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**HOUSEHOLDS' PERCEPTION AND WILLINGNESS TO PAY FOR BREAD WITH
CASSAVA FLOUR INCLUSION IN OSOGBO METROPOLIS, OSUN STATE,
NIGERIA**

by

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*Invited paper presented at the 4th International Conference of the African Association of
Agricultural Economists, September 22-25, 2013, Hammamet, Tunisia*

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Abstract

The rising cost of wheat importation for the production of bread, a well-established and accepted food product relished by the general public, has been a matter of great concern to the Nigerian government in recent times. This has led to the increased interest in cassava flour which has been identified as a close, cost-effective substitute to wheat flour in bread production. Motivated by the far-reaching benefits of the new cassava policy on the substitution of wheat flour with cassava flour in bread production to the economy, a logistic regression model was employed to examine households' perception and willingness to pay for bread with cassava flour inclusion in Osogbo Metropolis, Osun State, Nigeria. Findings suggest that bakery owners adopting the use of cassava flour in bread production pay careful attention to the taste, packaging, size, colour and price of the bread since these variables affect the buying decisions of the consumers. While consumers' willingness to pay a premium varied with degrees of cassava flour inclusion, households' willingness to pay showed a negative relationship with the premium price and a positive, significant relationship with household income and share of bread in total household food expenditure. Thus, proper attention should be given to price stabilization of bread with cassava flour inclusion as well as the design of empowerment programmes targeted at increasing household income.

Keywords: Bread, Cassava Flour Inclusion, Willingness to pay, Osogbo Metropolis

1. Introduction

Cassava (*Manihot esculenta crantz*) is the developing world's fourth most important crop after wheat, rice and maize. It represents a staple food for nearly a billion people in 105 countries from Asia, Tropical Africa and Latin America and provides a dependable source of livelihood for millions of farmers and many processors and traders worldwide (FAO, 2008a). The five largest producers of cassava in the world are: Nigeria, Thailand, Brazil, Indonesia and Congo Democratic Republic (FAO, 2010). However, Nigerian cassava production with 45.7, 43.4 and 44.6 million tons in 2006, 2007 and 2008 respectively is by far the largest in the world; a third more than production in Brazil and almost double the production of Indonesia and Thailand (FAOSTAT, 2009). Its high resilience and adaptability to a wide range of agro-ecological conditions and its ability to produce reasonable, dependable yields where most crops like maize cannot thrive has sustained its production through many generations in sub-Saharan Africa, a region susceptible to the damaging effects of drought and heavy rainfall (Adebayo *et al.*, 2009).

Cassava production also contributes largely to food security at the household level most especially for marginalized poor farm households who often live in marginalized areas- the same areas where cassava performs well. However, Nigeria accounts for zero per cent in terms of value-added to cassava globally. Thailand, for example, accounts for 10% of the total production of cassava in the world. Yet, it accounts for 80% of the value-added globally (Akinwumi, 2012). While others are adding value into what they have comparative advantage, Nigeria is spending billions annually in importing wheat, which she does not have comparative advantage in relation to other countries. Hence, development of market opportunities for cassava becomes imperative in ensuring increased income for resource-

constrained households, increased employment opportunities and the potential of having lower food prices for consumers (Plucknett, 1998).

Like cassava, bread is a staple food in developing countries. In Nigeria, it is consumed in relatively large quantities by different classes of people irrespective of their social status because it is affordable and available in a “ready to eat” form (Darko, 2002). The major ingredients in bread making are flour, water and yeast (Akobudu, 2006; Osuji, 2006). Before now, imported wheat flour has been the only kind of flour used in bread production in Nigeria. However, over the years, in response to the increase in the price of wheat, the rising cost of importation and the establishment of the composite flour program in 1964 by the Food and Agriculture Organization of the United Nations (FAO) with the main objective of developing bakery products with locally available raw materials in tropical countries that could not meet the requirements for wheat imports, researchers have come out with the conclusion that wheat flour can be successfully substituted with cassava flour in bread (IITA, 2002, Giami *et al.*, 2004, Nangano *et al.*, 2005, Pasqualone *et al.*, 2010).

While evaluating the nutritional value of the following composite flours: Cocoyam: wheat: Soybean (50:20:30), Cassava: wheat: soybean (50:20:30), and Sweet potato: wheat: soybean (50:25:25), Lyimo *et al.* (2007) found out that the cassava, wheat and soybean combination had the highest level of carbohydrate but the lowest percentage of protein. They concluded that formulation of composite flour of root and tubers such as cocoyam, cassava, and sweet potato up to 50% with cereals (wheat and maize) and legumes (such as soybeans) are good sources of carbohydrates and therefore may be adopted as an alternative and cheap source of energy. They further asserted that cassava flour can be used to substitute for wheat flour in producing good composite bread properties and with cereals such as maize to produce weaning mixtures, which will ensure food security. Similarly, Giami *et al.*, (2004) and Akubundu (2005) opined that up to 20% substitution of wheat flour for cassava flour had no adverse sensory and organoleptic effect on bread. This implies that bread made from flour with 10% and 20% cassava flour inclusion were not significantly different in most sensory attributes from bread made with 100% wheat flour. In fact, bread baked from wheat flour with 10% and 20% cassava flour inclusion was rated higher in aroma, colour, flavour, general acceptability and preference than 100% wheat flour. In Ghana, for instance, consumers have accepted as levels as high as 35% cassava flour content in sweet biscuits and 60% in hard dough biscuits. Research findings at the Federal Institute for Industrial Research, Oshodi (FIRRO) in Lagos showed that cassava flour can be successfully incorporated into wheat flour for bread making at different levels of substitution, 10-15% being most acceptable, while 15-20% is acceptable for confectionaries and other baked products (FIRRO, 2006). While substituting wheat with flour from other starchy crops like cassava in bread is not a new practice, it was not attempted by Nigeria until 2002 despite the fact that the country could not meet her wheat requirements. The then Obasanjo government made it mandatory for bakers to include 10 per cent of cassava flour in the production of bread and all other flour-based products. The lack of understanding of the millers on the possibility of cassava flour inclusion with wheat flour for making bread coupled with the insufficient domestic capacity to process industry grade cassava flour, hampered the success of the program and forced the government to reduce the cassava inclusion rate down to 5 percent (Global Agricultural Information Network, 2012). The program was abandoned altogether in 2007 as

with most other programmes in Nigeria and accounts for why N635 billion is still being spent on wheat importation annually.

In view of this, the present Nigerian government in a programme tagged “Agricultural Transformation Agenda (ATA)”, developed a series of policies with emphasis on transforming the agricultural sector in the structural and functional elements through the systematic development of commodity and financial value chains that guarantee competitiveness and efficiency in the use of agricultural products like cassava, sorghum, cocoa, rice and cotton. Bread, being a food product that is relished by the general public, one that can be made using cassava flour, therefore forms the centre of attention and interest. The policy stipulates measures to be taken to encourage flour millers, corporate bakers and master bakers across the country to start substituting wheat flour with cassava flour. This is as a result of its far-reaching benefits to the economy with respect to price stabilisation, creation of new markets for farmers, new job opportunities and most importantly, the reduction of amount spent on importation of wheat by about N335 million annually (Gbola, 2012; Layi, 2012). However, several criticisms have resulted against this policy. For instance, Nigerian law makers argued that compelling bakers to include cassava flour in bread production would amount to coercing Nigerians to eat products that might be injurious to their health. This is with respect to the claim that the country has a measurable diabetic population and that diabetic patients are barred from consuming foods such as cassava. The farmers, however, found this to be insubstantial, stating that diabetics have not been found to be more prevalent in parts of the country, where gari, fufu and tapioca, all made from cassava, are staple foods.

Based on the foregoing, the Federal Institute of Industrial Research (FIRO) embarked on a research of measuring the glycemic index, which is an indicator of how much individuals with diabetes and non-diabetics can handle the blood sugar levels due to the level of carbohydrates. The result indicates that cassava has a glycemic index of 52-53 which falls between the recommended glycemic index of 0-55 for diabetic patients. Hence, the claim that cassava should not be taken by diabetic patients was debunked. Also to substantiate this, the National Agency for Food and Drug, Administration and Control (NAFDAC), after considering the nutrients and health implications of cassava, concluded that the inclusion of cassava flour in bread production is wholesome (Chukwu, 2012). However, for successful implementation and sustenance of this promising plan, the view of the government is not enough. Just the way a minute hole could sink a gigantic ship, so a seemingly unnoticed or passive attention to the perception of consumers (households) about this policy and their willingness to pay for bread with cassava flour inclusion could result in a “sink” of the entire plan, keeping farmers of wheat exporting countries employed while displacing people at home from their jobs. Hence, this study intends to assess households’ perception and willingness to pay for bread with cassava flour inclusion in Osogbo metropolis, Osun State, Nigeria.

In line with the framework adapted from Millock *et al.*, (2002) and Bonti-Ankomah and Yiridoe, (2006), factors that directly affect consumers’ willingness to pay are consumers’ attitude, socio-economic attributes, purchase behavior and product attributes while factors that indirectly affect consumers’ willingness to pay for food products include advertisement, certification and labeling, perceived food quality, available information and knowledge. If an

individual cannot clearly differentiate between two alternative products, a price premium on a food product can confuse and/or affect the individual's purchasing decision.

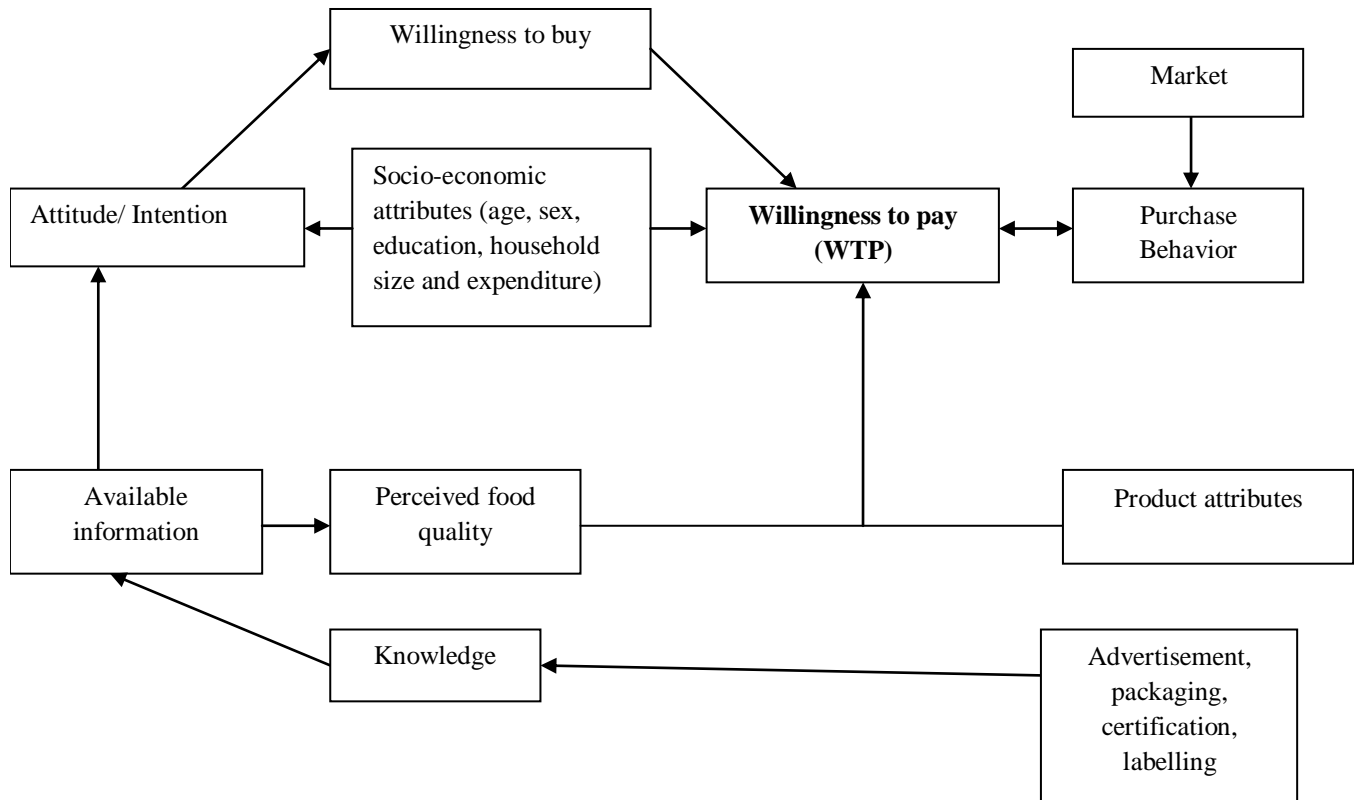


Figure 1: Framework reflecting Consumer Behavior towards Food Products
Adapted from Millock et al. (2002) and Bonti-Ankomah and Yiridoe (2006).

2. Review of Empirical Studies on Consumers' Willingness to pay for Food Products

Several studies have been carried out on consumers' willingness to pay for various food commodities. For instance, Munene (2006) analyzed consumer attitudes and their willingness to pay for functional foods using ordered probit models and the Contingent Valuation Method, he found that beliefs about the link between nutrition and health, concern about chronic diseases, current purchasing and consumption patterns and attitude towards functional foods were factors that significantly affected the respondents' willingness to pay a premium for functional foods. Similarly, Prathiraja and Ariyawardana (2003) in their study on the impact of nutritional labelling on consumer buying behaviour found out that consumers use nutritional labelling when making a purchasing decision because of their health consciousness. They further revealed that the majority of respondents were willing to pay more money for the nutritional information on food items.

In the same vein, Bhatta *et al.*, (2008) found available information to be an important factor influencing willingness to pay for organic products. The major factors identified by the

consumers include lack of information, higher prices over those of conventional foods and the limited and erratic nature of domestic supply of organic products. Majority (88%) of the consumers complained about irregular supply of the products which they said discourages them from buying more and the lack of means of differentiating organic from inorganic products. This findings corroborates the findings of Oviahon *et al.* (2011) on the determinants of bread consumers' willingness to pay for safety labels in Oredo Local Government Area of Edo State, Nigeria. Regression results revealed that educational level, new price, marital status, what respondents look out for in bread and source of information were the variables significant in explaining consumers' willingness to pay. However, contrary to the findings of Bhatta *et al.* (2008); Oviahon (2011) and Lupin *et al.* (2008) in a survey on consumers' willingness to pay for organic foods in Argentina, informed consumers were willing to pay price premiums for organic products. They concluded that lack of store availability, reliable regulatory system to control quality risks rather than price seemed to be the reason for the low consumption of organic products in Argentina. From the review of literature above, it is evident that there is a dearth of studies on consumers' willingness to pay for bread with cassava flour inclusion in Nigeria, a gap this study attempts to fill.

3. Materials and Methods

Area of Study: The study was carried out in Osogbo metropolis of Osun State, Nigeria. Osogbo metropolis consists of 3 local governments; Osogbo, Olorunda and Egbedore Local Government Areas (LGAs) with a total population of approximately 350,000 people (NPC, 2006). Osogbo is situated on Latitude 9.7°N and on Longitude 4.5°E of the equator. The area is marked by two seasons, the raining season which starts from April and terminates in October, and dry season which prevails from October to March. The town with an annual rainfall of about 0.6 meters lies mainly in the deciduous forest area which spreads towards the grassland belt of Ikirun, north of Osogbo. Osogbo is situated on a raised land which is well over 500 meters (800 feet) above the sea level and is drained by the Osun River and its tributaries. Even though farming is the traditional and major occupation of the people of Osogbo, industrial activities are commonplace.

Source of Data and Sampling Procedure: Primary data used in the study were collected from representative households using a multi-stage sampling procedure. In the first stage, 2 Local Government Areas (Osogbo and Olorunda) were randomly selected out of the 3 local governments in Osogbo Metropolis. The second stage involved the selection of 10 wards out of the 26 wards in the local government areas based on probability proportionate to size while the last stage was the selection of 150 households from the selected wards based on probability proportionate to size.

However, out of the 150 respondents sampled for the purpose of this research, only 127 provided useful and complete information. These 127 households constituted the sample size for this study.

Method of Data Analysis: The analytical methods used in this study include Descriptive Statistics, Contingent Valuation and the Logistic Regression Method. Descriptive statistics such as frequency tables, percentages and means were used to analyze respondents' socio-economic characteristics and the level of awareness and perception of households about bread with cassava flour inclusion while logistic regression was used to analyze factors affecting

households' willingness to pay for bread with cassava flour inclusion. The double-bounded contingent valuation model was used to narrow down the willingness to pay of respondents by asking a series of questions about their willingness to pay. This method has been shown to generate more efficient estimates than those based on a single question or those that ask an open-ended question about willingness to pay [Hanemann *et al.* (1991), Watson and Ryan, (2007)].

To identify the factors influencing willingness to pay for bread with cassava flour inclusion, households' responses to the willingness to pay question was regressed against the prices they were willing to pay and other socio-economic characteristics. The logit regression model is specified as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_{10} X_{10} + u_i$$

Where Y is the dependent variable, representing consumers' willingness to pay in naira, β stands for estimated parameters explaining the participatory variables respectively, X_i is a vector of respondents' characteristics relevant in explaining their demand for and willingness to pay for bread with cassava flour inclusion while u_i represents the error term.

Four separate regressions were estimated to clearly reveal the factors affecting households' willingness to pay for bread with 10%, 20%, 30% and 40% cassava flour inclusion.

Dependent variable

Y= Consumers' willingness to pay for bread with cassava flour inclusion (willing to pay = 1, 0 otherwise)

The independent variables include;

X_1 = Household Size

X_2 = Age (in years)

X_3 = Tertiary Education (yes = 1, 0 = otherwise)

X_4 = Occupation (Government salaried job = 1, 0 = otherwise)

X_5 = Sex (male=1, otherwise=0)

X_6 = Marital Status (married=1, 0 = otherwise)

X_7 = Awareness of bread with cassava flour inclusion (aware=1, 0 = otherwise)

X_8 = Household Income (Naira)

X_9 = Share of Bread in total household food expenditure

X_{10} = Bids of bread with varying degrees of cassava flour inclusion (Naira)

u_i = Error

The mean willingness to pay for bread with cassava flour inclusion by households was estimated using the coefficient estimates from the Logistic Regression Model specified above following Adepoju and Omonona (2009), Adepoju and Salimonu (2010) and Oviahon *et al.*, (2011).

$$\text{Mean WTP} = 1 * \ln \frac{1 + \exp \beta_0}{\beta_1} \dots \dots \dots (10)$$

Where β_0 and β_1 are absolute coefficient estimates from the logistic regression.

4. Discussion

Table 1 presents some selected socio-economic characteristics of the respondents. The mean age of respondents in the study area was 40.3 years which implies that majority of the respondents are in their active working age while almost all the respondents have one form of

formal education or the other but with majority having tertiary education. This could be as a result of the fact that some form of education is needed to fit into the urban way of life. Also, more than three-fifths of the sampled household heads were married while the mean household size of respondents was approximately 4 members per household. The average monthly income of the respondents stood at ₦79,034.

Table 1: Selected Socio-economic Characteristics of Respondents

| Variables | Frequency | Percentage |
|---------------------------|------------------|-------------------|
| Age(in years) | | |
| 20-29 | 26 | 20.5 |
| 30-39 | 43 | 33.8 |
| 40-49 | 27 | 21.3 |
| 50-59 | 24 | 18.9 |
| >59 | 7 | 5.5 |
| Total | 127 | 100.0 |
| Mean | 40.3 | |
| SD | 11.68 | |
| Educational Status | | |
| No Formal Education | 3 | 2.4 |
| Primary | 2 | 1.6 |
| Secondary | 56 | 44.0 |
| Tertiary | 66 | 52.0 |
| Total | 127 | 100.0 |
| Marital Status | | |
| Single | 35 | 27.6 |
| Married | 92 | 72.4 |
| Total | 127 | 100.0 |
| Household Size | | |
| 1-4 | 82 | 64.6 |
| 5-8 | 43 | 33.8 |
| >8 | 2 | 1.6 |
| Total | 127 | 100.0 |
| Mean | 3.95 | |
| SD | 1.86 | |
| Monthly Income (₦) | | |
| 0-40000 | 53 | 41.8 |
| 40001-80000 | 33 | 25.9 |
| >80000 | 4 | 32.3 |
| Total | 127 | 100.0 |
| Mean | ₦79,034 | |
| SD | ₦81,467 | |

Source: Field Survey, 2012

The distribution of respondents by awareness and perception of use of cassava flour in bread making in Table 2 revealed that a sizable proportion (72.4%) of the respondents were aware of the newly introduced policy on cassava flour inclusion in bread. This could be attributed to the high literacy level of the respondents.

Also, about three-fifths (60.8%) of the respondents asserted that they had never tasted bread with cassava flour inclusion while about one-fifths (19.6%) reported that they had eaten bread with cassava flour inclusion. Of the 19.6% that reported having tasted it, 11.8% preferred it to wheat flour bread while 10.1% reported that they were satisfied with it. Further, when asked if the level of satisfaction derived from the consumption of the bread would guarantee their future purchases, 14.8% of the respondents were positive that it would while the remaining 4.8% were of the opinion that it would not or were undecided. However, of the 102 respondents who were yet to taste bread with cassava flour inclusion, a greater proportion (65.4%) expressed their willingness to while the remaining 15.0% were either unwilling or undecided.

Table 2: Distribution of Respondents based on Awareness and Perception about Bread with Cassava Flour Inclusion

| Variables | Frequency | Percentage |
|---|------------------|-------------------|
| Awareness of Use of Cassava Flour in Bread Making | | |
| Yes | 92 | 72.4 |
| No | 35 | 27.6 |
| Total | 127 | 100.0 |
| Ever tasted Bread with Cassava Flour Inclusion | | |
| Yes | 25 | 19.6 |
| No | 77 | 60.8 |
| Don't Know | 25 | 19.6 |
| Total | 127 | 100.0 |
| Preference for Bread with Cassava Flour Inclusion | | |
| Yes | 15 | 11.8 |
| No | 6 | 4.7 |
| Don't Know | 4 | 3.1 |
| Total | 25 | 19.6 |
| Feeling of Satisfaction | | |
| Satisfied | 13 | 10.1 |
| Very Satisfied | 6 | 4.7 |
| Not Satisfied | 3 | 2.4 |
| Undecided | 3 | 2.4 |
| Total | 25 | 19.6 |
| Potential Consumers' Willingness to taste Bread with Cassava Flour Inclusion | | |
| Yes | 83 | 65.4 |
| No | 11 | 8.7 |

| | | |
|---|-----|------|
| Don't Know | 8 | 6.3 |
| Total | 102 | 80.4 |
| Consumers' Level of Satisfaction and Future Purchase of Bread with Cassava Flour Inclusion | | |
| Yes | 19 | 14.8 |
| No | 3 | 2.4 |
| Don't Know | 3 | 2.4 |
| Total | 25 | 19.6 |

Source: Field Survey, 2012

Factors such as taste, packaging, price, size, colour, market distance, health benefits have been found to affect consumers' buying decisions. For example, Chabikuli (2011) found out that price, brand name, fibre content and taste affected consumers' buying decisions for high fibre products. Similarly, Akankwasa (2007) reported that taste and skin colour significantly affected consumers' buying decisions for introduced dessert bananas. In line with previous studies, Table 3 reveals that price, taste, packaging, size, colour, market distance and health benefits are the factors influencing the buying decisions of the respondents. While 90.6% considered price to be very important in paying a premium for bread, 76.4% regarded size to be of great importance. However, of all the variables affecting the buying decisions of respondents, taste appears to be the most important as about 123 respondents (96.8%) reported that they will be willing to pay a premium for bread with cassava flour inclusion only if proper attention is given to the taste. This is followed by price, health benefits, packaging, size and colour respectively. The least important variable affecting buying decisions of the respondents was found to be market distance.

Table 3: Factors Influencing Consumers' Buying Decisions

| Variables | Frequency | Percentage |
|------------------------|-----------|------------|
| Taste | | |
| Unimportant | - | - |
| Of Little Importance | 2 | 1.6 |
| Very Important | 123 | 96.8 |
| Don't Know/Unsure | 2 | 1.6 |
| Price | | |
| Unimportant | 1 | 0.8 |
| Of Little Importance | 8 | 6.2 |
| Very Important | 115 | 90.6 |
| Don't Know/Unsure | 3 | 2.4 |
| Health Benefits | | |
| Unimportant | - | - |
| Of Little Importance | 10 | 7.9 |
| Very Important | 113 | 89.0 |
| Don't Know/Unsure | 4 | 3.1 |
| Packaging | | |

| | | |
|------------------------|------------|--------------|
| Unimportant | 3 | 2.4 |
| Of Little Importance | 16 | 12.6 |
| Very Important | 101 | 79.5 |
| Don't Know/Unsure | 7 | 5.5 |
| Size | | |
| Unimportant | 2 | 1.6 |
| Of Little Importance | 24 | 18.9 |
| Very Important | 97 | 76.4 |
| Don't Know/Unsure | 4 | 3.1 |
| Colour | | |
| Unimportant | 5 | 3.9 |
| Of Little Importance | 29 | 22.8 |
| Very Important | 89 | 70.2 |
| Don't Know/Unsure | 4 | 3.1 |
| Market Distance | | |
| Unimportant | 17 | 13.4 |
| Of Little Importance | 36 | 28.3 |
| Very Important | 67 | 52.8 |
| Don't Know/Unsure | 7 | 5.5 |
| Total | 127 | 100.0 |

Source: Field Survey, 2012

Table 4 shows the maximum likelihood estimates of the logit model used to assess the determinants of households' willingness to pay for bread with varying degrees (10%, 20%, 30% and 40%) of cassava flour inclusion. The chi-squared values for the four separate logistic regression models and their statistical significance show that the model is well fitted. The results of marginal effects of the regression are presented as follows; Out of the ten explanatory variables included in the regression model for bread with 10% cassava flour inclusion, only bid was significant in explaining households' willingness to pay. The bid, representing the original price of the common smallest loaf of bread plus the extra the respondents were willing to pay, had a negative and significant effect on the willingness of respondents to pay for the bread. The bid value of -0.026 implies that for every naira increase in the price of bread with 10% cassava flour, the likelihood of respondents paying for the bread will reduce by 0.026. This is consistent with the findings of Oni *et al.* (2005), Alagbe (2006), Yusuf *et al.*, (2007) and Oviahon *et al.* (2011) that increase in price reduces consumers' willingness to pay for food commodities.

With respect to bread with 20% cassava flour inclusion, bid, age of the household head and share of bread in total household food expenditure were the significant factors explaining households' willingness to pay. The marginal effect coefficient of -0.048 for bid implies that a naira increase in the premium price will lead to a decrease in households' willingness to pay for bread with 20% cassava flour inclusion by 0.048. However, with respect to age, a positive and significant marginal effect coefficient of 0.014 implies that older people are likely to spend more on bread with 20% cassava flour inclusion than younger ones. Similarly, the positive and significant relationship observed between the share of bread in monthly food expenditure of households and their willingness to pay implies that a naira increase in amount

spent on bread as a proportion of total household food expenditure will lead to an increase in households' willingness to pay by 1.926.

Regression results for bread with 30% cassava flour inclusion indicates that bid (premium price), household income, and the share of bread in monthly food expenditure of households are statistically significant factors affecting households' willingness to pay in the study area. While a unit increase in premium price will lead to a decrease in households' willingness to pay for bread with 30% cassava flour inclusion by 0.030, household income will increase the likelihood of paying for bread with 30% cassava flour inclusion. Also, with respect to share of bread in total monthly food expenditure, result shows that a naira increase in the share of bread in monthly food expenditure will lead to an increase in households' willingness to pay by 1.558.

Further, the logistic regression result for bread with 40% cassava flour inclusion followed the same pattern as that of bread with 10% cassava flour inclusion as only bid (premium price) was found to be significant. The negative and significant value of the premium price of -0.046 suggests that for every unit increase in the price of bread with 40% cassava flour inclusion, the likelihood of respondents paying reduces by 0.046.

Table 4: Logistic Regression Results at 10%, 20%, 30% and 40% Cassava Flour Inclusion in Bread

| Variables | 10% | | 20% | | 30% | | 40% | |
|--------------------|----------|--------------|----------|--------------|----------|--------------|----------|--------------|
| | dy/dx | Z-Statistics | dy/dx | Z-Statistics | dy/dx | Z-Statistics | dy/dx | Z-Statistics |
| Bid (₦) | -0.026 | -5.29* | -0.048 | -5.60* | -0.030 | -5.47* | -0.046 | -5.99* |
| Sex | 0.072 | 0.67 | 0.097 | 0.77 | -0.035 | -0.33 | -0.143 | 1.12 |
| Age (Years) | 0.008 | 1.46 | 0.014 | 2.31** | 0.006 | 1.15 | 0.005 | 0.76 |
| Marital Status | 0.054 | 0.49 | 0.138 | 0.96 | -0.073 | -0.65 | 0.193 | 1.25 |
| Household Size | -0.185 | -0.59 | 0.002 | 0.06 | -0.022 | -0.72 | -0.002 | -0.06 |
| Tertiary Education | -0.089 | -0.80 | 0.133 | 0.94 | -0.151 | -1.27 | -0.221 | -1.48 |
| Occupation | 0.601 | 0.48 | -0.198 | -1.04 | 0.035 | 0.28 | 0.030 | 0.19 |
| Household Income | 7.40e-08 | 0.10 | 2.41e-07 | 0.32 | 1.86e-06 | 2.25** | 1.07e-06 | 0.97 |
| Share of Bread | -0.817 | -0.93 | 1.926 | 1.90*** | 1.558 | 1.70*** | -1.203 | -1.13 |
| Level of Awareness | 0.001 | 0.01 | 0.135 | 0.90 | 0.169 | 1.38 | 0.042 | 0.30 |

*P<0.01; **P<0.05 and ***P<0.10=Significant at 1%, 5% and 10% probability level respectively

Number of observations = 127

Degree of Freedom = 10

10%
Prob> chi² = 0.0000
LR chi² (10) = 45.09

20%
Prob> chi² = 0.0000
LR chi² (10) = 114.13

30%
Prob> chi² = 0.0000
LR chi² (10) = 65.89

40%
Prob> chi² = 0.0000
LR chi² (10) = 94.96

Log likelihood = -60.5966 Log likelihood = -26.0810 Log likelihood = -49.6185 Log likelihood = -37.6571
Pseudo R² = 0.2712 Pseudo R² = 0.6863 Pseudo R² = 0.3990 Pseudo R² = 0.5577

As presented in Table 5, the mean willingness to pay for bread with 10% cassava flour inclusion was ₦61.09, implying that the premium above what consumers are currently paying for the common smallest loaf of bread (₦50) is ₦11.09. This was estimated as the mean willingness to pay minus what consumers are currently paying and it implies that on the average, the extra amount to be added to bread as a result of a 10% cassava flour inclusion should be ₦11.09 above which consumers might not be willing to pay for the bread.

For bread with 20% cassava flour inclusion, the mean willingness to pay stood at ₦61.37 indicating a slight increase of 28 kobo on that which was obtained for bread with 10% cassava inclusion. This implies that on the average, the extra amount to be added to bread as a result of a 20% cassava flour inclusion should be ₦11.37 for consumers to be willing to pay for the bread.

Table 5: Mean Willingness to Pay for Bread with Varying Degrees of Cassava Flour Inclusion

| Cassava Content | Flour | WTP (Naira) | Lower Bound | Upper Bound |
|------------------------|--------------|--------------------|--------------------|--------------------|
| 10% | | 61.09 | 57.81 | 66.07 |
| 20% | | 61.37 | 59.03 | 63.98 |
| 30% | | 64.42 | 61.15 | 68.38 |
| 40% | | 62.46 | 59.84 | 65.22 |

Source: Authors Computation, 2012

The mean willingness to pay for bread with 30% cassava flour inclusion was estimated as ₦64.42 which represents an increase of ₦3.05 on that which was obtained for bread with 20% cassava inclusion. The implication of this is that consumers will only be willing to pay for the bread as long as the extra amount added as a result of 30% cassava flour inclusion does not exceed ₦14.42 on the average.

However, with respect to bread with 40% cassava flour inclusion, mean willingness to pay was estimated as ₦62.46. Hence, the premium above what consumers are currently paying for the common smallest loaf of bread is ₦12.46. This implies that on the average, if an extra amount is to be added to bread as a result of a 40% cassava flour inclusion, it should be ₦12.46. This result shows a slight decrease of ₦1.96 to that which was obtained for bread with 30% cassava flour inclusion. The progressive rise in the average amount bread consumers are willing to pay for bread with 10-30% cassava flour inclusion could be attributed to the high literacy level of respondents and their willingness to try new food products but the decline in the average amount for bread with 40% cassava flour inclusion gives an indication of the highest level of cassava flour inclusion in bread after which households in the study area may not be willing to continue to pay a premium for.

Conclusion and Policy Recommendation

The study concludes that a sizable proportion of respondents were aware about the newly introduced cassava flour inclusion policy in bread. Majority of the respondents who had actually tasted bread with cassava flour inclusion preferred it to bread made entirely from wheat flour and reported that the level of satisfaction they received from the consumption of the bread will guarantee their future purchases. Also, the study revealed that households' willingness to pay for bread with varying degrees of cassava flour inclusion is influenced particularly by the premium price (bid), household income, age and the share of bread in total household food expenditure. The result of the analysis of the mean willingness to pay for bread with cassava inclusion is also a pointer to policy makers on the highest level of cassava flour inclusion to be adopted above which a households' willingness to pay may start to decline. Therefore, based on the findings of the study, it is recommended that bakery owners adopting the use of cassava flour in bread production pay careful attention to the taste, packaging, size, colour and price of the bread since these variables affect the buying decisions of the consumers

Also, proper attention should be given to price stabilization of bread with cassava flour inclusion as well as the design of empowerment programmes targeted at increasing household income since the premium price (bid) and household income exerted negative and positive effects on households' willingness to pay for bread with cassava flour inclusion respectively.

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