likelihood ratio means that the model has a good fit ( $p < 0.01$ ); while pseudo R<sup>2</sup> was low. Out of the seven independent variables, coefficients of four variables statistically influenced respondents' choice of pap flour. These were household size ( $p < 0.1$ ), monthly income ( $p < 0.01$ ), years of schooling ( $p < 0.01$ ) and marital status ( $p < 0.05$ ). Specifically, the result shows that for an infinitesimal change in household size, the probability that the household will choose pap flour will reduce by 2.5%. Also, as the monthly income household head increases, the probability of choosing increases marginally (0.00009%). This may be attributed to the fact that household with large size prefers the wet pap which is cheaper but with lower shelf life. Moreover, the longer a respondents spent in school, the probability that pap flour will be chosen is 2.2%. Education makes consumers to appreciate quality product in term of packaging and the shelf life. The result also shows that the probability to consume pap flour increases among married respondents (see Table 4). Home prepared food including pap is common among the married. Using the predicted probabilities from the probit regression model, the average probability that a respondent chosen at random in the study area will consume pap flour was estimated (0.83). This implies that in every 100 persons chosen in the study area, 83 will consume pap flour.

**Table 4. Probit Analysis Result**

| Variables                            | Coefficient  | Std. Err. | z      | P>z   | dy/dx    |
|--------------------------------------|--------------|-----------|--------|-------|----------|
| Age of respondent (X <sub>1</sub> )  | -0.0023437   | 0.0135032 | -0.174 | 0.862 | -0.00218 |
| Household size (X <sub>2</sub> )     | -0.0638267*  | 0.0342686 | -1.863 | 0.063 | -0.02568 |
| Monthly income (X <sub>3</sub> )     | 2.29E-06***  | 8.47E-07  | 2.704  | 0.007 | 8.80E-07 |
| Years of schooling (X <sub>4</sub> ) | 0.0547232*** | 0.0209784 | 2.609  | 0.009 | 0.022134 |
| Sex of respondent (X <sub>5</sub> )  | -0.0796571   | 0.1817436 | -0.438 | 0.661 | -0.02485 |
| Marital status (X <sub>6</sub> )     | 0.5572624**  | 0.2380027 | 2.341  | 0.019 | 0.020539 |
| Educational status (X <sub>7</sub> ) | -0.5306114   | 0.6868089 | -0.773 | 0.440 | -0.19395 |
| Constant                             | -0.0013425   | 0.7536633 | -0.002 | 0.999 |          |

Number of obs = 240, LR chi2(7) = 26.85\*\*\*, Prob > chi2 = 0.0008, Log likelihood = -150.79  
Pseudo R<sup>2</sup> = 0.3817

Note: \*\*\* indicates significant at 1%, \*\* indicates significant at 5%, \* indicates significant at 10%.

Source: Field survey (2017)

### 4.3. Determinants of monthly household expenditure on pap flour

The Tobit regression result (see Table 5) shows that log likelihood is -1127.94. This indicates that the model converged quickly. The likelihood ratio (69.22) was significant ( $p < 0.01$ ). This means that the model has a good fit. The pseudo R<sup>2</sup> was moderate. The table shows that the coefficients of household size ( $p < 0.05$ ), monthly income ( $p < 0.01$ ), years of schooling ( $p < 0.01$ ), duration of consumption ( $p < 0.01$ ), educational status ( $p < 0.05$ ) and marital status ( $p < 0.1$ ) were statistically significant. These independent variables influenced consumer's monthly expenditure on pap flour. The coefficients of monthly income, years of schooling, duration of consumption, educational status and marital status positively influenced monthly expenditure on pap flour while household size has a negative relationship with consumer's monthly expenditure.

**Table 5. Tobit Analysis Result**

| Variables                                 | Coef.        | Std. Err. | z-value | P>t   |
|---|--------------|-----------|---------|-------|
| Age of respondent (X <sub>1</sub> )       | -3.629403    | 6.460524  | -0.562  | 0.575 |
| Household size (X <sub>2</sub> )          | -8.653274**  | 3.77524   | -2.292  | 0.022 |
| Monthly income (X <sub>3</sub> )          | 0.0007664*** | 0.0002491 | 3.077   | 0.002 |
| Years of schooling (X <sub>4</sub> )      | 31.11743***  | 10.59157  | 2.938   | 0.004 |
| Duration of consumption (X <sub>5</sub> ) | 117.9074***  | 18.34406  | 6.428   | 0.000 |
| Sex of respondent (X <sub>6</sub> )       | -87.58886    | 89.7417   | -0.976  | 0.330 |
| Educational status (X <sub>7</sub> )      | 95.05149**   | 47.4335   | 2.004   | 0.045 |
| Marital status (X <sub>8</sub> )          | 124.5145*    | 68.9633   | 1.806   | 0.071 |
| Constant                                  | -615.4755    | 421.886   | -1.459  | 0.146 |

Number of obs = 240, LR chi<sup>2</sup>(8) = 69.22, Prob > chi<sup>2</sup> = 0.0000, Pseudo R<sup>2</sup> = 0.5150,  
Log likelihood = -1127.94

Note: \*\*\* indicates significant at 1%, \*\* indicates significant at 5% and \* indicates significant at 10%.

Source: Field survey (2017)

## 5. CONCLUSION AND RECOMMENDATION

Processing of agricultural products does not only reduce postharvest losses but also add values to the product. Thus, attracting better price than the raw product. The study showed that among the residents, the awareness on pap flour was high but the effective demand was low. The consumers acknowledged that pap flour saves time and the shelf life is longer compared to wet pap. However, the demand for the product was high among the well educated, high income earners and married respondents with small household size. In order to maximize pap flour sales by producers and marketers, the need to identify segmented market is important; with the aforementioned characteristics possessed by the targeted consumers.

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