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Consumption Preferences for Dairy Products in an Urban Setting: A Study of Sokoto Metropolis

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Abstract:

Although there were studies conducted on dairy product consumption in Nigeria, there were no notable studies on the characteristics of consumers who exhibit preferences for either the traditional or the pre-packaged dairy products. Consequently, this study seeks to find out the socioeconomic determinants of why a household prefers a pre-packaged dairy product or the traditional dairy products. The study area is Sokoto metropolis. The metropolis was grouped into four clusters, namely; Sokoto main, GRAs, Resident community and Peri-urban whereby 71 respondents were respectively selected from each cluster on a random basis. Data were collected with the aid of a structured food frequency questionnaire (FFQ). Descriptive and multinomial logistic regression tools were used to analyse the data. The result shows the mean age to be 39, with over 80% being married. Over 50% of the respondents have attained a tertiary education. Meanwhile, 62% of the respondents were middle to high income earners. The multinomial logit results showed that the preferences for the traditional dairy products was positively determined by the location variable (at the 1% level), while education and income level of the household heads were negatively significant at the 5% and 1% levels respectively. Meanwhile, the preferences for the pre-packaged dairy products was negatively influenced by the marital status of the household heads (at the 5% level), while the location and ethnicity of the household heads were positively significant at the 1% level respectively. Considering that there is a clear preference for the pre-packaged dairy products over that of the traditional dairy products by the highly educated and high income earners, it is hereby recommended that the processing of the traditional dairy products should be modernized, resulting in its production in a pre-packaged form acceptable to these categories of consumers.

Keywords: Dairy products, Preferences, Multinomial logit, Sokoto metropolis,

1. Introduction

Milk is often regarded as being nature's most complete food. This is because, it is an excellent source of protein, vitamins, minerals and essential amino acids (Nebedum and Obiakor, 2007). In addition to the major constituents, milk contains a large amount of lactose sugar, phosphate, peptone and nitrogen based enzymes. Walingo (2012) noted that dairy product consumption has potential to reduce blood pressure and risk of stroke, regulate weight gain, and improve body mass index. Grace *et al.* (2008) observed that milk is high in energy, good quality protein and micro-nutrients (especially vitamin A, B12, riboflavin, calcium and phosphorus), and that studies have shown benefits from milk consumption in terms of growth, physical activity and cognitive function.

Ruel *et al.* (2005) observed that while factors such as income, prices and availability affect what consumers are able to purchase or consume, consumer preferences, on the other hand, shape the decisions that consumers make regarding what they *choose to* purchase or consume. They noted that it is only when the consumers have satisfied their basic energy needs, that the role of consumer preferences in shaping food consumption patterns becomes more important. Sanusi and Adewoyin (2014) noted that consumer preference explains how a consumer ranks a collection of goods or services or prefers one collection over another. They noted further that this definition assumes that consumers rank goods or services by the amount of satisfaction, or utility afforded.

Kroes and Sheldon (1988) classified consumption preference studies into two; namely Revealed preference methods (RPM) and Stated preference methods (SPM). The former is being based on data obtained by direct observation or obtained in surveys asking for

actual behavior, while the latter use individual respondents' statements about their preferences in a set of options to estimate utility functions. However, Kroes *et al.* (1986) noted that, revealed preference methods are a more appropriate tool for deriving utilities and estimating models of demand. Therefore, other things being equal, Office of Management and Budget OMB (2003) cautioned that results from revealed preference study should be given more preference over that of stated preferences, because revealed preference data are based on actual decisions, where market participants enjoy or suffer the consequences of their decisions.

1.1. Statement of the Problem

It has been observed that whereas the consumption of pre-packaged dairy products in developed countries is over 90% (Yayar, 2012), the situation in developing countries such as Nigeria is however different with the consumption of the traditional dairy products still being a significant aspect of the diet of the consumers. Although there were several studies conducted on dairy product consumption in Nigeria (Jabbar and Domenico, 1990; Jansen, 1992; Akinyosoye, 2006; Belewu *et al.*, 2009) there were no notable studies on the characteristics of consumers who exhibit preferences for either the traditional or the pre-packaged dairy products. Consequently, this study seeks to find out the socioeconomic determinants of why a household prefers a pre-packaged dairy products or the traditional dairy products. This, it is hoped will assist the policy makers in both the public and private sectors in designing nutrition and health as well as appropriate strategies in manufacturing, pricing, marketing and product positioning. To achieve this, the following objectives were examined.

- Identify the socioeconomic characteristics of the respondents;
- Determined the revealed preferences of dairy products consumers in Sokoto metropolis.

1.2. Hypothesis

For the purpose of this study, the following null hypothesis was tested:

Ho: Household dairy product consumption preferences are not affected by the socio-economic characteristics of the household head.

2. Material and Methods

2.1. Study Area

The study area is Sokoto metropolis, which lies between latitude 13° 04'N and longitude 5°14'E and at an altitude of 272 m above sea level. The metropolis is in the dry Sahel surrounded by sandy terrain and isolated hills with an average annual rainfall of 550 mm starting in May-June and ending September-October. The highest temperatures of 45°C during the hot season are experienced in the months of March and April while Harmattan, a dry, cold and dusty condition is experienced between the months of November and February (Abdullahi *et al.* 2009). The metropolis is made up of Sokoto North and Sokoto South Local Government Areas (LG As) as well as parts of Bodinga, Dange-Shuni, Kware and Wamakko L G As with an estimated population of about 1,078,092 (NPC, 2012). The demographic structure of the metropolis is cosmopolitan albeit with the *Hausas* predominating, and Hausa is the common language. Also, residents in the metropolis were ethnic groups from within and outside Nigeria, especially *Yorubas*, *Ibos*, *Zabarmawa*, *Nupes*, *Ebiras*, and the *Togolese* among others. Occupation of the inhabitants includes trading, civil service while a reasonable proportion of the population works in organized private sectors. The metropolis is the capital city of Sokoto state and displays a classical example of urban primacy as it contains nearly 95 percent of the modern business and commercial ventures in the state (SOSG, 2014).

2.2. Sampling Procedure and Sample Size

A cluster sampling procedure was adopted for this study. This was done to ensure proper representation of important sub-population groups, namely; location, ethnicity, education and income level variables. These variables were known to have an influence on dairy product consumption and may not be adequately captured by a straightforward random sampling technique. Therefore, the metropolis was grouped into four homogenous clusters, namely; peri-urban, city centre, GRAs and the resident community.

Regarding sample size selection, Turner *et al.* (2005), provides the formula for determining the sample size as follows:

$$N_h = (z^2) (r) (1-r) (f) (k) / (p) (n) (e^2), \quad (1)$$

Substituting the recommended values gives

$$N_h = (3.84) (1-r) (1.2) (1.1) / (r) (p) (5.36) (.01). \quad (2)$$

Formula (2) reduces further to

$$N_h = (84.5) (1-r) / (r) (p). \quad (3)$$

For this study, therefore, using equation (3) the following sample size was arrived at.

$$N_h = \frac{(84.5)(1-r)}{(r)(p)}$$

$$N_h = \frac{(84.5)(0.99)}{(0.01)(0.19)}$$

$$N_h = \frac{32.955}{0.1159}$$

$$= 284 \text{ households}$$

Therefore, for each cluster, 71 households were randomly selected to give a total sample size of 284 households.

2.3. Data Collection

The primary data for this study was collected from June-October 2013 using a pre-tested structured food frequency questionnaires (FFQ) administered by the researcher and assisted by trained enumerators to elicit information from the respondents. Meanwhile, the household was adopted as the unit of investigation and was defined, following NPC (2012) definition, as consisting of a family who live together and take at least one meal a day together and had a recognized head of authority. Information was obtained mainly from the household heads and in some cases the household food budget manager (FBM).

2.4. Analytical Techniques

Following Yayar (2012), the dairy products were grouped into two categories, namely; traditional dairy products and pre-packaged dairy products. Consequently, from the responses obtained, three dependent variables were created whereby those respondents who indicated the consumption of traditional dairy products only were assigned 1, those respondents who indicated the consumption of pre-packaged dairy products only were assigned 2 and those whose preferences included both the traditional and pre-packaged dairy products were assigned 3. The values of Y are then said to be “unordered”. This is because, even though the outcomes are coded 1, 2, and 3, the numerical values are arbitrary because $1 < 2 < 3$ does not imply that outcome 1 (traditional dairy products) is less than outcome 2 (pre-packaged dairy products) is less than outcome 3 (both traditional and pre-packaged dairy products). Gujurati (2004) as well as Glynn *et al.* (2012) observed that in a situation where the regressand is unordered, the techniques of multinomial logit models can be employed to study such nominal categories.

Following Green (2012) the model is hereby specified as follows:

$$\text{Prob}(Y_i=j) = \frac{e^{\beta_j x_i}}{\sum_{k=0}^3 e^{\beta_k x_i}}, \quad \text{for } j = 0, 1, \dots, 3. \quad (4)$$

Greene (2012) as well as Long and Freese (2006) reported that in the multinomial logit model, you estimate a set of coefficients in this case, $\beta^{(1)}$, $\beta^{(2)}$, and $\beta^{(3)}$ corresponding to each outcome:

$$\text{Pr}(Y=1) = \frac{e^{x\beta^{(1)}}}{e^{x\beta^{(1)}} + e^{x\beta^{(2)}} + e^{x\beta^{(3)}}} \quad (5)$$

$$\text{Pr}(Y=2) = \frac{e^{x\beta^{(2)}}}{e^{x\beta^{(1)}} + e^{x\beta^{(2)}} + e^{x\beta^{(3)}}} \quad (6)$$

$$\text{Pr}(Y=3) = \frac{e^{x\beta^{(3)}}}{e^{x\beta^{(1)}} + e^{x\beta^{(2)}} + e^{x\beta^{(3)}}} \quad (7)$$

They noted that the model is however unidentified in the sense that there is more than one solution to $\beta^{(1)}$, $\beta^{(2)}$, and $\beta^{(3)}$ that leads to the same probabilities for $Y=1$, $Y=2$, and $Y=3$. To identify the model, one of $\beta^{(1)}$, $\beta^{(2)}$, or $\beta^{(3)}$ has to be set to 0. Therefore, for this study $\beta^{(3)}$ which is the coefficient for both traditional and pre-packaged dairy products is set to 0, the remaining coefficients $\beta^{(1)}$ (traditional dairy products) and $\beta^{(2)}$ (pre-packaged dairy products) measured the change relative to the $Y=3$ (both traditional and pre-packaged dairy products) group.

Setting $\beta^{(3)} = 0$, the equations therefore becomes:

$$\text{Pr}(Y=3) = \frac{1}{1 + e^{x\beta^{(1)}} + e^{x\beta^{(2)}}} \quad (8)$$

$$\text{Pr}(Y=1) = \frac{e^{x\beta^{(1)}}}{1 + e^{x\beta^{(1)}} + e^{x\beta^{(2)}}} \quad (9)$$

$$\text{Pr}(Y=2) = \frac{e^{x\beta^{(2)}}}{1 + e^{x\beta^{(2)}} + e^{x\beta^{(1)}}} \quad (10)$$

Finally, following Nmadu *et al.* (2013), the coefficients of the base outcome (β^3) were recovered by the use of the following equation:

$$\beta_3 = -(\beta_1 + \beta_2) \quad (11)$$

where

β_3 = coefficient of the variable of the base outcome (both traditional and pre-packaged dairy products)

β_1 = estimated coefficient of the traditional dairy products,

β_2 = estimated coefficient of the pre-packaged dairy products.

3. Results and Discussion

3.1. Personal Characteristics

Age, marital status, ethnicity, level of education and economic status of the household heads were some of the personal characteristics that were evaluated and the results are presented in Table 1. The result shows that a greater percentage of the respondent households were headed by middle-aged people with the mean age being 39. Meanwhile, the fact that more than 80% of the respondents were married should not be surprising considering the mean age of the respondents, which, under normal situation is a matured adult who is therefore expected to have a family of his/her own. Many urban consumption studies in Nigeria have reported similar results, notably Emodi and Madukwe (2011).

The high level of educational achievement recorded with over 50% of the respondents having attained one level of tertiary education or another (Table 1), it is expected consumption of dairy products in those households may be substantial considering that, higher educational level of the household head has been linked with improved health consciousness and thus greater consumption of such nutrients rich food as dairy products. The consumer economic situation has great influence on his/her buying behavior. Therefore, the fact that 62% of the respondents were middle to high income earners, the consumption of dairy products by the respondents is expected to be high. It should be noted that high income and educational attainment of respondents are some of the features associated with household demand studies set in urban areas. For example, a similar result was obtained by Erhabor and Ojogho (2011).

	Frequency	Percentage
Age (years)		
18---25	24	8.45
26---35	102	35.92
36---45	78	27.46
46--55	49	17.25
>55	31	10.92
Total	284	100
Mean	39	
Marital status		
Single	51	17.96
Married	229	80.63
Others	4	1.41
Total	284	100
Ethnicity		
Hausas	211	74.30
Others	73	25.70
Total	284	100
Educational qualification		
None	33	11.62
Primary	33	11.62
Secondary	43	15.14
NCE/OND	49	17.25
First degree/HND	87	30.63
Postgraduate	39	13.73
Total	284	100
Economic status		
Low	106	37.32
Medium	133	46.83
High	45	15.85
Total	284	100

Table 1: Showing socioeconomic characteristics of the respondents.

Source: Field Survey, 2013.

3.2. Multinomial Logistic Regression (MLogit) Results

The multinomial logit results for the revealed preferences of dairy product consumption by the households is presented in Table 2. The analysis showed that the preferences for the traditional dairy products was positively determined by the location variable (at the 1% level), while education and income level of the household heads were negatively significant at the 5% and 1% levels respectively. Meanwhile, the preferences for the pre-packaged dairy products was negatively influenced by the marital status of the household heads (at the 5% level), while the location and ethnicity of the household heads were positively significant at the 1% level respectively (Table 2).

	Traditional and Pre-packaged dairy product (base outcome)		Traditional dairy product		Pre-packaged dairy product	
		Coefficients	Coefficients	z	Coefficients	z
Age		-0.00199	.0246386 (.0311705)	0.79	-.0226533 (.0260852)	-0.87
Sex		-1.45997	1.645434 (1.66321)	0.99	-.1854611 (.4591017)	-0.40
Marital status		0.881195	.3259493 (1.080445)	0.30	-1.207144 (.5263934)	-2.29*
Dependents		0.16802	-.101503 (.2169797)	-0.47	-.0665168 (.129228)	-0.51
Household size		-0.02314	.1045764 (.0728015)	1.44	-.0814361 (.0710658)	-1.15
Ethnicity		12.8117	-14.60353 (1223.032)	-0.01	1.791835 (.4109704)	4.36**
Location		-3.00636	1.66864 (.62757)	2.66**	1.337722 (.4841932)	2.76**
Education		0.728598	-.6088937 (.2573512)	-2.37*	-.119704 (.1515771)	-0.79
Income		4.149442	-3.584714 (.7176784)	-4.99**	-.5647282 (.326598)	-1.73
Constant		-4.19377	.5998381 (3.337302)	0.18	3.593927 (1.260973)	2.85**
LR χ^2 (18)					297.10***	
Log likelihood					-154.65706	
Pseudo R ²					0.4899	

Table 2: Multinomial logit results for the revealed preferences of dairy product consumption by the households. Notes: Standard errors in parentheses. **= $P < 0.01$ *= $P < 0.05$

Not surprisingly, the results show a positive relationship between the consumption of dairy product (traditional and pre-packaged) and location variable. This is as expected, considering the unanimity of most dairy product consumption researchers on the positive influence of location on dairy product consumption. For example, Fuller *et al.* (2004) reported that location among other things have, by far, the greatest impacts on dairy product consumption. While Njarui *et al.* (2011) noted that generally as degree of processing increases, the frequency of consumption increases for urban households while declining for rural households. Finally, Melesse and Beyene (2009) reported that household location was found to affect consumption of milk products by influencing the availability of such products.

Meanwhile, the results for both educational level and economic status of the household heads showed a negative relationship between these variables and the consumption preferences of traditional dairy products. This implies that, the households headed by the highly educated as well as high income earners were more likely to substitute the traditional dairy products for the pre-packaged dairy products. This may be as a result of health concern regarding the traditional dairy products as well as the fact that these respondents can afford to buy the much more expensive pre-packaged dairy products. This result is in line with that of many dairy product consumption researchers, most notably; Jansen (1992), Akinyosoye (2006) and Njarui *et al.* (2011). Specifically, Yayar (2012) reported that better educated consumers tend to have higher preferences for packed milk than less educated consumers. This he attributed to the fact that the higher educated household head is more concerned about safety and hygienic conditions of milk.

In Nigeria, it has been reported severally (Jabbar and Domenico, 1990; Jansen, 1992; Akinyosoye, 2006) that the consumption of pre-packaged dairy products was more pronounced among the people of southern ethnic origin than those from the northern region. This, Jabbar and Domenico (1990) attributed to the fact that people of southern ethnic origin do not have a milk drinking culture, as such their exclusive reliance on the pre-packaged dairy products. Consequently, the positively significant ethnicity variable for the consumption preference of the pre-packaged dairy products was as expected.

Finally, it was not surprising that the preferences for the pre-packaged dairy product was negatively related to the marital status of the household heads. In other words, the unmarried household heads preferred the pre-packaged dairy products than the married household heads. Two reasons may be adduced for this. First, the household size in an unmarried households is less numerous when compared to a married household, as such, can afford to consume the much more expensive pre-packaged dairy products. This view was confirmed by Yayar (2012), as he reported that multinomial logit results indicate that household size had a negative impact on the probability of packed fluid milk consumption. Secondly, the unmarried household is more likely to be headed by the young and most likely to eat away from home. King *et al.* (2000) reported that changing demographics as well as the current trends in major cities of

food consumption away from home have resulted in increase preferences for value-added dairy products such as flavored milk, cheese, ice cream, and yoghurt.

Consequently, the hypothesis that household dairy product consumption preferences are not affected by the socio-economic characteristics of the household head is hereby rejected in part and the alternative accepted in part, as the multinomial logit results show five of the nine socio-economic variables to be significant determinants of consumption preferences of the households heads.

4. Conclusion and Recommendation

In conclusion, the analysis of the results showed that the preferences for the traditional dairy products was positively determined by the location variable, while education and income level of the household heads were negatively significant determinants of the preferences for the traditional dairy products. Meanwhile, the preferences for the pre-packaged dairy products was negatively influenced by the marital status of the household heads, while the location and ethnicity of the household heads were positively significant determinants of the preferences for the pre-packaged dairy products. Considering that there is a clear preference for the pre-packaged dairy products over that of the traditional dairy products by the highly educated and high income respondents, who incidentally were the major consumers of dairy products in the metropolis, it is hereby recommended that the processing of the traditional dairy products should be modernized, resulting in its production in a pre-packaged form acceptable to these categories of consumers.

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