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CONSUMER WILLINGNESS TO PAY FOR SAFE BREAD IN ETINAN LOCAL GOVERNMENT AREA OF AKWA IBOM STATE, NIGERIA

Dontsop Nguezet P. M.[1], Udoh E. S.[1] and Adelekan O. J.[2]
[1]Department of Agricultural Economics, University of Ibadan, Nigeria
[2]Department of Economics, Joseph Ayo Babalola University, Nigeria
E-Mail: pdontsop@yahoo.fr

ABSTRACT

Research over the years has shown that potassium bromate when used in bread production is a source of food poisoning. This study estimated the demand for bread, determined consumers' level of awareness of harmful health effects of bromate, as well as their confidence in safety labels, examined the factors that influence consumers' willingness-to-pay for safe bread and determined how much more consumers' are willing to pay for safe bread. A multi - stage random sampling was used to select two hundred (200) households used for the analysis. Descriptive statistics, Ordinary Least Squares (OLS) regression model and Maximum Likelihood Estimation (MLE) were used for the analysis. About 53% of consumers are aware of the potential harm of bromate residue in bread and 49.1% were confident in safety labels. About 89 and 10 % of willing consumers were willing to pay 35 kobo and 70 kobo per gram of safe bread respectively. Income and age were significant in explaining the demand for bread at 1%, having positive and negative relationships respectively. Age, confidence and risk were significant at 10%, 1% and 1%, respectively (having positive relationships) in explaining consumer willingness to pay for safe bread. Based on the facts so revealed, sensitization programmes through mass media, enlightenment programmes tailored to suit illiterate masses and emphasis on food regulatory bodies should be mounted.

Keywords: bread, food safety, potassium bromate, willingness to pay, poverty, Probit model.

1. INTRODUCTION

In developing countries, a large proportion of ready to eat food is sold in the streets. The consumption of street food is common in many countries where unemployment is high, salaries are low, work opportunities and social programmes are limited. Aside from this, it is needless to say that irrespective of social status, bread is a staple food in developing countries. It is consumed in relatively large quantities by whatever rank and file of society because it is affordable and available in a "ready to eat" form (Darko, 2002). As a result, label is intended to help draw consumers' attention to the desirable attributes of the product. When a firm labels its product, it assumes that the information it provides is important to consumers and that they will respond by changing their purchase decision (Kuchler *et al.*, 2003). The major challenge in both flour milling industry and bakeries is the baking quality of flour, which is determined by the capacity of the dough prepared from it to retain gas. As a result of wide variations in the composition of flour, various treatments and supplements/ conditioning agents (flour/bread improvers) are added for strength during mixing, extensibility for molding and also to increase loaf volume and texture (Akunyili, 2003).

The use of potassium bromate has been a common choice among flour millers and bakers throughout the world because it is cheap and probably the most efficient oxidizing agent. However concern has been expressed on the harmful effects of potassium bromate. Bromate has since been banned and removed from the list of improvers generally regarded as safe (GRAS) ingredients by the FAO/WHO Experts Committee on Food additives worldwide since 1992. As flour improver for producing bread, bromate acts as an efficient oxidizing

agent. Under normal circumstances, bromate is completely used up i.e., it disappears during baking and converts to a harmless inert bromide in the finished produce. Due to the high profit margin accruable to bakers when they use it in bread production, bakers do not care about the level of bromate in their bread and in most cases consumers are unable to differentiate bread with or without bromate residue content (Oni and Inedia, 2005).

Using potassium bromate as a flour modifier is mass poisoning considering the fact that bread is eaten by almost everybody and is a staple food for children. Based on the associated health problem of the use of potassium bromate in bread, it has become necessary to look for a way to stop its use in bread production. One way of achieving this aim is to force producers to affix safety labels on their product (Oni and Inedia, 2005); noting also revealed that the market place is dotted with assorted labels of different brands (Odigie, 2003). Hence it is the negative effects of the use of potassium bromate in bread production, the inability of the ordinary bread consumer (apart from labels) to identify bread produced with bromate, the potential gains of a healthier society, the fact that bread is a staple food that form the background against which this study is necessitated in the study area. Specifically, the study will determine how informed the consuming households are about the varying deleterious effects of the consumption of potassium bromate in bread and also estimate the demand for bread in the study area.

In Nigeria, despite the fact that the use of potassium bromate in flour milling and baking has been banned by NAFDAC since 1993, several law unbinding bakers still use potassium bromate as a flour improver which unsuspecting ill-informed consumers still purchase. It is against this background that addressing the

willingness to pay for safe food (viz bromate free) by the consumer, on the premise that the label indeed represents the bread content, is necessitated. This study aims to analyse consumer willingness to pay for safe bread in Etinan Local Government Area, Akwa Ibom State of Nigeria.

2. REVIEW OF LITERATURE

2.1 Theoretical framework

Essentially, the study of consumer willingness to pay draws heavily from the theory of demand which in economics, aims at describing the behaviour of consumers (Adegeye and Dittoh 1985). An important step in the neo-classical utility analysis is best used to explain the theory of demand-Marshall's theory of demand. The demand for a commodity is the quantity which consumers are able and willing to buy at various prices during a given period of time. So, for a commodity to have demand, the consumer must possess the willingness to buy it, the ability or means to buy it and it must be related to per unit of time i.e., per day, per week, and per month or per year. Demand is a function of price, income, prices of related goods and tastes. An individual consumer's demand refers to the quantities of a commodity demanded by him/her at various prices, other things remaining equal. However, in a market there is not one consumer but many consumers of a commodity. The law of demand expresses a relationship between the quantity demanded and its price. It may be defined in Marshall's words as "the amount demanded increases with a fall in price and diminishes with a rise in price". Thus it expresses an inverse relation between price and demand (Figure-1).
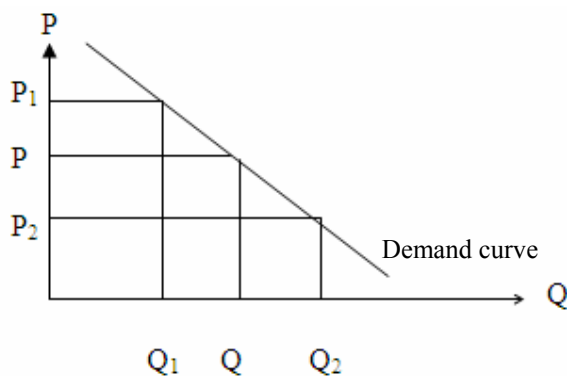

Figure-1. A normal demand curve.

Where

P = Price of commodity
Q = Quantity demanded

From Figure-1, an increase in price from P to P_1 leads to a reduction in quantity demanded from Q to Q_1. Similarly, a reduction in price from P to P_2 will result in an increase in quantity demand from Q to Q_2. A normal demand curve slopes downward from left to right for the following main reasons:

The law of demand is based on the law of diminishing marginal utility. According to this law, when a consumer buys more units of a commodity, the marginal utility of that commodity continues to decline.

Every commodity has a certain level of consumers but when its price falls new consumers start consuming it, as a result demand increases. On the contrary, with the increases in the price of the product, many consumers will either reduce or stop its consumption and the demand will reduce; this is due to the price effect.

When the price of a commodity falls, the real income of the consumer increases because he has to spend less in order to buy the same quantity. On the contrary, with the rise in the price of the commodity the real income of the consumer falls, this is called the income effect.

The other effect of change in the price of the commodity is the substitution effect. With the fall in the price of a commodity (the prices of its substitutes remaining the same), the consumers will by more of this commodity rather than the substitutes. As a result, its demand will increase.

There are different uses of given commodities and services that are responsible for the negative slope of the demand curve.

In certain cases the demand curve slopes up from left to right i.e., it has a positive slope. Under certain circumstances, consumers buy more when the price of a commodity rises and less when price falls. Many causes are attributed to an upward sloping demand curve vis a vis:

War: If a shortage is feared in anticipation of war people may start building stocks, for hoarding even when the price rises.

Depression: During a depression, the prices of commodities are very low and the demand for them is also less; this is because of the lack of purchasing power with consumers.

Giffen paradox: If a commodity happens to be a necessity of life and its price goes up, consumers are forced to curtail the consumption of more expensive foods and still consume more of the necessity of life.

Demonstration effect: If consumers are affected by the principle of conspicuous consumption or demonstration effect they will like to buy more of those commodities which confer distinction on the possessor, when their prices rise.

Ignorance effects: Consumers buy more at a higher price under the influence of "ignorance effect" where a commodity may be mistaken for some other commodity, due to its price, deceptive packing, label etc.

Speculation: According to Marshall "the law of demand does not apply to the demand in a campaign between groups of speculators. A group, which desires to unload a great quantity of a thing on to the market, often begins by buying some of it openly. When it has raised the price of a thing, it arranges to sell a great deal quietly and through unaccustomed channels.

Income demand indicates the relationship between income and the quantity of commodity

demanded. It relates to the various quantities of a commodity or service that will be bought by the consumer at various levels of income in a given period of time other things being equal. Things that are assumed to remain equal are the price of the commodity in question, the prices of related commodities and the tastes, preferences and habits of the consumer for it. The income - demand relationship is usually direct. The demand for the commodity increases/decreases with rise/fall in income in income respectively (Jhingan, 2001).

The income-demand function for a commodity is written as: $D = f(Y)$

The income demand relationship is usually direct. The demand for the commodity increases with increase in income and decreases with fall in income as shown in Figure-2 below. When income is OI, the quantity demanded is OQ, and when income rises to OI_1, quantity demanded also increases to OQ_1. The reverse can also be shown likewise. Thus, the income demand curve has a positive slope. But this is the case of normal goods.
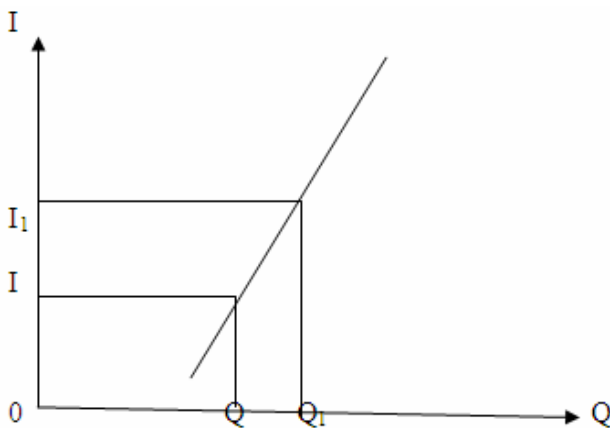

Figure-2. Income - demand curve.

Cross demand deals with related goods, how the change in the price of one affects the demand of the other. Related goods are of two types; substitutes and complementary. In the case of the substitutes or competitive goods, a rise in the price of one good A, raises the demand for the other goods B, the price of B remaining the same. The opposite holds in the case of fall in the price of A, when the demand for B, the price of B remaining the same. In the case where the two goods are complementary or jointly demanded, a rise in the price of one good say A will bring a fall in the demand for good B. If however, the two goods are independent, and a change in the price of A will have no effect on the demand for B.

2.2 Review of related empirical literature

Mitchell (2002) discussed the economic theory behind food safety regulation, and its predicted effects on trade since food safety issues are becoming more important in the area of international food trade. This study addressed the different food safety regulations that are established in different countries. It observed that the

more stringent regulations are in a country, the higher the production cost for firms and may in turn be unable to sell their goods as cheaply as foreign firms not subject to the regulations. Consumers will pay more for safer food, but the firm's ability to communicate its food safety level and the consumers inability to take social costs (e.g. lost workdays resulting from a food borne illness) into account - can leave the domestic firms at a disadvantage, these regulatory differences can create conflicts across countries while safety regulations can lead to trade conflicts e.g. reductions in trade, they can also lead to increased dialogue on food safety standards (improvements in food safety, as firms comply with the stricter safety regimes of their trading partners).

The study also opined that if the foreign producers cannot provide the safer food as cheap as domestic firms, it could be a benefit to consumers; however, if foreign firms could provide food that is safe and cheap, consumers lose from a ban. If the foreign firm decides that the value of the domestic country's market is high enough, the foreign firms can adopt the domestic country's more expensive food safety regulations. If these regulations spread throughout the foreign country's industry, this can improve food safety for the foreign country's own consumers. The study concluded that as advances in science and increase in wealth put greater focus on food attributes, both firms and governments find themselves increasingly responding to consumer demands for food safety.

Chohen, Quemeda and Frederick (2003) in their study examined food safety and genetically modified (GM) crops and its implications for developing country research. The study found out that those developing countries face competing regulatory paradigms in the developed world. Developing countries, thus, have to assess how their exports will be affected if developed countries require labelling of GM foods. The study concluded that developing countries, in approving GM crops, should evaluate not only how GM seeds impact agricultural productivity, but also how GM products influence their participation in global trade.

Hwang, Roe and Teisl (2005) studied the concerns the US Consumers express toward several prominent food production and processing technologies. Modern science has been seen to be capable of generating incredible advances in food production and processing technologies that can produce more food, reduce costs, and enhance attributes in ways not imagined only decades ago. However, due to the intimate and ubiquitous role that food plays in our life, the impacts of food production and processing on the environment, and the social and physical distance between consumers and the food production process, consumers scrutinize not only the cost and attributes of food but, increasingly, the technology and methods used in food production and processing in a quest to ensure food safety. Food technologies that are adopted or rejected are based on the outcome of the interval scrutiny.

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The analysis in this study was done as follows: first consumers concerns across eight technologies - antibiotics, pesticides, artificial growth hormones, genetic modification (GM), irradiation, artificial colours and flavours, pasteurization and preservatives were ranked. Ranking provided a view to which technologies were of greatest concern at the time the data were collected. Second, correlations across the level of concern expressed for each technology were presented. This allows for speculation about the common elements of technologies that can cause consumer reticence. Third factor analysis was used to identify common unobserved factors driving common concerns across the eight technologies.

Finally, the economic, demographic and attitudinal variables that explain both the average level of concern with the eight technologies of interest and the unobserved concern factors were investigated using regression techniques. The ratings suggested that pesticides and artificial growth hormones generated the most concern for US consumers, while technologies such as pasteurisation, artificial colours and flavours and preservatives generated significantly less concern. Antibiotics, genetic modification, and irradiation raised immediate levels of concern. The result of the correlation suggested that different forces may drive the concern behind each technology. Factor analysis suggested that respondents concern about a cluster of technologies, share a common unobservable component. The study then concluded that analysis of the relative ratings may provide insight into market niches that may be more acceptable of certain types of technologies and that greater insights may be possible if theories of risk communication and response are brought to bear on the current empirical regularities.

Calvin (2002) examined food safety issues and the private and public responses to United States food borne illness outbreaks due to microbial contamination associated with imported produce. The study reviewed outbreaks of food borne illnesses associated with certain crops, Guatemalan raspberries, Mexican strawberries (contaminated either in Mexico or the United States) and Mexican cantaloupe - as it affects trade. Findings revealed that the impact of a food borne illness on trade depends on whether foreign producers can quickly correct the contamination problem and convince buyers that their product no longer poses a risk. It was discovered that outbreaks of food borne illness in the United States associated with imports of fresh produce affect not only consumers and the growers of the contaminated product, but also frequently other suppliers to the United States market, including U.S producers.

In the Mexican strawberry case for instance, after just one outbreak and an initial collapse of trade, strawberry trade rebounded in following years. In the Guatemalan raspberry and Mexican cantaloupe cases, the U.S Food and Drug Administration (FDA) refused to accept these products into the United States after outbreaks in consecutive years. The impact of the ongoing cantaloupe problem on the future is still unknown. The study concluded that the FDA, the centres for Disease Control and Prevention, the produce industry, retailers, and foreign governments have worked together to keep unsafe produce off the market and resolve food safety problems. Different food safety practices can mitigate the chances of contamination.

Moon and Balsubramian (2001) studied public perceptions and willingness to pay a premium for Non-GM foods in the US and UK using consumer survey data collected in the United States (US) and United Kingdom (UK) to examine the linkages between subjective risk and benefit perceptions and willingness to pay a premium for non genetically modified (non-Gm) foods. Public acceptance of agro biotechnology was measured using a six point Likert scale ranging from "Strongly Oppose" to "Strongly Support". Unsure respondents could select the option "Don't know". Notably, the percentage of US respondents that support agro biotechnology (32%) in this survey is considerably lower than the 70% by Hoban up to 1998. This finding corroborates the declining trend in the public acceptance rate in the US over the last few years. Yet the Figure displays a key discrepancy across the US and UK. The percentage of consumers who selected "Don't know" was substantially larger in the US and UK. This result suggests that a significant segment of US consumers have not developed attitudes toward agro biotechnology. Controversy over biotech food stems not only from potential adverse health and environment effects of agro biotechnology but also from a number of other qualitative aspects.

The survey design addressed eight risk/benefit attributes associated with agro biotechnology encompassing the following: (i) health risks (ii) environmental hazards (iii) moral and ethical considerations (iv) the image of multinational corporations as the primary beneficiaries of biotechnology (v) growing control of multinational corporations over farming (vi) the potential for a reduction in world food shortages resulting from the introduction of transgenic crops (vii) reduced use of chemicals in crop production and (viii) potential for improvements in the nutritional content of foods.

The first five attributes represent negative aspect while the latter three portray potential benefits of agro biotechnology. These attributes were measured using a seven-point (Likert-type scale ranging from "Disagree completely" to "Agree completely" to "Don't Know". Overall, UK respondents showed a greater level of consensus about the negative attributes of agro biotechnology than US respondents. To provide more detailed analysis of behavioural intentions with regard to non-GM foods, a probit model was specified. While UK consumers were significantly more willing to pay a premium to avoid GM foods than US consumers, risk and benefit perceptions clearly translated into behavioral intentions as measured with willingness to pay in both countries.

Akungor, Miran and Abay (2007) carried out a survey project whose aim was to explore the Turkish consumers' perceptions regarding food safety and the trade off they make between the chemical residues and

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cosmetic quality in fresh fruit and vegetable marketing chain. An analytical hierarchy process was used to uncover consumer preferences. It was noted that consumers rank organic products higher than non-organic products. Similarly, with respect to nutritional value, hygiene and taste, consumers always rank organic alternatives over non-organic alternatives. Organic awareness was measured and a probit model used to estimate the consumers' preferences and willingness to pay for organic food. The results revealed that educated and high income individuals have increased interest on organic product purchases. The choice for organic products is due to consumer perception that organic products have higher nutritional value and carry low health risk. It is also found that consumers do not perceive that organic products have higher prices than conventional counterparts.

Oni and Inedia (2005) analyzed the extent to which bread consumers consider food safety labels before consuming the product in Benin Metropolis of Edo State in Nigeria. Data used were collected from questionnaire administered to bread consumers. The analytical tools employed for the study were descriptive statistics (frequency distribution) and probit model. The results of the probit model were applied to explain bread purchasing behavior of consumers due to payment for label. The model revealed that the probability of willingness to pay more for safety labels in bread is positively affected by the individuals' knowledge, income, education, household size and weekly bread consumption proxies' expenditure. It is negatively affected by price and confidence as regards safety of bromate in bread over time as the perception variable indicates. Income, educational level of respondents, Gender and perception about residue in bread and a prior knowledge of effect of bromate on human health significantly influence the probability of their willingness to pay for safety labels in bread.

It is worthy of note also that the United States Centre for Food Safety and Applied Nutrition (2006) provides guide to adopting and maintaining food safety practices. This manual seeks to provide a practical, (Hazard Analysis Critical Control Points) HACCP - based approach to evaluate industry's active managerial control of food borne illness risk factors. The manual mentioned that it is essential that regulatory program managers design an inspection program based on HACCP principles that guides and supports their field staff in assisting operators with incorporating these principles into their routine activities. "Since food safety management systems are designed by retail and food service operators to meet their own needs, there is a need to use a risk-based methodology during inspections to uncover the systems being used and to evaluate their effectiveness".

The Food and Agricultural Organization of the United Nations in 2005 discussed the special problems of food quality and safety in developing countries as well as their impact on food security and presented ways and means of dealing with these problems. The study observed that safety of food is a basic requirement of food quality

and that "Food Safety" implies absence or acceptable and safe levels of contaminants, adulterants, naturally occurring toxins or any other substance that may make food injurious to health on an acute or chronic basis. Food quality was considered as a complex characteristic of food that determines its value or acceptability to consumers. It was further stated that food systems in developing countries are not always as well organized and developed as in the industrialized world. Moreover, problems of growing population, urbanization, lack of resources to deal with pre-and post harvest losses in food and problems of environmental and food hygiene mean that food systems in developing countries continue to be stressed, adversely affecting quality and safety of food supplies. People in developing countries are therefore exposed to a wide range of potential food quality and safety risks.

The above reviewed literature highlighted the expanding and pressing concern for food safety in developing countries and discussed issues of food safety and their implications being handled presently in developed countries.

3. METHODOLOGY

The study was undertaken in Etinan Local Government Area of Akwa Ibom State. The state is in the South-East of Nigeria. The local government has boundaries with Uyo and Nsit Ibom Local Government Area. A multi-stage random sampling technique was used in collecting the data. In the first stage, six (6) wards were randomly selected. In the second stage, three (3) villages were randomly drawn from each ward. In the last stage, ten (10) respondents were randomly selected from each village while fifteen (15) respondents were drawn from four (4) relatively large villages. This procedure resulted in a total sample of two hundred (200) households. However, after data cleaning one hundred and eighty two (182) questionnaires were subsequently used for the analysis. The analytical techniques that were used in data analysis include: descriptive statistics such as frequency tables and percentages, Ordinary Least Squares (OLS) regression and a Maximum Likelihood Estimation (MLE) probit model.

3.1 Models specification

3.1.1. Estimation of demand for bread

Demand is a function of income, age, household size, level of education, risk. Double log OLS (Ordinary Least Squares) regression will be estimated as follows. We included in the model age squared to take in account the life cycle hypothesis in consumption theory.

BE = f (Inc, age, edu, household, risk, error)

Where,

BE = Household Bread Expenditure (in Naira)
Ln (Inc) = Monthly income of the household in Naira
Ln (age) = Age of the household head in Years
Ln (age^2) = Age squared

Ln (edu) = Number of years spend in formal education by the household head

Ln (household) = Household Size

Risk = Risk which is a dummy variable that takes 1 if the household is aware of health problem associated with bromated residue and 0, if otherwise.

A priori Expectations: Given the nature of the study area (rural and hence relatively low income), an increase in income is expected to increase expenditure on food-hence income is likely to have a positive coefficient. Age is expected to have a positive coefficient. Household size is expected to have a positive coefficient. Risk, level of education may be negative or positive.

3.1.2 Estimation of probit model

The estimated econometric model that was used followed the one used to estimate consumers' willingness to pay for food safety labels in urban Turkey Sedef *et al.*, (2000). The model (probit) aims at estimating the probability of purchasing under an alternative scenario.

Empirically, the model for the present study is described as follows:

$CW = f$ (Inc, age, edu, household, breadexp, risk, confi, S_i)

CW = Consumers' willingness (CW) to pay for safety labels: 1 if the household is willing to pay higher for safety label and 0 if otherwise.

Ln (Inc) = Monthly income of the household in Naira

Ln (age) = Age of the household head in Years

Ln (age^2) = Age squared

Ln (edu) = Number of years spend in formal education by the household head

Ln (household) = Household Size

Ln (bread exp) = Household weekly expenditure on bread in Naira

Risk = Risk which is a dummy variable that takes 1 if the household is aware of health problem associated with bromated residue and 0, if otherwise.

Confi = Confidence in safety labels (confident =1, 0, otherwise)

S_i = Error term

4. RESULTS AND DISCUSSIONS

Table-1 presents the socio-economic/ demographics characteristics of respondents. It reveals that about 57% of the respondents are female and about 43% are male. About 29% of the respondents are less than or exactly 40 years old. About half of them are between 41 and 50 years and over 65% are above 40years. This could explain their involvement in agriculture as at these ages, they are more likely to have acquired land as assets through inheritance, many years of saving and also would feel the need to engage in agriculture to augment their income to cope with the responsibility of managing their families, providing for their food needs and/or other needs. Table-1 reveals that 84.2% of the respondents are married, 6.0% are widowed while the other 10.9% are either single or divorced. This table further show that about 46% of the respondents have some form of tertiary education, 33.5% has secondary education while 15.4% have no formal education. About 50% of the respondents are involved in government services, 47.8% are involved in agriculture while about 2% are involved in services. A greater percentage (76.4%) of households have a family size greater than 5 people an about 65.4% of the households have between five and eight people. About 49% of the respondents have an income of less than ₦20,000 monthly, 32% have between ₦20,000 and ₦40,000 and 19% have more than ₦40,000. A relatively large percentage (48.9%) of the respondents has an average monthly income of less than ₦20,000. This could explain the involvement of an equally large percentage (47.8%) of respondents in agriculture, probably at a subsistence level to cater for the pressing needs of their family.

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Table-1. Socio -economic characteristics of households.

Characteristic	Description	Frequency	Percentage
Age	Up to 30	12	6.6
	31-40	44	24.2
	41-50	87	47.8
	>50	39	21.8
	Total	182	100.0
Sex	Male	79	43.4
	Female	103	56.6
	Total	**182**	**100.0**
Marital status	Single	16	8.8
	Married	153	84.2
	Widowed	11	6.0
	Divorced	2	2.1
	Total	**182**	**100.0**
Education (years)	≤6	28	15.4
	7-12	61	33.5
	13-16	50	27.5
	>16	33	18.1
	No response	10	5.5
	Total	**182**	**100.0**
Occupation	Agriculture	87	47.8
	Services	4	2.2
	Government services	91	50.0
	Total	**182**	**100.0**
Household size	≤4	27	14.8
	5-8	119	65.4
	>8	20	11.0
	No response	16	8.8
	Total	**182**	**100.0**
Average monthly income (₦)	≤20,000	89	48.9
	21,000-40,000	58	31.9
	>40,000	35	19.2
	Total	**182**	**100.0**

Source: Field Survey, 2007

Others socioeconomics characteristics are presented in Table-2. It shows that 25.3%, 19.8%, and 18.7% of the respondents claimed to purchase their bread from supermarkets, lock up shops, and roadside hawkers, respectively. The remaining 36.2% purchased their bread from other sources. A larger percentage of respondents claimed to purchase bread from sources other than supermarkets and lock up shops; this could be tied to the fact that the area, being typically rural, does not have a lot of supermarkets. About half (50.5%) of consumers buy labeled bread while 46% of them buy unlabeled one. The choice of the kind of bread bought could be predicated upon their level of education or specifically their awareness / unawareness of possible health ills that could stem from consuming unlabeled bread. About 46.7% of consumers spend less than or exactly ₦200 on bread while 53.3% spend more than ₦200 on bread. Relatively, a larger fraction of the respondents spend more than ₦200

on bread. This could be explained basically by their household size being more than five (5) on a larger score. Also, this could be explained by the prevalent age group, given the need to catch up with other responsibility and their heavy involvement in agriculture; bread which presents in a, needless to say, ready to eat form will be consumed for meals and in between meals. About 45 and 46% of respondents are confident and not confident respectively in safety labels. The lack of confidence and no response columns may have stemmed from the fact that respondents may not be informed about the importance or authenticity of labels because of their level of education and possibly the "Nigerian factor" which leaves consumers under the impression that anything goes and labels may not be worth it anyway. As a matter of fact only about 23% of respondents are interested in the NAFDAC endorsement.

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Table-2. Distribution of respondents by other descriptive characteristics.

Characteristic	Description	Frequency	Percentage
Source of bread purchase	Supermarket	46	25.3
	Lock up shops	36	19.8
	Roadside hawkers	34	18.7
	Stalls	57	31.3
	Others	9	4.9
	Total	**182**	**100.0**
Kind of bread bought	Labelled	92	50.5
	No label	83	45.6
	No response	7	3.8
	Total	**182**	**100.0**
Weekly bread expenditure (N100loaf)	$\leq$ N 200	85	46.7
	N201 - N400	33	18.1
	N401 - N600	29	15.9
	>600	20	11.0
	No response	15	8.2
	Total	**182**	**100.0**
Confidence	Yes	82	45.1
	No	85	46.2
	No response	15	8.2
	Total	**182**	**100.0**
Information of interest	Constituents	14	7.7
	Nutritional value	36	19.8
	NAFDAC endorsement	42	23.0
	No response	90	49.5
	Total	**182**	**100.0**

Source: Field Survey, 2007

Table-3. Distribution of respondents by awareness of potential harmful effects of potassium bromate.

Characteristic	Description	Frequency	Percentage
Awareness potassium bromated in bread	Aware	96	52.7
	Not Aware	62	34.1
	No response	24	13.2
	Total	**182**	**100.0**
Source of Awareness	Friends/Neighbours	32	33.33
	Television/radio	54	56.25
	Print media	10	10.42
	Total	**96**	**100.0**
Awareness of harmful effects	Cancer	76	79.16
	Reduction of immunity	23	23.96
	Reproduction dysfunction	25	26.04
	Total	**96**	**-**

Source: Field Survey, 2007

Table-3 presents the distribution of respondents based on their awareness of potential harmful effects of potassium bromated. It can be deduced from the Table that 52.7% of consumers are aware of potential harmful effects of bromate in bread. The other 47.3% are either not aware or have never heard about bromate. The Table reveals that 56.3% of the consumers became aware through the mass media such as radio and television, 33.3% became aware through friends/neighbours while 10.4% became aware through print media. The Table shows that 79.2% are aware about cancer effect of potassium bromated, about 24.0% are aware that it reduces immunity while 26.0% are

aware of the potential of bromated bread to have negative effects on reproductive performance.

Table-4 presents the distribution of respondents according to their willingness to pay for extra for safety label. It shows that 40.1% percent of respondents are willing to pay for safe bread and 59.9% are not willing. Further, 89.0% of the respondents willing to pay for extra reported that they were willing to pay 35Kobo/gram of safe bread while 11.0% of them were willing to pay an extra of 70 kobo/gram of safe bread.

Table-4. Distribution of respondents by willingness to pay extra for safe bread.

Characteristic	Description	Frequency	Percentage
Willingness	Willing	73	40.10
	Not willing	109	59.90
	Total	**182**	**100.00**
Extra amount willing to pay/gm	35 kobo	65	89.04
	70 kobo	8	10.96
	Total	**73**	**100.00**

Source: Field Survey, 2007

About 51% variation of demand for bread is explained jointly by the explanatory variables. Out of the six explanatory variables, two are significant in explaining the demand for bread. These include income and age. The coefficient of income (0.67) was significant at 1% level and positively related to the expenditure on bread by the household. This mean that as income increases, the expenditure on bread increases also. The same trend is observed for age except the relationship between expenditure on bread and age is not linear. This is showed by the coefficient of age square (-0.34) which is negative showing that at certain age the expenditure start to decrease as age increases. In other words, the negative relationship of age^2 bread expenditure suggests that older people are likely to spend less on bread than younger one.

An analysis of elasticity shows that expenditure on bread is inelastic to income as a 100 percent increase in income will lead to a 66.7% increase in bread expenditure. This elasticity value being less than 100 means that bread expenditure is inelastic with respect to income. It can be inferred here that bread is a normal good.

The significance of age^2 in explaining the demand for bread can be explained by the fact that a relatively lower age group are expected to be involved in physical cum agricultural activities leading to a need for food in "ready to eat" form and also the need to eat in between meals; bread satisfy both needs. The load of responsibility on a lower age group (viz families e.g. between 40 and 60years) as shown by their larger household sizes results in a press easily relieved by bread. The significance of income could be explained by the nature of the area (being rural) of the area and hence prevalence of low income group; where it is expected that for the poor (low income group) and increase in income leads to an increase in food expenditure where as for a higher-income group prevalent society increase in income may not necessarily lead to an increase in food expenditure.

The results of the regression follow the a priori expectation that bread expenditure (consumption) is influenced, like consumption for any other good, primarily by income. It is not influenced by education, household size, risk (awareness of harmful health effects). This is likely to be because whether or not a person is educated he will consume bread in some form but this is expected to be significant in explaining the willingness to pay extra for safe bread. Risk is as expected not significant because in specifying the demand for bread the type of bread (labelled or unlabelled) is not indicated.

Table-5. Ordinary least squares estimation of demand for bread.

Variables	Coefficient	T - statistics
Ln (inc)	0.67***	6.51
Ln (age)	0.29**	2.54
Ln ($age^{2)}$)	-0.34**	-2.27
Ln (edu)	-0.02	-0.17
Ln (household)	0.15	1.19
Risk	0.05	0.40
Constant	0.25	0.14
F-statistic (6, 114)	19.70***	
R-squared	0.54	
Adj - R squared	0.51	

Note: * = significant at 1%

The Probit model aims at explaining the probability of consumer willingness to pay for safety labels. Out of the seven explanatory variables used to specify the model three are significant in explaining consumer willingness to pay for safe bread. These are age^2, risk and confidence. This significance implies that these factors are important considerations in willingness to pay for safe bread. Age^2, risk and confidence have positive coefficients; this implies that older people, people aware of associated health problems in consuming bromated

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bread, also confident in safety labels are likely to be willing to pay for safe bread.

The results shown in the table can be further explained based on the marginal effects. The marginal effects (elasticity) indicate by how much a unit charge in any of the independent variables will explain the probability of willingness to pay for a safe food significantly or insignificantly. Percent increase in the income of consumer will result in a 0.77 percent increase in the probability that consumer will be willing to pay for safe foods. This value is less than unity indicating that willingness to pay is inelastic with respect to income. A unit percent increase in age will lead to an increase in the

probability that consumers are willing to pay for a safe food by 0.27 percent. This is less than unity meaning that willingness to pay is inelastic with respect to age. One percent increase in household size reduces the probability that consumers are willing to pay for a safe food by 0.18 units. This still suggests inelasticity. A unit percent increase in bread expenditure increases the probability that consumers are wiling to pay for a safe food by 0.13 percent. This value is inelastic with respect to size of the household. A unit increase in the number of years spent in acquiring formal education will increase the probability that consumers are willing to pay for safe bread by 0.10 percent.

Table-6. Maximum likelihood estimation results of the probit regression for determinant of consumer willingness to pay for safe bread.

Variables	Coefficient	z	Marginal effects
Ln (income)	0.23	0.65	0.77
Ln (age)	-0.55**	2.30	0.35
Ln (age ^{2})	0.82*	1.82	0.28
Ln (education)	0.33	0.95	0.11
Ln (household)	-0.53	-1.53	-0.18
Ln (bread expenditure)	0.38	1.39	0.13
Risk	1.01	2.67**	0.32**
Confidence	1.08	2.81**	0.36**
Constant	-388	-3.30	
LR statistic = 62.03 **			

Note: * =significant at 10%; ** =significant at 5% and ** =significant at 5%

CONCLUSION AND RECOMMENDATION

It can be deduced from the analysis of consumer willingness to pay of this study that with respect to the willingness to pay for safe bread it was noted that 58.2 percent of respondents are not willing to pay for safe bread following their lack of awareness of harmful health effects of bromate residue in bread or their lack of confidence in safety labels. The analyses also revealed that age[2], confidence and risk are significant in explaining consumer willingness to pay for safe bread. It was also noted from the estimation of the income demand for bread that bread is a normal good.

Based on the revealed facts in this study the following recommendations can be made:

Sensitization programmes on food safety, the issues relating to harmful effects of potassium bromate in bread production, should be further mounted through the mass media namely radio/television. This is to create awareness for uninformed and emphasis for the informed; since this is the most patronized source of information by the respondents. Also enlightenment programmes tailored to suit the illiterate masses of the study area should be inaugurated and subsequently intensified to bring to the forefront the varied aspects of negative health implication of potassium bromate in bread, given that education is

significant in explaining consumer willingness to pay for safe bread. Finally, efforts(already in gear), to check the use of potassium bromate in bread production, by food regulatory agencies viz NAFDAC, should be further intensified with a bid to increasing consumers confidence in safety labels, being a significant factor in explaining their willingness to pay.

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