

Determinants of Bread Consumers' Willingness to Pay for Safety Labels in Oredo Local Government Area, Edo State, Nigeria

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ABSTRACT: The study examined the determinants of bread consumers' willingness to pay for safety labels in Oredo Local Government Area in Edo State. Stratified sampling technique was used to select three wards (strata) from the 12 wards in the area of study to have representative sample of different classes of people (high, middle, and low income earners) and one hundred and twenty bread consumers were interviewed. Data were analysed using descriptive statistics and binary logistic regression model. Average age of consumer of bread in the area was 38.1 years while mean income was ₦132, 567.50 monthly. Household size was 5 members and majority of respondents were married. Majority (94.2%) of the respondents preferred safety labeled bread with 72.5% willing to pay extra amount for safety labeled bread. High proportion of the variation in willingness to pay was explained by the independent variables (Pseudo $R^2=78.38\%$). The mean willingness to pay for safety labeled bread was ₦175.4. The consumers' willingness to pay for safety labeled bread decreased as the price ($p<0.1$) increased while increase in educational level, marital status, label, and source of information were statistically significant at ($p<0.05$ and increased consumers' willingness to pay for safety labeled bread. Consumers are willing to pay for safety label and this increased with increase in the level of education, news (electronic) as their source of information, labeled bread as the key characteristics of bread considered by respondents, and being married while it decreased with increase in price of bread.

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1. Introduction

Consumer demand for high quality food has been on the increase in the developed countries due to their increased level of awareness about links between diet and health, knowledge of quality characteristics and access to information about new production and processing technology (Organization for Economic Co-operation and Development (OECD), 1997). The knowledge about the effect of food consumption on human health, increasing awareness of food-borne diseases such as bird flu, and increasing concern about the environment, are driving consumer demand for food that are healthier, safer, more palatable and environmentally or animal friendly (Caswell and Mojduszka, 1996; Krystallis and Chryssohoidis, 2005; Roosen, 2003; and Schroeder, Marsh and Mintert, 2000).

Consumers evaluate alternatives in terms of functional and psychological benefit that the food offers. Consumers are influenced by both internal and external factors in terms of the choice they make of their food. The internal factors are demographics, psychographics (lifestyle) personality, motivation, knowledge, attitudes, beliefs and feelings. The external; factors are culture, ethnicity, family, social class, reference groups and market mix factors (Consumer Behaviour, 2008).

Bread being a staple and popular food in most households throughout the world, sometimes has potassium bromate as one of its constituents (OECD, 1997). Some chemical additives are used in the preparation of bread. These chemicals speed up mixing time and reduce necessary fermentation time so that a batch of bread may be mixed, make up, rise more than necessary (in size) and baked in a far lesser time. One of such chemical additives is potassium bromate (American Bakers Association (ABA) and American Institute of Baking (AIB) International, 2008).

Potassium bromate ($KBrO_3$) has been used in limited ways and amounts by the baking industry for almost a century. Research over the years has shown that potassium bromate is a source of food poisoning. As if not enough, its use as a flour modifier even in bread production, still exist. Potassium bromate use in Nigeria was banned in 1993 by National Agency for Food and Drug Administration and Control (NAFDAC) in keeping with Decree no 15 of 1993 (as amended), establishing NAFDAC to control and regulate the manufacture, importation, exportation, distribution, advertisement, sale and use of food, drugs, cosmetics, chemicals, detergents, medical devices and all drinks (Akunyili, 2007). The ban makes it a crime punishable by Nigerian law for local manufacturers to employ this substance in preparation of food and consumables. The ban of this additive increases the

cost of production of bakers thereby increasing the price of bread. Consumers' willingness to pay for food attributes is a major proxy of measuring the demand of products using labels to revealed food attributes. Consumer Food label include the serving size, health claims, ingredient list, percentage daily value. Consumer willingness to pay for safety labels implies good knowledge of the negative implication of potassium bromate in bread. (Oni et al, 2005). Food safety label standard usually specifies production practices that the producing industries use (Van Ravenswamy and Blend, 1998).

Food safety is affected by the decisions of producers, processors, distributors, food service operators and consumers as well as government regulations (Caswell, 2003). In 1992 and 1998, the agency, Food and Drug Administration (FDA) of the United States conducted rounds of test on baked products and the test revealed that many baked products in the country, contained potassium bromate at levels considered unsafe for human beings. Due to the high profit margin available to the bakers when they use potassium bromate in bread, bakers ignored the ban on potassium bromate and continued to use it with no care about the level of bromate in their bread and in most cases, consumer are unable to differentiate bread with or without bromate in purchased bread (Odigie, 2003).

NAFDAC took interest in the baking industry to work towards enforcement of the ban on the use of potassium bromate. This has prompted NAFDAC and its current Director General, Dr. Paul Orhii, to launch the 'second war' against the use of potassium bromate in the baking industry (Alfred, 2008). Orhii has

renewed NAFDAC's call that bakers should stop using potassium bromate in the production of bread and bakery products in the country because of the life – threatening dangers posed by the chemical and at a recent one day workshop on “Food Safety in Bread Products” in Lagos, he lamented that despite the bromate ban, some bakers were still using it in baking bread (NAFDAC 2009).

Based on all these health related problem of the use of bromate in bread products, it is clear that food safety label is important for healthy living of consumer. In this vein, this study intends to assess the consumer's willingness to pay the extra cost for a safety labeled bread in Oredo Local Government Area, Edo State.

Based on the framework of Millock (2003), combined with Bonti-Ankomah and Yiridoe, (2006)'s analyzing steps, a simplified theoretical frame for willingness to pay analysis is put forward in Figure 1. Consumers and markets are two independent but interactive subjects under the frame. This research follows classical consumer behaviour theory: perception determines behaviour and behaviour determines willingness to pay. Willingness-to-buy provides the threshold of entering the market, which is the previous step before purchasing (Soler, 2004).

Purchase behaviour reflects the real willingness to pay and gains positive or negative experiences which will reversely affect consumer's willingness to pay in future. Consumer's characteristics influence all decision making process. Therefore, it is meaningful to explore consumer's individual characteristics for the division of safety or non-safety labeled bread.

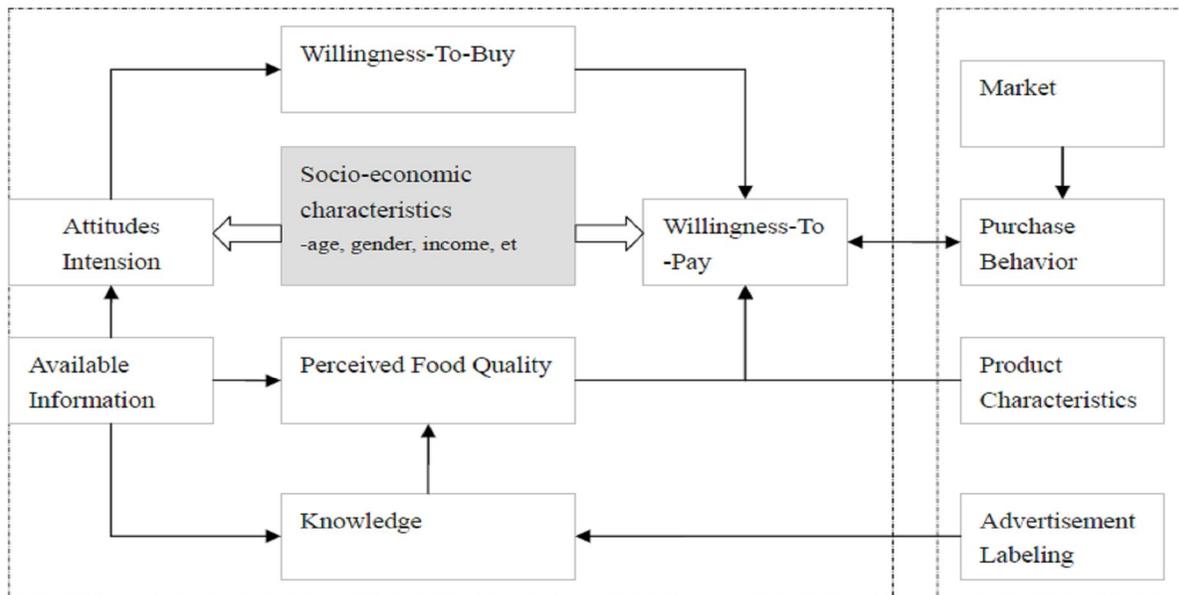


Figure1. Framework on consumer's behaviour towards food, Millock (2003)

2. MATERIALS AND METHODS

Area of Study: The study was carried out in Oredo Local Government Area, Benin City, Edo State. Geographically, the state is located between longitude 6°4 east and 6°43 east and latitude 5° 44 North and 7° 34 North. The state has a population of 3,497,502 on a landmass of 17,802sqkm (NIPOST, 2009). The state is divided into 18 local government area to ease governance among which is Oredo local government area. Oredo Local Government Area has its head quarters in Benin City. It has an area of 249km² and a population of 374,671, at the 2006 census. It is the site of major activities in Benin City and it is made up of 12 wards (NIPOST, 2009).

Source of data and sampling procedure: Primary data were used for this study. The data were collected using a well structured questionnaire. The information collected include: socio-economic characteristics of the respondents and issues about willingness to pay for a safety labeled bread. A stratified sampling technique was used in this study to select three wards (strata) from the 12 wards in the local government area to represent all the different classes of people in terms of income status (high, middle and low income earners). From each stratum, a representative sample of 45 respondents was randomly selected from each stratum and this gave a sample size of 135 respondents. Out of these number, only 120 of the filled and returned questionnaire were found to be meaningful for relevant to this study.

Method of Data Analysis: The logit regression was employed for this study to explain the log-likelihood of willingness to pay, because of its comparative mathematical simplicity and asymptotic characteristics, which constrained the predicted probabilities to a range of zero to one. Logit model was used for this study as specified by Hanemann (1989), Whittington, et al (1990), Branka and Kelly (2001), Yusuf et al, (2005), Adepoju and Omonona (2009)

$$P_i = E(Y=1/X_i) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_i)}}$$

Where P_i is a probability that Y_i = 1

P_i = price consumers are willing to pay for safety labeled bread

Y = Consumer's willingness to pay. '1' if willing to pay and '0' otherwise

B₀ = is the intercept which is constant

B_i = is the coefficient of the price that the respondents are willing to pay for food safety labeled bread. Mean willingness to pay for safety label bread by respondents was used as given by Hanemann (1989).

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

Where β₀ and β₁ are absolute coefficient estimates from the logistic regression and the Mean WTP is the mean for the safety labeled bread by respondents.

To identify the factors that influence willingness to pay for food safety label bread by consumers, the respondents' responses to the WTP question was regressed against the prices the respondents are willing to pay and other socio economic characteristics of the respondents. The regression Logit model is specified as:

$$Y = \frac{1}{1 + \exp^Z}$$

Where Y is the responses of household willingness to pay which is either 1 for Yes or 0 for No.

$$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_{14} X_{14}$$

β₀ is a constant

β₁.....β₁₄ are the coefficient of the explanatory variables X₁.....X₁₄

The explanatory variables can be expressed as described by Raheem (2006) and was modified to suit this study.

The Explanatory Variables are:

- X₁ = Income Naira (₦)
- X₂ = Age of consumers (year)
- X₃ = Level of education (years)
- X₄ = Household size (number of people in the house)
- X₅ = Gender (female = 0, male = 1)
- X₆ = Unit price of bread (Naira)
- X₇ = Marital status of respondent, (Married = 1, otherwise = 0)
- X₈ = label (Yes = 1, No = 0)
- X₉ = Point of purchase of bread (super-market = 1, otherwise = 0)
- X₁₀ = Occupation of respondents (professional (Bankers, Civil servant) = 1, otherwise = 0)
- X₁₁ = Knowledge of the effect of bromate on human health (Yes = 1, No = 0)
- X₁₂ = Source of information about effect of bromate in bread (NAFDAC = 1, otherwise = 0)
- X₁₃ = Perception (1 = indicating no change of health produce to bromate and 0 = meaning having a chance of health problems due to bromate over time)
- X₁₄ = Consumption of bread in Kg per week per household (Kg/week)

4. DISCUSSIONS

Table 1 presents some selected socioeconomic characteristics of respondents. The mean age of respondents in the study area was 38.1years which implies that, majority of the respondents are in their active working age and therefore may appreciate the importance of labeling in a product in creating good or bad impression about the product. Majority of

respondents were educated, which means that they are able to read and write as it applies to the reading of the safety label on a safety labeled bread. Education is expected to increase the awareness of consumers as regards the negative effect of potassium bromate on consumer's health. Therefore, majority of the respondents are likely to be well informed about the negative effect of potassium bromate on human health. The result further shows that professionals in the study area accounting for about half of the respondents sampled. The implication is that, the respondents are likely to subscribe to buying of safety labeled bread since most of them are gainfully employed. The mean household size of the respondent is 4.79 which is approximately 5 members per household. The result implies that the respondents sampled in the study area are likely to be willing to pay for safety label in bread since the lesser the number of household size, the more the household's willingness to pay.

Table 2 represents the logit analysis of the factors that determine the willingness of consumers to pay for food safety labeled bread.

Table 1: Selected Socioeconomic Characteristics of Respondents

Variable	Frequency	Percentage
Age		
15-25	13	10.8
26-35	47	39.2
36-45	35	29.2
46-55	12	10.0
56-65	10	8.3
66-75	3	2.5
Total	120	100
Mean	38.5	
SD	11.1	
Educational level		
No formal education	3	2.5
Primary school	11	9.2
Secondary school	18	15.0
Tertiary	88	73.3
Total	120	100
Household Size		
1-5	94	78.3
6-10	22	18.3
11-15	4	3.4
Total	120	100
Mean	4.79	
SD	2.1	

Table 2: Respondents' Willingness to Pay for Safety Labeled Bread

Variable	Coefficient	Standard Error	Z-statistics	Probability
New-price	-0.0813217***	0.015492	5.25	0.000
Constant	14.26222 ***	2.817477	-5.06	0.000

*** Denotes statistically significance at 1%

Degree of freedom is 1

Log likelihood = -40.523661; Chi² (LR statistics) = 60.11

Pseudo R² = 42.58%; Significance level = 0.0000

Mean Willingness to Pay = ₦175.4;

Premium above what consumers are currently paying = ₦15.4

Table 3 shows the result of logit model shows that only five variables were significant at both 1% and 5% levels. These significant variables are: educational level, new- price, marital status, what respondents look out for in bread, and source of information. The chi-squared shows the overall goodness-of-fit of the model. The pseudo R² indicates that 78.38% of the variation in willingness to pay was explained by the independent variables. The result indicates that educational level has a positive and a statistical significant effect on the willingness to pay for food safety label in bread by consumers. Respondents with higher level of education, appears to be more capable of knowing the health implication of poisonous food. However, the likelihood of respondents paying the extra cost for safety labeled bread increases as their level of education increases. The result reveals that they are willing to pay as much as 2.3 for safety labeled bread when their level of education increased by one year. Similarly, studies carried out by Govindasamy and

Italia (1999), Prathiraja, (2003), Alagbe, (2006), and Yusuf et al (2007) reported that a higher educational level increases consumer's willingness to pay.

New-price, which is the original price of bread plus the extra the respondents were willing to pay, has a negative and significant effect on the willingness of consumers to pay for safety labeled bread. That is, as the price of a safety labeled bread increases, the likelihood of respondents' willingness to pay decreases. The result shows that likelihood of respondent paying the extra cost of safety labeled bread with respect to price is -0.1419. This implies that for every ₦1 increase in price of safety labeled bread, the likelihood of the respondents paying reduces by - 0.1419. This study is consistent with the findings of Yusuf et al (2007), Oni et al (2005), Alagbe (2006) that increase in price reduces the willingness of consumers to pay.

The result also shows that marital status has a positive and significant effect on the willingness to pay

for food safety label in bread. The likelihood of consumers to pay a given price for food safety label increases when the respondents are married. The result shows that the likelihood of consumers paying for food safety labeled bread with respect to marital status is 3.3630. This implies that, when respondent is married, the likelihood of paying for food safety labeled bread is 3.3630. This result is similar to Yusuf et al (2007) which also show that, willingness to pay increases with married respondents.

Respondents' source of information has a positive and statistically significant effect on the willingness to pay for food safety labeled bread. That is the likelihood of respondents' willingness to pay for safety labeled bread increases as their source of information is through the media. The result reveals that the likelihood of respondents paying for food safety label with respect to news as their source of information is 2.7367. This means that as the respondents listen to news as their source of information, the likelihood of paying for food safety label increases by 2.7367. This result is similar to that of Zeng and Xiawei (2005), that access to information about green food is vitally important as television

which is the most popular media and primary channel for advertising of green products concept and products, attracts consumer's attention by interesting, intuitional and repeating visual signals and consolidates consumer's confidence in both green foods and distinguished producers.

The result further shows that, the household income is statistically insignificant, but that it has a positive effect on the willingness to pay of respondents. That is, the likelihood of household to pay for food safety label increases as household monthly expenditure increases. The result reveals that the marginal effect on probability of household paying for safety label with respect to household's monthly expenditure is 0.0794. This implies that for every 1% increase in household monthly expenditure, the likelihood of willingness to pay increases by 0.0794. Mean willingness is ₦175.4

The premium above what consumers are currently paying for bread (₦160) is ₦15.4 i.e mean willingness – what consumer are currently paying (₦175.4 - ₦160 = ₦15.4). This implies that, if an extra amount is to be added to bread because of a safety label, it should be ₦15.4.

Table 3 Regression Result of Consumers' Willingness to Pay for Food Safety Labeled Bread.

Variable	Coefficient	Standard error	Z-statistics	Probability
Household income	0.0794	0.993	0.08	0.939
Age	-0.0133	0.0491	-0.27	-0.109
Educational level	2.351**	0.9711	2.42	0.015
Household size	-0.8529	0.5784	-1.47	0.140
Gender	0.4230	1.3135	0.32	0.747
New-price	-0.1419***	0.0467	3.04	0.002
Marital status	3.3630**	1.5583	2.16	0.031
Look	-3.8584**	1.6353	-2.36	0.018
Point of purchase	2.1083	1.8544	1.14	0.256
Occupation	-1.7883	1.9014	-0.94	0.347
knowledge	1.0877	1.3608	0.80	0.424
Source of information	2.7367**	1.2473	2.19	0.028
Perception	0.6540	2.4153	0.27	0.787
Kg/wk of bread consumed	0.0288	0.0859	0.33	0.738
Constant	-29.5453***	10.4357	-2.83	0.005

*** Denotes Statistically Significance at 1%

** Denotes Statistically Significance at 5%

Number of observations = 120

LR χ^2 (14) = 110.64

Significance level = 0.0000

Pseudo R^2 = 0.7838

Log likelihood = -15.2595

Degrees of freedom = 14

Conclusion and Policy Recommendation

This study analysed consumer's willingness to pay for food safety label in bread in Oredo local Government area on Edo State. The number of respondents who used label as a way of identifying bromate free bread showed on the average the importance of labeling as a marketing function.

Majority of the respondents were found to purchase bread from well established market outlets as the major factor that determined their point of purchase was quality against of the respondents who were aware of the health benefit of potassium bromate in bread educational attainment, source of information, prices of bread and marital status are key factors in determining consumers' willingness to pay for safety labels.

Government should focus on human capacity building of respondents since result showed that increase in educational level increases respondent's willingness to pay for safety label.

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