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Consumers' Willingness to Pay for Safe and Labeled Palm Oil in Ibadan Metropolis

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Abstract

In recent decades, the quality attribute of palm oil in food products has raised significant concerns about its effects on human health, society and the environment. Ensuring the safety and quality of palm oil is therefore critical, as it remains a widely used ingredient in many households. This study examined consumers' willingness to pay for packaged palm oil in Ibadan Metropolis. A multi-stage sampling procedure was used to select respondents for the study. Data were obtained with the aid of a structured questionnaire. Data collected were analyzed using descriptive statistics, Contingent Valuation Method (CVM) and logit regression model. Results revealed that 83% of palm oil consumers were aware of packaged and labeled palm oil as a quality attribute. However, only 19.4% were willing to pay for safe packaged and labeled palm oil at ₦2100 per liter. The result also showed that household size, access to credit, packaging and labeling were factors that significantly influenced respondents' willingness to pay for safe and labeled palm oil among the consumers at 10%, 1% and 1% levels of significance respectively. The study recommended that emphasis should be laid on the benefits of safe and labeled palm oil through educational campaigns by producers, government agencies and relevant NGOs so as to increase the potential of consumers' willingness to pay for safe palm oil products.

Introduction

Palm oil is the world's leading produced tropical oil and the most commonly consumed vegetable oil (Suleiman *et al.*, 2021). It is widely available and used for a variety of food and non-food purposes (Noor and Hua, 2016). The primary production area is in Southeast Asia particularly Indonesia and Malaysia which account for 85% of its production. Other significant producers include Thailand, Colombia, Nigeria and Ecuador (Savarese *et al.*, 2022). Palm oil production in Nigeria has deep roots beginning in the early 20th century when the tree, native to West Africa was introduced to Nigeria by the British colonial government (Oladiti *et al.*, 2024). Nigeria is among the World leading producers of palm oil ranking 5th globally (Statista, 2023). In 2023, Nigeria produced 1.5 million metric tonnes of palm oil, accounting for about 2% of global production (United States Department of Agriculture (USDA, 2023) and Price waterhouse Coopers (PwC, 2019). From 2009 to 2023, production generally increased with the highest growth recorded in 2010 at approximately 14% (Statista, 2023).

In Nigeria, subsistence farmers who account for about 80% of the country's total palm oil production, predominantly drive palm oil production (Adeyemi, 2019). These farmers rely primarily on the labor of their immediate family members, leading to inefficient practices due to unskilled labor. This impacts the quality and efficiency of both production and processing (Biodiin, *et al.*, 2021). Furthermore, most crude palm oil for domestic consumption and industrial

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purposes is processed in mills lacking food-grade equipment, failing to meet international food quality and safety standards. Consequently, the quality of the palm oil produced varies significantly depending on the processing methods and packaging materials used (Okonkwo *et al.,* 2012).

Food safety, as defined by the World Health Organization (WHO, 2002), is the assurance that food, when consumed in the usual manner, does not cause harm to human health and well-being. However, in developing countries like Nigeria, efforts toward ensuring food safety in the palm oil production industry have had limited impact due to a lack of information on the subject. Over the past few decades, the use of palm oil in food products has raised significant concerns about its effects on human health, society, and the environment (Capecchi *et al.,* 2019; Savarese *et al.,* 2022), underscoring the urgency of identifying factors that contribute to consumer acceptance. In recent year, stakeholders in the palm oil industry were alarmed by the presence of adulterated or "killer palm oil" in markets across the country, with some dealers diluting original palm oil with other substances to maximize profit, thus compromising the safety of unsuspecting buyers (Akinfenwa, 2018). Given the extensive use of palm oil for cooking and garnishing food, this issue has heightened consumers' safety concerns leading to an increased demand for information regarding the quality and safety of palm oil, which may ultimately influence their purchasing preferences (Lam *et al.,* 2018). To minimize consumer uncertainty and protect public health, governments often introduce food safety laws, regulations, or policies (Wongprawmas and Canavari, 2017). One such policy tool is food safety certification labels, which serve to highlight the attractiveness of a product and guarantees consumers' certain level of quality (Altmann, 1997).

Recently, there has been a significant increase in consumer demand for packaged products (Balogun *et al.,* 2020). This trend reflects the growing awareness among consumers about the importance of product transparency and quality since buyers need reliable information to guide their consumption decisions and maximize utility, specific labels and certifications are normally used to provide effective information to them (Richartz and Abdulai, 2022). According to Obayelu *et al.,* (2015), food labels could be a possible answer to the imperfect information dilemma in food safety. Labels can effectively bridge the informational gap between producers and consumers, satisfy consumer demand for broader and more stringent quality assurance criteria, and ultimately create value for both consumers and producers (Council for Agricultural Science and Technology (CAST, 2015). When food safety information is available, the average price that consumers are willing to pay for safe food increases (Luning *et al.,* 2015).

In Nigeria, different studies have been carried out on food safety information and consumers perception (Oni *et al.,* 2005, Adesope *et al.,* 2010, Obayelu *et al.,* 2015, Obi-Egbedi *et al.,* 2017, Balogun *et al.,* 2020). However, studies that identified the determinants of consumers' willingness to pay for safe packaged and labeled palm oil in Nigeria are limited. This study therefore adds to literature in consumer's perceptions and willingness to pay for safe packaged and labeled palm oil. Therefore, the objectives of this study are to: (i) determine consumer's awareness of safe packaged and labeled palm oil, (ii) estimate the average maximum amount that consumers will be willing to pay for safe packaged palm oil and (iii) determine the factors influencing consumers' willingness to pay for safe packaged palm oil.

Materials and Methods

Study area

The study was conducted in the Ibadan Metropolis, situated in Oyo State, Nigeria. Oyo State is located in the south west region of Nigeria and covers a land area of 28,454 square kilometers. It has a latitude of 8.1196°N and a longitude of 3.4196°E. The state has a population of approximately 7,976,100 million people as of 2022. Ibadan, the capital city of Oyo State, is positioned at the edge of the savannah and is the third-largest metropolitan area in Nigeria, with a population now estimated at 4,004,320 million residents (World Population Review, 2024). It lies between the coordinates of 7.23N latitude and 3.55E longitude. Ibadan is situated in the southwest of Nigeria, about 128 kilometers inland from Lagos and 530 kilometers southwest of Abuja, the federal capital. The city covers a total area of 1,190 square miles (3,080 square kilometers).

Sampling size and sampling technique

A multi-stage sampling procedure was used to select 160 respondents for this study. The first stage was the random selection of Ibadan south west and Ibadan North LGAs. This is followed by a random selection of four (4) out of the twelve wards in each local government. The final stage involved the random selection of 20 respondents from each ward, to make a total of 160 respondents.

Instrument for data collection

Primary data was used for this study. Data were collected from palm oil consumers with the aid of a structured questionnaire. Information collected includes: socio-economic characteristics of the respondents, their perception and awareness of packaged palm oil and willingness to pay for packaged palm oil.

Method of data analysis

Descriptive statistics:

Descriptive statistics such as mean, standard deviation and percentages were used to assess the socio economic characteristics of palm oil consumers and their level of awareness about packaged and labeled palm oil.

Contingent valuation method (CVM):

CVM was used i to determine consumers' willingness to pay for safe packaged palm oil. A mixed questioning procedure, normally called closed-ended with follow-up, was used. This procedure consists of a dichotomous choice question (Yes or No) and a maximum willingness to pay question. In this method, consumers were asked whether or not they are willing to pay a premium above the current market price of palm oil. Consumers' responses are YES if they are willing to pay any premium for packaging of palm oil or NO, if they are not willing to pay a premium for packaging of palm oil. If consumers' response was yes, an open-ended question was asked about the exact amount they were willing to pay for safe palm oil. The price consumers are willing to pay differs across consumers. Consumers' mean WTP is specified below as:

$$Mean\ WTP = \frac{1}{\beta Xi}\ x \ln(1 + exp\beta 2) \quad (1)$$

Logit regression model:

Logit regression model was used 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. Following Turcin and Giraud (2001), Adepoju and Omonona, (2009) and Obayelu, (2015) the logit model is specified as:

$$logit\ (Li) = log[\frac{p}{1-p}] = \alpha + \beta Xi \quad (2)$$

Where Pi = likelihood of WTP; α = intercept parameter; β = vector of slope parameters; and Xi = vector of explanatory variables.

Explicitly, the effect of the different factors on consumers' willingness to pay for safe and packaged palm oil using a logit regression model is expressed as:

$$WTPi* = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11} + \beta_{12}X_{12} + \beta_{13}X_{13} + ei. \quad (3)$$

*WTPi**= Responses of household willingness to pay which is either 1 for Yes or 0 for No;

0 = Intercept (constant); i = Coefficient of the price that the respondents are willing to pay for packaged palm oil;

The independent variables are:

X_1 = Age of consumers (years);

X_2 = Gender (Female = 1; Male = 0);

X_3 = Marital status (married = 1; otherwise = 0);

X_4 = Education (years);

X_5 = Household size (number);

X_6 = Access to credit by consumers (yes =1; no = 0)

X_7 = Member of association (yes =1; no = 0)

X_8 = Travel experience (yes = 1; no = 0);

X_9 = Income (Naira);

X_{10} = Price of palm oil (Naira)

X_{11}= Safety of palm oil (yes = 1; no = 0);

X_{12} = Awareness of food safety information (Yes = 1; No = 0);

X_{12} = Closeness to market (km)

X_{13} = Packaging and labeling of palm oil (Yes = 1; No = 0)

e_i = Error term;

Results and Discussion

Socio-economic characteristics of the respondents

The profile of socioeconomic characteristics of the palm oil consumers in the study area is presented in Table 1. The results in the table show that the majority (45%) of palm oil consumers fall within the age group

Table 1: Distribution of socioeconomic characteristics of the palm oil consumers.

Variable	Frequency (160)	Percentage (100%)	Mean	Standard Deviation
Age				
16-30	57	35.6		
31-45	72	45.0	36.4	±10.6
46-60	28	17.5		
61-75	3	1.9		
Gender				
Male	24	15.0		
Female	136	85.0		
Marital status				
Single	49	30.6		
Married	89	55.6		
Separated	8	5.0		
Divorced	5	3.1		
Widowed	9	5.6		
Educational status				
No education	10	6.3		
Informal	2	1.3		
Primary	33	20.6		
Secondary	71	44.4		
Tertiary	44	27.5		
Household size				
1-3	67	41.9		
4-6	85	53.1	4	±2
7-9	8	5.0		
Income				
1-50000	107	66.9		
50001-100000	51	31.9		
100001-150000	1	6	45331.25	±26974
150001-200000	1	6		
Access to credit				
No	112	70.0		
Yes	48	30.0		
Belong to an association				
No	75	46.9		
Yes	85	53.1		
Traveled abroad				
No	139	86.9		
Yes	21	13.1		

Source: Field survey, 2023

of 31-45 years with the mean age as 36.38±10.6 years. This suggests that most of the respondents are still in their active age. The table also shows that most (85%) of palm oil consumers are female, implying that women are predominantly the consumers and purchasers of palm oil in the study area. This could be because women are primarily responsible for cooking in many households. This agrees with Ibrahim *et al.,* (2020) that women are the primary purchasers of palm oil. The majority (55.6%) of palm oil consumers are married and most (44%) of the respondents have a secondary level of education. This result corroborates the findings of Ibrahim *et al.,* (2020). About 66.9% of the palm oil consumers earned less than ₦ 50,000 with the mean income of ₦45331±₦26974. Majority (53.1%) of palm oil consumers have household sizes between 4-6 persons and a mean household size of 4±2 members. The implication of this is that most of the respondents have moderate household size. This agrees with Balogun *et al.,* (2020). The majority (70%) of the respondents do not have access to credit and do not have international exposure (86.9%) which suggests that most of the respondents are not exposed to external culture and are likely to stick to local preferences. This contradicts the study of Balogun *et al.,* (2020) who reported that the majority of respondents had travel experience.

Distribution of respondents by sales point and form of purchase.

The distribution of respondents by sales point is presented in Table 2. The result shows that a greater percentage (48.1%) of palm oil consumers purchased their palm oil from open markets while 18.8%, 13.8%, 13.8% purchased their palm oil from retail point, farms and supermarkets respectively. The table also revealed that most (58.8%) of consumers purchased packaged and unlabeled, while 26.3% preferred to purchase the unpackaged and unlabeled palm oil and only 15.1% purchased the packaged and labeled form.

Consumers' awareness about safe packaged and labeled palm oil.

Table 3 represents consumers' level of awareness about packaged and labeled palm oil. The result revealed that about 83% of palm oil consumers are aware of packaged and labeled palm oil as a quality attribute. The result further reveals that the majority (58.8%) of the respondents agree that packaged palm oil is safe for consumption. This suggests that consumers' are aware about the importance of food quality and safety. This agrees with Balogun *et al.,* (2020) that increased consumers' awareness about food quality and safety promotes producer's consciousness to adopt improved packaging, and enhancement of attributes that leads to good nutrition, health and food safety. However, it appears that a majority (86.9%) of respondents do not engage in reading the information on the labels of packaged palm oil, which indicates a potential gap in consumer awareness or interest in understanding the specific details of palm oil products before consumption.

Table 2: Distribution of respondents by sales point and form of purchase.

	Frequency (160)	Percentage (100%)
Sale point		
Supermarket	22	13.8
Farms	22	13.8
Retail point	30	18.8
Open market	77	48.1
Others	9	5.5
Purchase form		
Unpackaged and unlabeled	42	26.3
Packaged and unlabeled	94	58.8
Packaged and labeled	24	15.1

Source: Field survey, 2023

Table 3: Distribution of awareness of packaged and labeled palm oil

	Frequency (160)	Percentage (100%)
Aware of packaged and labeled palm oil		
Yes	132	82.5
No	28	17.5
Packaged and labeled palm oil is safe for consumption		
Yes	94	58.8
No	66	41.3
Knowledge of safety information on packaged palm oil		
Yes	21	13.1
No	139	86.9

Source: Field survey, 2023

Estimate of consumers' willingness to pay for safe packaged palm oil

Figure 1 shows that only 19.4% of the consumers are willing to pay a premium for safe packaged and labeled palm oil. This is surprising and could be because most of the respondents are low-income earners and may not be able to afford packaged palm oil because of its price. However, the result shows that the mean willingness to pay was ₦2100 per liter and the premium above what consumers are currently buying palm oil is ₦1100.

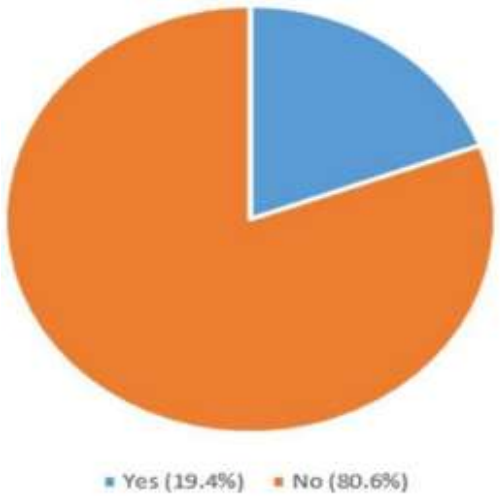

Fig. 1: Distribution of consumers' willingness to pay for safe packaged palm oil.

Factors influencing consumers' willingness to pay for safe packaged palm oil.

Table 4 presents the determinant of willingness to pay for packaged and labeled palm oil by consumers. The result shows that household size, access to credit and packaging and labeling significantly influenced respondents' willingness to pay for safe packaged and labeled palm oil at 10%, 1% and 1% levels of significance respectively.

The coefficient of household size was positive and significant at 10%. This implies that consumers with larger household sizes are more likely to be willing to pay for safe palm oil. This is surprising but could be because larger households might have greater pooled resources or income, allowing them to afford safer products. The result of the marginal effect of household size indicates that a unit increase in household size will increase their willingness to pay (WTP) by 3.2%. This result indicates that consumers with access to credit are more likely to express a willingness to pay for safe palm oil. This suggests that access to credit enhances consumers' purchasing power, which enables them to allocate financial resources toward purchasing higher-quality or safer food products, such as palm oil. The result of the marginal effect showed that a unit increase in consumers' access to credit will increase their WTP by 19.8%. This agrees with the result of Balogun *et al.,* (2020) that a naira increase in the income of consumers will increase their willingness to pay. The coefficient of packaging and labeling was positive and significant at 1%. This suggests that consumers who pay attention to the packaging and labeling information on palm oil products are more likely to be willing to pay for safe and properly labeled palm oil. This positive and significant relationship indicates that effective packaging and labeling play a crucial role in influencing consumer behavior. This agrees with Obayelu *et al.,* (2015) that positive attitude towards certification and labeling increases consumers WTP for certified and labeled moringa product. The result also shows that a unit increase in packaging and labeling of the product will increase consumers' WTP by 24.1%

Table 4: Determinants of willingness to pay for packaged and labeled palm oil by consumers

Variables	Coefficients	Standard error	Marginal effect	Standard error
Age	-0.0498	0.0359	-0.0047	0.0035
Gender	0.5749	0.6112	0.0633	0.077
Marital status	-0.1850	0.5362	-0.0174	0.0506
Education	0.0653	0.0673	0.0061	0.0062
Household size	0.3440*	0.1811	0.0323 *	0.0174
Access to credit	1.613***	0.5519	0.1981***	0.0836
Member Association	0.8010	0.5508	0.0744	0.0523
Traveled abroad	-0.5524	0.8548	0-.0443	0.0578
Income	-0.0000	0.0000	0-1.23e-06	0.0000
Price	0.1532	0.5691	0.0140	0.0508
Safety	-1.015	0.6893	-0.0953	0.0649
Knowledge of food safety information	-0.8617	0.6058	-0.1009	0.0865
Closeness to market	0.7123	0.6507	0.0737	0.0724
Packaging and labeling	1.753***	0.6978	0.2410**	0.1225
Constant	-2.056	1.760		

PseudoR ^{2} = 0.3153, Prob > Chi^2 = 0.0000, Log likelihood = -53.711152

***, * indicates significant at 1% and 10% respectively.

Conclusion

The study revealed that consumers are aware about packaged and labeled palm oil. However, the majority of the respondents were not willing to pay for safe packaged palm oil, particularly when there is going to be an increase in price. The result revealed that the mean willingness to pay for safe packaged and labeled palm oil was ₦2100 per liter and those few consumers (19.4%) who are willing to pay will only pay a premium of N1100 above the amount they are currently buying palm oil. Household size, access to credit and packaging and labeling were found to be the determinants of WTP for safe packaged palm oil in the study area.

Recommendations

This study recommends that while there is awareness about packaged and labeled palm oil among consumers, there is a need for further education and information dissemination to emphasize the benefits of packaging and labeling that could help increase consumers' willingness to pay for safe palm oil products. Also, producers can create awareness about adulterated and good palm oil through various strategies, including educational campaigns, transparent supply chains, collaboration with NGOs and certification bodies, engaging with retailers and consumers, quality assurance and testing, and supporting research and development.

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