

Awareness of IFSERAR's Pasteurized Milk, Perception and Willingness to Pay in Odeda Local Government Area of Ogun State, Nigeria

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KEYWORDS Pasteurized Milk. Awareness. Perceptions. Willingness to Pay

ABSTRACT Milk is a source of protein but contains some micro-organisms which could be harmful if consumed raw. Pasteurization helps in making it safe for consumption without substantial depletion of its nutrient composition. This study examined the level of awareness of pasteurized milk, amount willing to pay per liter and factors influencing willingness to pay in Ogun state, Nigeria. A multi-stage sampling procedure was used. Data were analyzed with descriptive and Probit regression methods. The results revealed that mean amount households were willing to pay was ₦ 138.44 per liter. The level of awareness of IFSERAR's milk was very low (21.20%). The factors that influenced willingness to pay were age, sex, household size, knowledge of the benefits of pasteurized milk, price, its flavour, and shelf life. It was recommended that in order to increase consumption, there is the need for awareness creation about the product, addition of flavour to give it better odour and tastes and improvement of shelf life of pasteurized milk.

INTRODUCTION

Although animal protein is very important for normal functioning of human body, its consumption in many developing countries is not that adequate (Lupien 2004; FAO 2004). It is also pathetic that an average Nigerian cannot meet the minimum animal protein requirements despite the diversity in the country's animal species. Specifically, available statistics show that recommended minimum per capita daily protein intake by FAO is 53.8g, but the estimated per capita daily protein intake is 45.4g (FAO 1992; Iyangbe and Orewa 2009). The importance of animal protein is encapsulated in its functions as the building block of life and constituents of enzymes and hormones (Marchuk 1992). Specifically, inadequate protein intake among children is responsible for hormonal imbalances, retarded growth and poor brain development.

Milk is one of the main sources of animal protein. FAO (1990) reported that annual milk production in most developing countries has been increasing at the rate of 2.8%, while annual demand was increasing at the rate of 3.6%. It was noted that milk production per person per year was 34 liters and 311 liters in developing and developed countries respectively. The importance of milk in human diets cannot be over-emphasized. Because of its high calcium and

phosphorous composition, it is very important in bone and teeth formation.

Milk is obtained from secretion of mammary glands and its nutrient composition varies from one animal to another. The constituents of milk can be grouped into water and solids, although water takes the highest percentage of milk component. The solid components of milk consist of protein, lactose, minerals and fat. The fat content also varies from species to species. The major component of protein is casein which is usually dispersed as solid particles that do not settle. The dispersion of this particle in milk is usually referred to as colloidal suspension. Lactose which is also known as milk sugar and some mineral salt are soluble in milk water (Wattiaux undated).

Milk is highly perishable and its quality can be easily lost by extreme temperature, acidity and contamination by microorganisms. There is the need to cool and store raw milk at about 4°C after collection before further processing (Wattiaux undated). Some people consume raw milk especially those that produce them. However, consumption of raw milk or raw dairy products has their adverse effects because it may contain microorganisms that cause diseases. Those who are more susceptible to these diseases include people with chronic illnesses or with weak im-

mune systems, the children, the elderly and pregnant women (CDFA 2011). It is therefore necessary to ensure that the microorganisms has been removed or rendered harmless.

In order to preserve milk and make it consumable, it is usually processed into several products. Pasteurization is the process of subjecting the milk to heat treatment in order to eliminate harmful bacteria and prevent fermentation in raw milk. Hornby (2010) and Jargansen and Hoffman (undated) define pasteurization as a process of heating a food, which is usually a liquid (milk), to a specific temperature for a predefined length of time and then immediately cooling it after it is removed from the heat.

Gould (2011) reported that non-pasteurized raw milk was responsible for 86 food poisoning outbreaks between 1998 and 2008, leading to 1,676 illnesses, 191 hospitalizations, and two deaths. It was also emphasized that improper handling of raw milk is responsible for nearly three times more hospitalizations than any other food-borne disease outbreak. Between 1912 and 1937, about 65,000 people died of tuberculosis contracted from consuming milk in England and Wales (Wilson 1943). California Department of Food and Agriculture (CDFA) (2011) reported that pasteurization reduces incidence of milk-borne illnesses such as typhoid fever and diarrheal. Although, there has been an argument that some nutrients such as thiamin (<3%), pyridoxine (0–8%), cobalamin (<10%), and folic acid (<10%) would have been lost in the process of pasteurizing milk, the amount lost was reported to be small compared to the quantity in milk except for vitamin C (Jarvis 2003; Alvarez and Parada-Rabell 2005). It was also noted that milk is not the main source of vitamin C. Therefore, loss of it in milk may not constitute significant nutritional deficiency.

In Nigeria, milk is processed into several products such as cheese, yoghurt, butter, pasteurized milk (PM) etc. The processing processes are usually carried out by the wives of the nomadic Fulanis and may not be under hygienic conditions. Also, the heat applied in the course of locally processing milk can result in loss of some vital nutrients, unlike when pasteurized. Production of pasteurized milk by organized institutions like IFSERAR and other private companies is expected to meet the required hygiene for food safety and acceptability. It will also increase availability of milk and increase farm revenues from dairy enterprise. That is why pasteurized milk is now sold in some Nigerian mar-

kets, although research is very scanty on the factors influencing willingness of households to pay.

According to Payne (1990), income, food customs, livestock ownership and nutritional knowledge were responsible for the variation in milk consumption. Iyangbe and Orewa (2009) used the Ordinary Least Squares (OLS) multiple regression to analyze the factors influencing daily per capita protein intake. Among urban poor, age, education level, monthly income, sex and involvement in farming significantly increased protein consumption. However, among rural dwellers, age, dependency ratio, monthly income increased consumption while household size and education level reduced it. Uzunoz and Akcay (2012) analyzed the factors affecting consumption of packed and unpacked milk in Turkey using Probit regression. The results showed that gender, age, education, professional status, marital status, and milk buying place were not statistically significant, while household size, hygiene preference and price were statistically significant.

Negassa (2009) noted that educational attainment influences ability to process more complex information and make informed decisions about households' welfare. Using data from several countries in Central Europe, Sanchez-Villegas et al. (2003) assessed differences in cheese and milk consumption and found that there was no statistically significant relationship between the level of education and consumption of milk when they pooled the estimates from different countries. Negassa (2003) found that there was no difference in the likelihood of raw milk consumption by households headed by persons with at least primary education and illiterate. Kilic et al. (2009) found that if household size increases, the probability of consuming packed fluid milk compared to unpacked fluid milk decreased. Also, Tiriyaki and Akbay (2009) found that as household size increased, the likelihood of consume unprocessed fluid milk instead of consuming processed fluid milk increased. Households' income is one of the key factors affecting demand although the magnitude of the marginal propensity to consume varies across different income groups. Tiriyaki and Akbay (2009) found that as household income increased, the household would tend to consume more of processed fluid milk instead of choosing unprocessed fluid milk.

This paper seeks to assess households' willingness to pay (WTP) for pasteurized milk by

answering the following questions: What is the level of awareness of pasteurized milk? What is the average amount they are willing to pay per liter of pasteurized milk? What are the factors that determine willingness to pay for pasteurized milk?

MATERIAL AND METHODS

Study Area

Odeda local government area is one of the twenty local government areas in Ogun State with headquarters is Odeda. It is located along Abeokuta-Ibadan express road which is about 20 kilometers from Abeokuta, the state capital. It occupies an area of 1658.9 square kilometers. It is composed of semi-urban centers and several small and scattered settlements in which over 60% of the people are farmers. The Fulani's are found in deferent part of the local government area grazing their cattle. It shares boundary with Oyo State to north and east, bordered in west with Abeokuta north and south local government areas and to the south with Obafemi Owode local government area. Major villages in the local government area are Iyanbu, Alabata, Osiele, Kango, Owe, Opeji, Eweje Olado and Ilugun.

Sampling Procedure

Multistage sampling procedure was used for data collection. First stage was purposive selection of Odeda Local Government due to its proximity to the market where pasteurized milk is sold. The second stage was random selection of FUNAAB community, Osiele, Opeji and Obantoko in the local government area. The third stage is the random selection of 110, 60, 25 and 65 respondents in FUNAAB, Osiele, Opeji and Obantoko respectively. A total of 260 questionnaires were administered out of which only 250 were found useful.

Modeling Willingness to Pay

There are various definitions of willingness to pay (WTP), but the most common one is the maximum amount that an individual is willing to pay for a good or service (DFID 1998). There are two main ways of measuring WTP which are the revealed preference and stated preference. The stated preference approach usually measures the economic value by building in the non-use val-

ue and option values (Heywood and Stephens 2003). The stated preference is categorized into choice modeling techniques and contingent valuation.

Contingent Valuation is a method that has been widely used in environmental economics and health studies where the monetary value of the good did not exist. It is a direct method of measuring willingness to pay where they are asked how much the respondents are willing to pay for a particular good or service. The range of questions asked include open-ended question such as what is the maximum amount the respondents are willing to pay, dichotomous questions which the response could be yes or no (for example, would you like to pay ₦ X for the goods/services in question) or it could be a double bounded dichotomous question which is followed up by another dichotomous question depending on the earlier question asked. Also, the question could be inform of iterative bidding in which a series of dichotomous choice question with the last question asked been open-ended. Lastly, the CV method could be a payment card where the respondents would select the maximum amount they are willing to pay from a list of possible sum presented in a card. This study used the open-ended question to interview the respondents on the maximum amount they are willing to pay for pasteurized milk. We used the Probit model to determine the factors influencing Willingness to pay for Pasteurized milk. The Probit model specification is as stated below:

$$Y_i = \beta_0 + \sum_{k=1}^{19} \gamma_k X_{ik} + e_i$$

Where Y_i is the dependent variable measured as a binary variable (willing to pay = 1 and 0 otherwise), $\hat{\beta}_0$ is the intercept, γ_k are the coefficients of the independent variables, X_{ik} are the independent variables and e_i are the error term. The included independent variables were heard about pasteurized milk (yes = 1, 0 otherwise), residence in FUNAAB (yes = 1, 0 otherwise), residence in Osiele (yes = 1, 0 otherwise), residence in Opeji (yes = 1, 0 otherwise), age (years), sex of household head (male = 1, 0 otherwise), marital status (married = 1, 0 otherwise), household size, occupation (civil servant=1, 0 otherwise), income (₦), number of years of schooling (years), awareness of nutritive benefits of pasteurized milk (yes=1, No=0), have knowledge that IFSERAR is selling pasteurized milk (yes=1, No=0), PM not available in the market (yes=1, No=0), PM smells like raw meat (yes=1, No=0), PM cannot be preserved for long (yes=1, No=0),

PM is too expensive (yes=1, No=0), PM has too much cholesterol (yes=1, No=0) and preferred powdered/canned milk (yes=1, No=0).

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

Table 1 shows the socio-economic characteristics of the respondents. The mean age was 29 years, while 57.6 percent of the respondents fell within the age range of 20-29 years. Majority of the respondents were single (62.8%) and 58 percent were males. Most of the respondents had tertiary education (74 percent) and 45.6 percent were students. This was because the survey was conducted in an academic environment. The mean household size was 3 while 48 percent of the households had less than 2 members.

Table 1: Socio-economic characteristics of the respondents

<i>Socio-economic characteristics</i>	<i>Frequency</i>	<i>Percentage</i>
<i>Age</i>		
<20	24	9.6
20-29	144	57.6
30-39	51	20.4
40-49	17	6.8
50-59	10	4
60-69	3	1.2
>69	1	0.4
Total	250	100
<i>Gender</i>		
Male	145	58
Female	105	42
Total	250	100
<i>Marital Status</i>		
Single	157	62.8
Married	89	35.6
Widowed	4	1.6
Total	250	100
<i>Household Size</i>		
<2	120	48
2-4	62	24.8
5-7	63	25.2
8-10	2	0.8
>10	3	1.2
Total	250	100
<i>Educational Level</i>		
No Formal	12	4.8
Primary	12	5.6
Secondary	27	10.8
Tertiary	185	74
Adult	12	4.8
Total	250	100
<i>Occupation</i>		
Farming	16	6.4
Civil Servant	77	30.8
Trading/Business	22	8.8
Mechanic	5	2
Student	114	45.6
Others	16	6.4

Source: Field Survey 2012

Awareness and Perceptions of Pasteurized Milk

Table 2 shows that majority of the respondent (63.2%) were aware of pasteurized milk but very few (21.2%) knew about the Institute's pasteurized milk. This shows that the institute pasteurized milk was yet to saturate the market. Also, majority of the respondent (86.8%) were of the view that pasteurized milk was not available in the market. The availability of a product in the market would influence willingness to pay. Only very few of the respondent (18%) were of the opinion that pasteurized milk smells like raw meat. A high percentage of the respondents (69.2%) were of the view that pasteurized milk is highly perishable and could not be stored for a long time. Also, most of the respondents (74.8%) preferred the canned/powdered milk to the pasteurized milk. Inability to store the pasteurized milk could have been the reason for lowered preference. There is no clear cut margin of the respondents' view on the price tag of the product.

Table 2: Awareness and perception of pasteurized milk

<i>Awareness/perception</i>	<i>Frequency</i>	<i>Percentage</i>
<i>Aware of Pasteurized Milk</i>		
Yes	158	63.2
No	92	36.8
Total	250	100
<i>Knowledge of IFSERAR Pasteurized milk</i>		
Yes	53	21.2
No	197	78.8
Total	250	100
<i>Non-availability in the Market</i>		
Yes	212	86.8
No	38	15.2
Total	250	100
<i>Smells Like Raw Meat</i>		
Yes	45	18
No	205	82
Total	250	100
<i>Problem of Preservation</i>		
Yes	173	69.2
No	77	30.8
Total	250	100
<i>Lower Preference for Pasteurized Milk</i>		
Yes	187	74.8
No	63	25.2
Total	250	100
<i>Expensive</i>		
Yes	126	50.4
No	124	49.6
Total	250	100

Source: Field Survey 2012

Willingness to Pay for Pasteurized Milk

Table 3 shows the amount the respondents were willing to pay. The average amount the respondents were willing to pay was ₦138.44. Only 35.6 percent of the respondents were willing to pay above average amount. The average amount the respondents were willing to pay per litter was below the actual amount that IFSERAR sells a litter of pasteurized milk (₦200). As shown in the Table 3, only 13.2 percent of the respondents were willing to pay the price that was in the range of IFSERAR's price. Also, 34 percent were willing to pay less than ₦50.

Table 3: Amount willing to pay in for pasteurized milk

Amount (₦)	Frequency	Percentage
<50	85	34
50-99	16	6.4
100-149	60	24
150-199	29	11.6
200-249	33	13.2
250-299	4	1.6
>300	23	9.2
Total	250	100

Source: Field Survey (2012)

Factors Influencing WTP for Pasteurized Milk

Table 4 shows the factors affecting willingness to pay for pasteurized milk. The factors that determined WTP in the study include: age, sex, household size, awareness of the nutritive benefit of milk, high cost of PM, none availability of PM in the market and inability to preserve PM for a long time. The Table shows that the probability of willingness to pay for pasteurized milk significantly decreased ($p < 0.01$) with the age of the respondents. This is contrary to the finding of De Alwis et al. (2009) who found that increasing age was associated with an increasing probability of fresh milk consumption.

The parameter sex of the respondent has a positive sign and statistically significant ($p < 0.01$). This implies that households that were headed by men had higher probability of willing to pay for pasteurized milk. Similar finding was reported by De Alwis et al. (2009) Household size parameter is positive sign and statistically significant ($p < 0.01$). This implies that as household size increases, willingness to pay for pasteurized milk increased. This finding goes in line with that of Tiriyaki and Akbay (2009) but contrary to the finding of Kilic et al. (2009).

Table 4: Factors influencing willingness to pay for pasteurized milk

Variable	Coefficient	Standard Error
Heard about pasteurized milk	-.3332378350	.23365863
FUNAAB	.1249947391	.25691291
Osiele	.2396318266	.30830181
Opeji	.8934606460E-01	.53443710
Age	-.3383455234E-01***	.12220348E-01
Sex	.8275819484***	.23209619
Marital status	.2828049789	.25625238
Household size	.2343685181***	.79550164E-01
Civil servant	.2274111245	.31707252
Income	-.3322921646E-06	.70740212E-06
Number of years of schooling	-.5779467975E-02	.17135746E-01
Aware of the nutritive benefits of pastuerized milk	.6689068848**	.30038557
Knowledge of IFSERAR pasteurize milk	.1724837531	.26139007
Pasturized milk not available in the market	.2733732035	.23837253
Smells like raw meat	-1.201469351***	.31509450
Can not be preserved for long time	.4796979264*	.28785285
Too expensive	.7952946327***	.29096326
Have too much cholesterol	.1515084742	.29892014
Preferred powdered or canned milk	.2181523527	.24749620

*** significant at 1% , **significant at 5%, *significant at 10%

The parameter of having knowledge of the nutritive benefits of pasteurized milk is with positive sign and statistically significant ($p < 0.05$). It has been found out that increasing level of positive attitudes about nutritional value increased probability of consuming the fresh milk frequently (De Alwis et al. 2009). The parameter of perception of the respondents that pasteurized milk smells like raw meat is with negative sign and statistically significant ($p < 0.05$). This implies that those respondents that had the feeling that the milk smells like raw meat were not willing to pay.

Also, the parameter of perception of the respondents that pasteurized milk was expensive is with positive sign and statistically significant ($p < 0.01$). This implies that those that indicated that it was expensive were still willing to pay. Also, the parameter of perception of the respondents that pasteurized milk cannot be preserved for long period of time is with positive sign and statistically significant ($p < 0.10$). This implies that households that complained about its perishability had higher probability of consuming it.

CONCLUSION

The key findings in the analyses carried out in this study have pointed to very low awareness of IFSERAR'S pasteurized milk (21.20%) despite high awareness of pasteurized milk in the population (63.2%). Although some complained about its odour and shelf life, a very high percentage of the respondents indicated that it was not readily available in markets. These findings imply that there are good market prospects for pasteurized milk if adequate awareness is created and other issues bordering its odour and perishability are addressed. The average amount the respondents were willing to pay was ₦ 138.44, although most of the respondents showed preference for canned/powdered milk. The perception of households about its nutritive value was also found to influence willingness to pay. Therefore, there is the need to educate households through media programmes about the nutritional benefits of pasteurized milk.

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