

## Socio-economic characteristics and willingness of consumers to pay for the safety of *fura de nunu* in Ilorin, Nigeria

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### RESEARCH ARTICLE

#### Abstract

This study investigated the socio-economic characteristics, safety perception and willingness of consumers to pay premium (WTP) for the safety of *fura* (a semi-solid cereal-based dumpling) and *nunu* (West African yoghurt) in Ilorin metropolis, Nigeria. Primary data, generated through the use of structured questionnaires, and purpose interviews were used for the study. Data were analysed using descriptive statistics, logit regression analysis and Pearson correlation. The majority of the consumers were low income earners with low level of education. The consumers were willing to pay extra for safety intervention because of the need to safeguard their health. Income was the only variable that had significant ( $P \leq 0.01$ ) influence on WTP. Level of education ( $P \leq 0.05$ ), income ( $P \leq 0.01$ ) and safety perception ( $P \leq 0.05$ ) had a positive relationship with WTP. The consumers' willingness to pay premium provides a good baseline for safety intervention throughout the chain of this nutritious product. It is hoped that the safety intervention would safeguard the health of the consumers who are mainly youth, enhance consumers' confidence in the products, ensure food security and ultimately enhance income of the processors who are mainly rural women.

**Keywords:** health, youth, rural women, income, consumers' confidence

#### 1. Introduction

The combination of *fura* (a semi-solid cereal-based dumpling) and *nunu* (local yoghurt) is a meal often relished by its consumers (especially in the West African sub-region). *Fura* is produced by blending millet with spices and water, compressed into dough balls and cooked (Jideani *et al.*, 2001; Kordylasi, 1990; Owusu-Kwarteng *et al.*, 2010), while *nunu* is a product of spontaneous fermentation of fresh milk during 24 h incubation. They are both produced by Hausa/Fulani housewives in this region.

The combination, called *fura de nunu* in the region, has been described to be an almost balanced diet (Owusu-Kwarteng *et al.*, 2010). *Fura* provides mostly energy, while *nunu* supplies protein and minerals in the diet. Besides the aforementioned health and nutritional benefit of *fura de nunu*, it is also a source of income for village women, who engage in its production and vending. However, despite the obvious nutritional and economics benefits of this product,

many city dwellers often avoid its consumption, as its safety is doubtful due to unhygienic conditions under which the product is commonly produced and vended. Therefore, there is urgent need to provide empirical evidence based on scientific evaluation of consumption patterns of *fura de nunu*, human safety risk, consumption associated disease outbreaks/sickness and surveillance programs. Understanding the socio-economic and safety perception of the consumers for this product will assist in developing safety protocol for the product.

Our preliminary work on the hazards associated with *fura de nunu* revealed the presence of some pathogenic organisms in random samples taken at different points of processing and vending. This underscores the need to develop a safety management system for the product. It is hoped that the adoption of safety intervention to be proposed would enhance consumers' confidence in consumption of the product and, in the long run, translate

to more income which will improve the livelihood of processors, who are mainly rural women.

However, an adopted safety approach could lead to increase in the cost of processing and handling, which could push up the selling price of this product. Hence, there is a need to access the willingness to pay of consumers for the safety intervention. The aim of this work was to provide baseline information on the pattern of consumption and willingness to pay of consumers for the safety of *fura de nunu*.

## 2. Methodology

### Study area

The study was carried out in Ilorin Metropolis. Ilorin is the administrative capital of Kwara State and is a major commercial centre in North Central Geopolitical zone of Nigeria. It is an urban settlement with good mix of all the major ethnic nationalities of the country, and therefore an ideal location for the study. Although the mayor of the town is a Fulani man, Yoruba is the predominant language. Inhabitants of Ilorin metropolis are mostly traders, businessmen, civil servants and artisans. The surrounding villages are populated by livestock and crop farmers. Fulani women selling *fura de nunu* from the surrounding villages are common sites in the major streets, public offices and corners of the city.

### Sampling and questionnaire distribution

Major *fura de nunu* spots and consumers were first identified. Combined random and purposeful samplings were employed to select over 210 respondents. This is a focused sampling technique designed according to the aims of the study and usually employed to enhance the credibility and reduce judgement error (Coyne, 1997). Five major commercial hubs (*Sango*, *Oja-Oba* market, *Ipata*, Post office and *Maraba*) notable for *fura de nunu* vending in the city were randomly selected. Two streets with a heavy concentration of *fura de nunu* vendors and high patronage were randomly selected in each of the hubs. Finally, 20 consumers in each of the streets were purposively interviewed with the aid of structured questionnaires. Questionnaires were used to obtain data on socio-economic status of respondents, consumption pattern, perception on the safety of *fura de nunu* and willingness to pay for its safety. 205 questionnaires were used for the analysis; the remaining five were discarded because of incomplete information.

### Data analysis

Statistical analysis of the data was done using SPSS version 15.0 (SPSS, Chicago, IL, USA) and MS Excel 2010 (Microsoft, Redmond, WI, USA) software. Descriptive

statistics were used to describe the characteristics of the consumers and their perception on the safety of *fura de nunu*. The logit regression model was used to identify the factors determining the willingness of consumers to pay for the safety of *fura de nunu*. Logit regression analysis is a technique which allows for estimating the probability that an event occurred or not, by predicting a binary dependent outcome from a set of independent variables. The logit model is defined as:

$$L_i = \ln(P_i / (1 - P_i)) = \beta_0 + \beta_1 X_1 + \dots + \beta_n X_n + e_1 \quad (1)$$

Where

$L_i$  = logit likelihood;

$P_i$  = probability of consumers' willingness to pay for safety of *fura de nunu*;

$\beta_1$  = coefficients;

$X_1$  = independent variables; and

$e_1$  = error term.

Willingness to pay is defined by the independent variables as follows:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6) \quad (2)$$

Where

$Y$  = consumers' willingness to pay for the safety of *fura de nunu* (willing = 1, otherwise = 0);

$X_1$  = gender (male = 1, female = 0);

$X_2$  = marital status of respondents (single = 0, married = 1);

$X_3$  = age of respondents;

$X_4$  = educational level (non-formal = 0, primary = 1, secondary = 2, tertiary = 3);

$X_5$  = monthly income of respondents; and

$X_6$  = safety perception (safe = 1, not safe = 0).

## 3. Results and discussion

### Characteristics of *fura de nunu* consumers in Ilorin metropolis

Table 1 shows the characteristics of the interviewed *fura de nunu* consumers. 50.24% of the consumers were male, while 49.76% were female. They were mostly single (58.54%) and the majority was 21-30 years old (43.41%) with an average of 32.9 years. Therefore, most consumers are in the active economical and reproductive age. This is similar to the findings of Ezekiel *et al.* (2013) and Akerele *et al.* (2010). The average age recorded may be explained that youths eat more out of home than other population groups. Therefore, this study is biased towards young adults. Most of the respondents had basic education. The average was 1.69 on the scale of 0 to 3 which corresponds to junior secondary level (0: non-formal; 1: primary; 2: secondary; 3: tertiary education). Respondents were mostly low income earners with the majority (55.12%) earning less than NGN 18,000

**Table 1. Characteristics of fura de nunu consumers in Ilorin Metropolis.**

Variable	Frequency	Percentage
Gender		
Male	103	50.24
Female	102	49.76
Marital status		
Single	120	58.54
Married	85	41.46
Age (years)		
15-20	40	19.51
21-30	89	43.41
31-40	30	14.63
Above 40	46	22.45
Mean	32.9±8.76	
Education (minimum:0; maximum: 3) <sup>1</sup>		
Mean	1.69±1.35	
Income (Naira)		
Less than 18,000	113	55.12
18,000-30,000	45	21.95
31,000-40,000	12	5.85
41,000-50,000	6	2.92
Above 50,000	29	14.14
Mean	28.09±13.51	

<sup>1</sup> Education – non-formal: 0; primary: 1; secondary: 2; tertiary: 3.

per month (1 USD = ~199 NGN). The average income was NGN 28,090. The observed low education (in Nigeria, nine years of education is the compulsory minimum which is equivalent to junior secondary school and is regarded as basic/low education (Labo-Popoola *et al.*, 2009)) and low income of the respondents may be that the high income and educated people would rather patronise supermarkets to buy their yoghurts than from street hawkers because of their food safety awareness.

### Reasons for purchase and purchasing pattern

Several reasons were mentioned for consuming *fura de nunu* (Table 2), the most prominent was because of its nutritional value (46.34%). During the interview, most of the consumers informed us that their muscles and nerves were relaxed after consuming *fura de nunu*. They claimed it reinvigorates them. This is similar to the conclusion of Benkerroum (2012) that consumers' preference for traditional foods is driven by their believed health values and gustatory properties. Most of the respondents purchased the products from Fulani hawkers along the road (47.31%). Their average monthly expenditure on *fura de nunu* was NGN 910.00. Appearance/hygiene of Fulani hawkers was

**Table 2. Reasons for purchase of fura de nunu and purchasing pattern.**

Reasons for taking fura de nunu		
To quench thirst	46	22.43
Sourness	21	10.24
Nutritional benefits	95	46.34
Others are taking it	15	7.31
Undecided	30	13.68
Place of purchase		
Fulani hawkers along the road	97	47.31
Motor park	38	18.53
Fura de nunu spot	70	34.16
Monthly expenditure (Naira)		
Less than 500	119	58.05
500-1000	48	23.41
1000-2,000	32	15.61
Above 2,000	6	2.93
Factors considered when buying fura de nunu		
Retail environment	44	21.46
Appearance/hygiene of Fulani hawkers	77	37.56
Packaging	50	24.39
Appearance/smell of the product	34	16.59

the most important factor considered by majority of the respondents (37.56%).

### Safety perception and willingness to pay for safety of fura de nunu

Data on safety perception and willingness to pay for the safety of *fura de nunu* is presented in Table 3. The majority (70.24%) of the respondents considered *fura de nunu* to be safe for consumption. This is in agreement with the report of Benkerroum (2012) which found that consumers consider traditional foods to be safe, but in contrast to the finding of Akerele *et al.* (2010) on consumers' perception on safety of *kilishi*. The 'safe' claim could be due to the fact the product is considered as heritage that people have been consuming for a long time without any reported case of disease outbreak/sickness. Lack of official data on food safety induced sickness is lending credence to this claim. However, respondents were still willing to pay for any effort to improve the safety of the products. This they attributed to the need to safeguard their health. This shows that their initial claim that the product is safe could be due to lack of adequate awareness on food safety. The majority were willing to pay less than 20% of the initial price for the safety of the products. However, most of those that were not willing to pay (66.68%) believed it is the responsibility of the producers to ensure the safety of the products.

**Table 3. Safety perception and willingness to pay for safety of *fura de nunu*.**

Variables	Frequency	Percentage
Safety perception		
1: Safe	144	70.24
0: Not safe	61	29.76
Willingness to pay for safety of <i>fura de nunu</i>		
1: Yes	154	75.12
0: No	51	24.88
Percentage of initial price willing to pay		
Less than 10	60	29.27
11-20	62	30.24
21-30	32	15.61
31-40	21	10.24
41-50	13	6.34
Above 50	17	8.30
Reasons for willingness to pay		
Personal health	116	56.58
Compensate vendors	35	17.07
Both	54	26.35
Reasons for unwillingness to pay		
Already expensive	7	13.72
I am less concerned about safety	10	19.60
Producers should ensure safety	34	66.68

### Factors influencing the willingness to pay for the safety of *fura de nunu*

Effect of the studied variables on the willingness to pay for the safety of *fura de nunu* and the correlation matrix of studied variables with willingness to pay is presented in Tables 4 and 5, respectively. Income was the only variable that had significant effect ( $P \leq 0.01$ ) on the willingness to pay for safety of *fura de nunu*. Level of education ( $P \leq 0.05$ ), income of the respondents ( $P \leq 0.01$ ) and safety perception ( $P \leq 0.05$ ) had significant correlations with willingness of the respondents to pay for the safety of the product. The willingness to pay was significantly increasing with the mentioned variables.

Respondents with a higher level of education were more willing to pay for the safety of the products. Their level of education could have predisposed them to better information on health risk of consuming unregulated products. However, majority of the respondents did have low level of education. Several studies have reported significant correlations between the level of education of consumers and food safety awareness, and concluded that education through public enlightenment could help promote food safety consciousness among consumers, especially in developing countries (Babalola *et al.*, 2010; Ezekiel *et al.*, 2013; Oni *et al.*, 2005). Griffith *et al.* (1995) advocates the use of hygiene education based on health education theory to promote food safety awareness among consumers. However, it is important that professionals, especially college professors in food and health related disciplines, are involved in education of consumers and training of workers on food safety (Unklesbay *et al.*, 1998). In the present study, income was the only variable that had a significant effect on the willingness to pay for the safety of *fura de nunu*. Income has been reported several times to have highly significant relationship with food intake for low income earners (Aromolaran *et al.*, 2004; Bouis *et al.*, 1992; Grimad, 1996; Subramanian and Deaton, 1996). Respondents with higher income are more willing to pay extra for the safety intervention.

As previously mentioned, the majority of consumers were willing to pay premium because of the need to safeguard their health. This was corroborated by our preliminary findings that showed the presence of pathogenic organisms on samples taken at different points of processing and vending of this product. These show the imperativeness of designing a safety management system that would take care of all the risks associated with the consumption of this nutritious food – from the raw materials through processing, to the table of the consumers. Several studies have advocated the design of safety management systems through the integration of good hygiene practices (GHP) and hazard analysis critical control points (HACCP) plans into traditional food operations (Benkerroum, 2012; Obadina *et al.*, 2008; Setiabuhdi *et al.*, 1997). The objective of GHP is to prevent contamination of food throughout

**Table 4. Effect of studied variable on willingness to pay for safety of *fura de nunu*.**

Variables	Coefficient	Standard error	t-value	Significance
Constant	0.471	0.183	2.582	0.011
Gender	-0.059	0.061	-0.954	0.341
Marital status	0.011	0.096	0.117	0.907
Age	-0.002	0.005	-0.377	0.706
Education	0.045	0.029	1.522	0.129
Income	0.007	0.002	2.925	0.004
Safe	0.126	0.066	1.892	0.06

Table 5. Correlation matrix of studied variables.<sup>1,2</sup>

	Gender	MS	Age	Education	Income	Safe	WTP
Gender	1						
MS	0.005	1					
Age	0.132	0.746**	1				
Education	0.370	-0.598**	-0.560**	1			
Income	0.188**	0.170*	0.186**	0.103	1		
Safe	-0.290	0.720	0.310	-0.910	0.105	1	
WTP	-0.310	-0.540	-0.73	0.161*	0.225**	0.141*	1

<sup>1</sup> Correlation is significant: \*\* at the 0.01 level (2-tailed) and \* at the 0.05 level (2-tailed).

<sup>2</sup> MS = marital status; WTP = willingness to pay.

the production chain. This is achieved through effective cleaning and sanitising of all surfaces that would come in contact with food along the chain, including the hands of processors and vendors. The major objectives of HACCP are to identify hazards, assess the severity and establish effective corrective measures to the identified hazards (Oranusi *et al.*, 2003; Setiabuhdi *et al.*, 1997). Combined application of these strategies would ensure and verify that *fura de nunu* is safe for consumers. The safety assurance as a result of the application of these strategies could make it appeal to the educated and high income groups that have presently been avoiding it.

#### 4. Conclusions

This study investigated the consumption pattern, safety perception and willingness to pay of consumers for safety of *fura de nunu* in Ilorin Metropolis, Nigeria. The purpose of the study was to provide a baseline for assessing the adoption of safety intervention for the products and offering suggestions for food safety intervention strategies in the subject area. Most of the consumers have high concerns about the safety of *fura de nunu* and were ready to pay extra for safety intervention, because of the need to safeguard their health. The willingness to pay of consumers provides a good starting point for the proposed safety intervention. This is a stimulant to develop safety management regime for *fura de nunu* throughout the food supply chain. It is hoped that the safety intervention would enhance consumers' confidence in consumption of the products and at the long run translate into a higher income and an improved livelihood for the processors, who are mainly rural women.

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