Analysis of Consumer Behaviour Towards the Usage of Milk Products in Sekondi-Takoradi Metropolis, Ghana.

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Abstract

The purpose of this paper was to find out the various variables that drive milk consumers to choose some brands and types of milk often consumed. It also sought to find out the level of awareness and consumption of the various types of milk on the market. Milk consumption in the Sekondi-Takoradi Metropolis is on the rise, and this is a good indication since milk is rich in many nutrients which help in fighting against malnutrition. Milk products provide a lot of nutrients to all manner of people. However, milk also has some health challenges for its consumers largely due to the level of fat and cholesterol. There are different types of milk on the Ghanaian market and these are classified based on the level of fat they contain. The current investigation or research was executed using the method of complex statistics information. The study examined 686 respondents from the Sekondi-Takoradi Metropolis. Data was collected on 20 consumer attributes considered important when purchasing milk. Direct observation, a structured questionnaire and a face-to-face interview were used to collect the data which was analyzed using some statistical tools including binary logistic regression model. It was found that, most consumers consume full cream or high fat milk, and milk products which is a major threat to health conditions. Brand familiarity, taste, flavour, nutritional values and creamy nature of the product were cited as salient attributes driving consumers to patronize full cream milk. Also, there is a low level of awareness of the various types of milk on the market, especially the ones with low-fat content, hence consumers do not consider the fat content of milk products before buying. However, the study shows that when consumers are well educated about these types of milk products and their level of cholesterol or fat, they will be much sensitized to go in for milk and milk products with low-fat content rather than the products with high-fat content.

Keywords: *Binary logistic regression model. brand-choice, consumers' behaviour, Ghanaian market, milk product*

Introduction

Consumer behaviour is defined as human activity focused on the purchasing, consuming and usage of the products and services within the context of decision making before and after purchasing [5, 6, 7, 8]. Consumer behaviour can be defined as the behaviour that consumers display in searching for, purchasing, using, evaluating and disposing of products and services that they expect will satisfy consumer needs and wants [9, 10]. Consumer behaviour focuses on how individuals make decisions to spend their available resources (time, money, effort) on consumption related items. That include what they buy? Why they buy it? When they buy it? Where they buy it? How often they buy it? How often they use it? How they evaluate it after the purchase? The impact of such evaluations on future purchases, and how they dispose of it [12, 14, 15, 16]. The process starts much before the products have been acquired or [11, 12].

The importance, health benefits, and the nutritional values of milk cannot be disputed. For some time now, the Ghanaian powdered and evaporated milk market has been dominated largely by full cream milk products or brands like: Ideal milk (since 1957), Nido and Peak milk (which were later introduced). The market has in recent times grown and seen the introduction of some new kinds of milk products. These include: Filled milk (Cowbell, Nunu, Nido Essentia and Miksi milk), Semi-skimmed milk (Cowbell semi-skimmed milk, etc), Non-dairy tea creamer (Atona, This Way, Carnation tea creamer, Kremela, etc.), Soya milk (Sunrise Organic Soya milk, Lactosoy, Vitamilk, etc.), and some other Full cream milks like; Loya milk, Vega, Pomo, etc. There have been several educational programmes spear headed by the Ghana Health Service (GHS) for the indigenes in the country about the need to regulate or control the intake of protein, fat and oil based products, which are high in cholesterol by the adult population in other to help control the incidence of heart diseases, stroke and other cardio related diseases [1, 2, 3, 4]. Most health experts are of the view that higher fat or cholesterol milk products, if is to be consumed, must not be consumed by adults but should be reserved for the younger ones while the adults take the low fat or cholesterol milk products.

It is therefore imperative, for us to investigate: why consumers decide to choose certain brands or types of milk products and whether they understand the makeup or constituents and the benefits to be derived from these products before opting for them.

The main objective of this article is to determine the factors or variables that drive milk consumers in choosing some brands and type of milk and milk products consumed very often. This article uses binary logistic regression to determine the key variables. The purpose of this multivariate statistical technique is to find a way to summarize the information obtained from the attributes identified into smaller set of new, composite dimensions of factors (variates) with a minimum loss of information.

This paper will be of immense significance since it outcome can aid in identifying the milk consumption patterns in the Sekondi-Takoradi Metropolis. It can also help to identify some potential health risk issues which have not been well monitored in other to be regulated, thus mitigating the inherent health risks associated with the consumption of milk.

Methods

This section outlines the methodology employed. Exploratory research was conducted using random target population within the Sekondi-Takoradi Metropolis for generalization of the results. A structured questionnaire was prepared and self-administered to the respondents, personal observation and face to face interview were employed to solicit for information for this study. The study population was made up of consumers within the catchment areas of Sekondi, Takoradi, Kwesimintsim, and Effia Kuma within the Sekondi-Takoradi Metropolis. Due to unavailability of the sampling frame and the impossibility to include every individual, the sample area was stratified into four zones (Sekondi, Takoradi, Kwesimintsim and Effia Kuma).

A central location technique was adopted as a way of recruiting respondents. The central location included super markets, shops, filling station and the Takoradi Technical University campuses, where it is easy to access some respondents with a milk. This sampling technique was used because it is fast, inexpensive and the subjects are readily available, and it is also suitable for an exploratory study. From 800 questionnaires administered, 686 were usable. The remaining questionnaires were discarded due to excessive missing observations, thereby yielding a response rate of 86%. This response rate was considered for statistical reliability and generalizability [15]. The data was analysed using Statistical Package for Service Solution, version 21 and Excel.

Table 1: Variables X_i

Variable definition	*Var.*	*Variable definition*	*Var.*
Brand name of the product	**X_1**	A product that you are familiar with	**X_{11}**
Taste of the product	**X_2**	How popular the product/ brand is	**X_{12}**
Flavour of the product	**X_3**	The quantity in the product package	**X_{13}**
How quality the product is	**X_4**	A product that has an interesting Advert	**X_{14}**
Affordability of the product	**X_5**	A product that has a lot of promotions organized for it	**X_{15}**
How attractive the packaging is	**X_6**	Gender	**X_{16}**
Health Benefits/ Nutritional values of the product	**X_7**	Age group	**X_{17}**
Level of availability of the product	**X_8**	Socio-economic class	**X_{18}**
The dissolving rate of the product when used	**X_9**	Type of community	**X_{19}**
How old the product is on the market	**X_{10}**	Highest educational level	**X_{20}**

The logistic regression model or the logit model as it is often referred to, is a special case of a generalized linear model and analyses models where the outcome is a nominal variable. This method was used to find the best fitting and reasonable model to describe the relationship between an outcome *(dependent or response)* variable Y, and a set of independent *(predictor or explanatory)* variables X_i, which are also called the *covariates* [13, 15]. In order to simplify notation, we use the quantity $\pi(x) = E(Y| x)$ to represent the conditional mean of 'Y' given 'x' when the logistic distribution is used, with a specific form of the model being:

$$\pi(x) = P(Y \mid X_i) = \frac{e^{\beta 0+\beta 1X1+\beta 2X2+\cdots+\beta pXp}}{1+e^{\beta 0+\beta 1X1+\beta 2X2+\cdots+\beta pXp}} \quad (1)$$

where,

$$X_i = 1, 2, 3, \ldots., p \text{ number of variables [15].}$$

The model in this is given by

$$y = \begin{cases} 1, & if\ consumer's\ main\ brand\ is\ a\ full\ cream\ milk\ product \\ 0, & otherwise \end{cases}$$

$$P(Y = 1 \mid X_i) = \frac{e^{\beta_0+\beta_1X_1+\beta_2X_2+\cdots+\beta_pX_p}}{1 + e^{\beta_0+\beta_1X_1+\beta_2X_2+\cdots+\beta_pX_p}} \quad (2)$$

And, the logit or linear transformation of the model $P(Y = 1 \mid X_i)$ is given by:

$$g(x) = ln\left(\frac{P(Y = 1 \mid X_i)}{1 - P(Y = 1 \mid X_i)}\right) \quad (3)$$

Results

Figures 1 and 2 shows that, both Cowbell milk (powdered filled milk) and ideal evaporated milk (largely full cream milk) has approximately 100% awareness level in the Sekondi-Takoradi Metropolis. This is followed by Nido (powdered full cream) 92.25%, Carnation tea creamer (non-dairy creamer) 91.25%, Peak evaporated milk (full cream milk) 73.50%, Ideal powdered milk (filled milk) 71.50%, and Vitamilk (Soya milk) 62.75%. The least popular is Milgro (full cream milk) for the powdered milk range at 8.25%, Jago (full cream milk) for the evaporated milks, 9.50%, and Lactosoy for the soya milk range at 2.25%. The corresponding penetration levels of these products into household were: Ideal evaporated milk (98.25%), Cowbell milk (91.75%), Nido milk (72.25%), Carnation tea creamer (67.75%), Peak evaporated milk (54.00%), Vitamilk (47.75%), and Ideal powdered milk (41.25%).

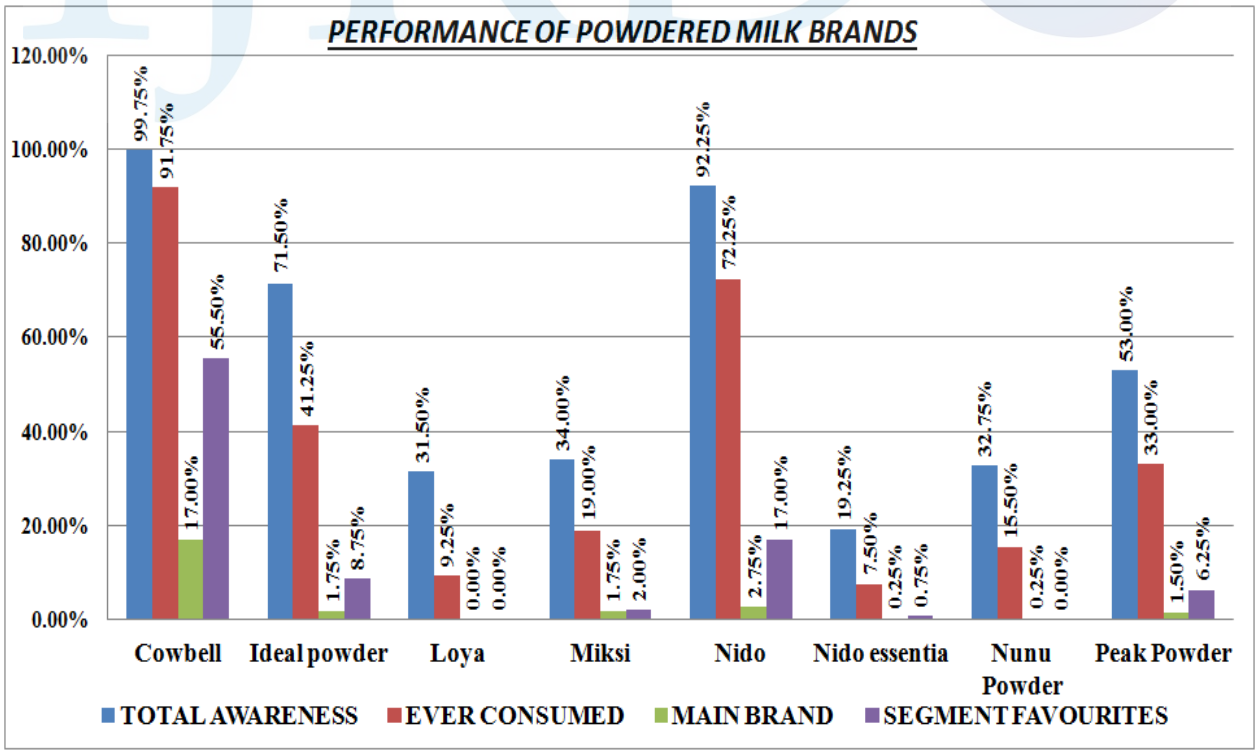

Figure 1: Performance of Powdered Milk brands

From the above counts, it can be deduced that, the milk brands with higher level of awareness also has a commensurate level of penetrations into households as compared to those with low level of awareness. Hence, it can be inferred that, there is a positive relationship between brand awareness and brand penetration (ever consumed) into households.

It was also found that, majority of consumers prefer Ideal evaporated milk as their main or most often consumed brand of milk product. This accounted for 61% of the consumption level. This was followed by Cowbell milk (17%), Carnation tea creamer (6.25%), Peak evaporated (3.5%). In summary, 70% of consumers consume full cream milk as their main type of milk, 23% filled milk, 6% nondairy creamer, and 1% soya milk.

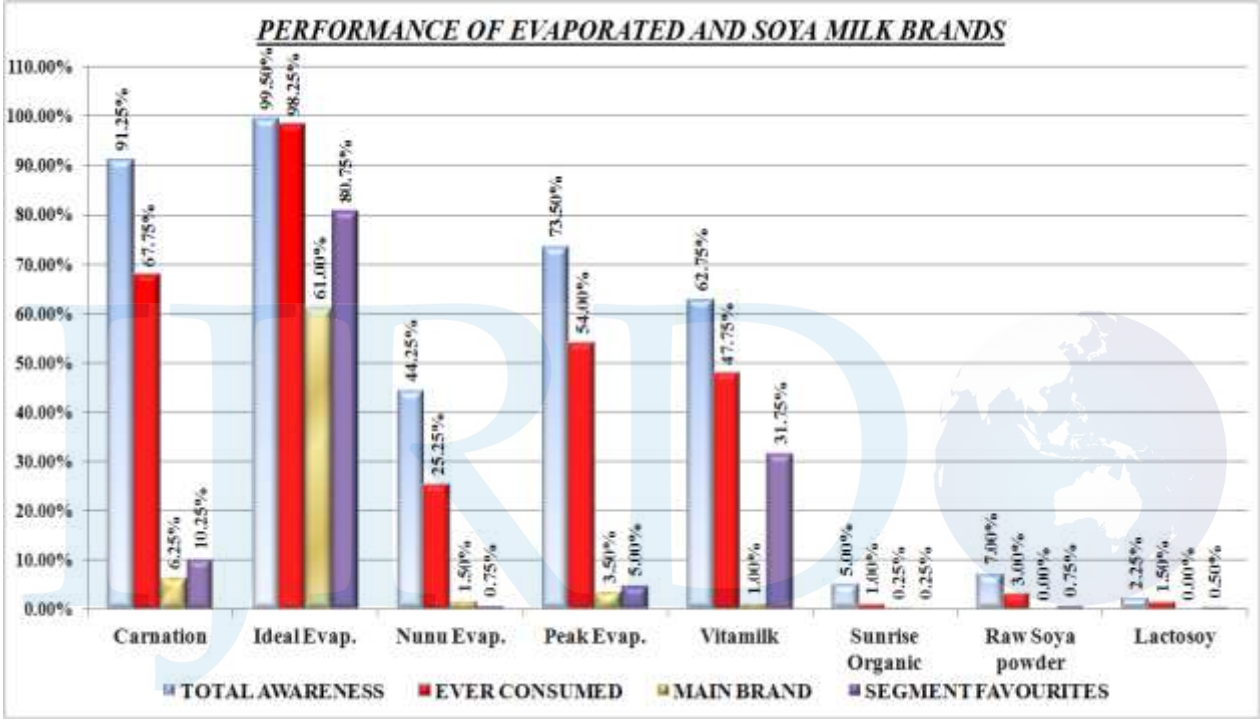

Figure 2: Performance of Evaporated and Soya Milk brands

Figure 3 gives some highlight into the reasons why consumers decide to consume their main brand of milk products; 50% of the consumers stated that, they preferred or consumes their main brand of milk product because 'It has a nice taste', 39% due to its 'Creaminess', 19.25% due to its 'Nutritional values', and 16.50% due to its 'Quality'. These are off-course consistent with the characteristics of full cream milks, due to the high fats in them. In addition are reasons which can be described as '*passing on of brand onto generations'* or *'brand familiarity'* which was mentioned as some of the reasons for choosing some of the preferred brands, and these accounted for about 40.25% of the respondents in total. Specifically, 15.25% posited, they consume their favorite brand of milk product because, 'it is what they are familiar with', 14% said 'that is what their parents always buy' and 11% indicated 'they were brought up/grew with it'. Only 8% asserted they chose their main brand because 'it has or contained low fat or cholesterol'. This can suggest a picture of lack of awareness or knowledge of the fat contents in milk products.

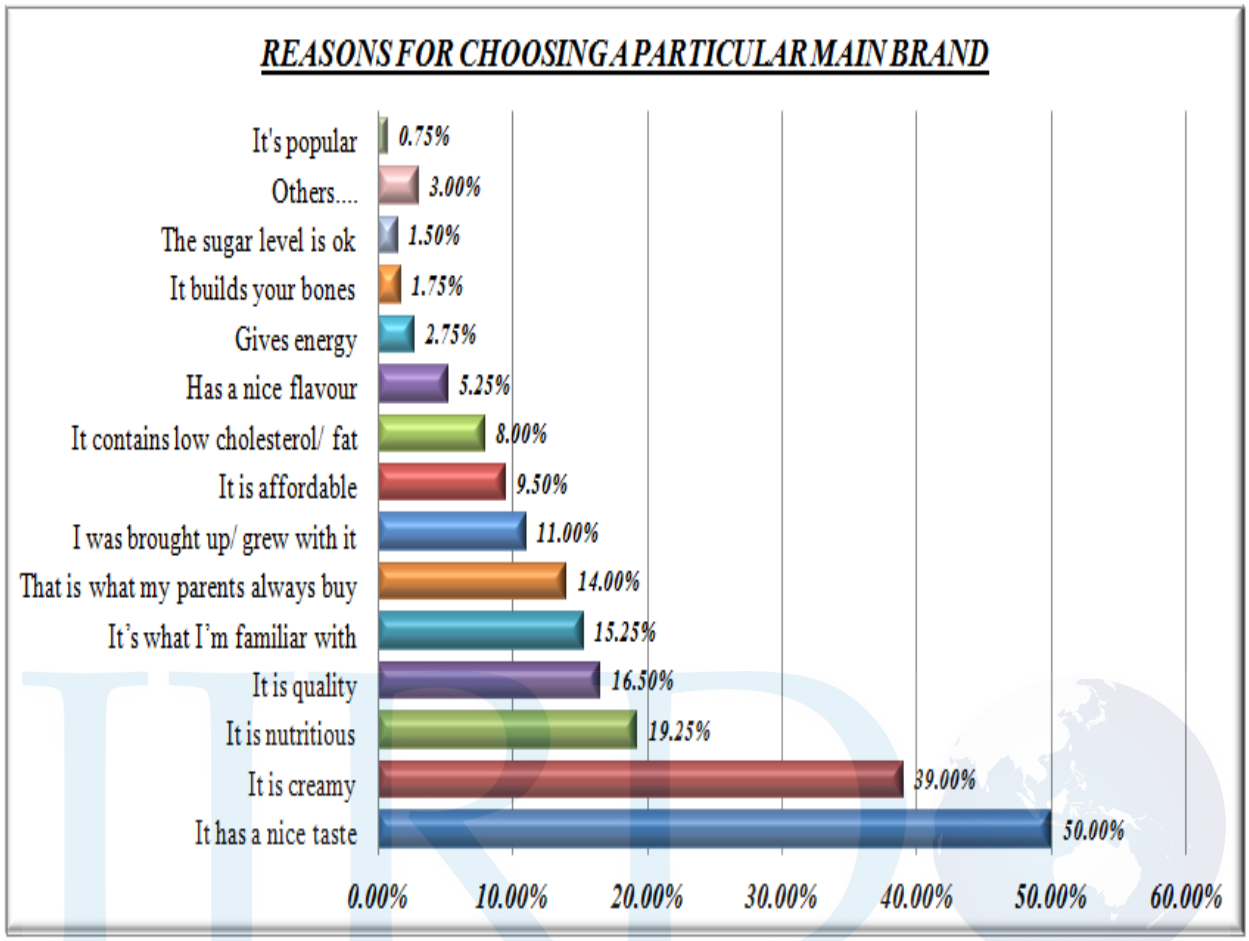

Figure 3: Reasons for Choosing Milk Brand

On the issue of consumer disposition towards types of milk on the market, it was revealed that, fresh milk had the highest level of awareness with 57%, followed by Soya milk (40.25%), with the least been filled milk (4.75%). As many as 29% of the consumers indicated they have never heard of these brand names before. Of those who mentioned that they were aware of some of these brands of milk, 28.27% said they preferred fresh milk, 25.80% indicated soya milk, 20.14% were for full cream milk, 5.65% said Skimmed milk, 1.77% preferred semi skimmed milk and non-dairy creamer respectively. However, 15.90% posited hey prefer none.

The results also show that; 41.25% constituting the majority indicated they will prefer Skimmed milk as their main type of milk, followed by full cream milk (16.25%), Fresh milk (11.75%), Filled milk (11.25%), Semi-skimmed milk (9%), Soya Milk (6.75%) and Non-Dairy Creamer (3.25%). These accounted for 61.50% of the total consumers who posited their preference for low-fat milk. Also 28.50% indicated their preference for full fat or cream milk. The counts above indicates that, even though most consumers are conscious of the level of fat they consume, they are not well educated on the fat content of milk products in general hence their preference.

Table 2 presents the binary logistic regression model. The result shows that at 5% significance level, there is a significant association between an individuals' choice of *full cream milk* as his preferred milk type and the *brand name of a milk product*. In addition, the odd ratios show that, an individual who considers *brand name of a milk product* important in choosing which milk brand to buy during shopping is 10.363 more likely to choose *full cream milk* as his preferred

milk type as compared to those who do not consider milk brand important when shopping for milk. This is consistent with the fact that, most of these full cream milk brands have been in the system for a long time, hence consumers are used to them and see them as trusted brands than the others that are much younger on the market.

It was also found that there is no significant association between an individuals' choice of *full cream milk* as his preferred milk type and the *taste of a milk product* during shopping. In addition, an individual who considers *taste of a milk product* as important in choosing which milk brand to buy during shopping is 1.119 more likely to choose *full cream milk* as his preferred milk type as compared to those who do not consider the *taste of a* milk product important when shopping for milk. This means that, milk products that are tasty are not synonymous only to the full cream milks, but also the other types**.**

Table 2: Binary logistic regression model.

Characteristics	B	S.E.	Wald	df	Sig.	Exp(B)
X1: Brand	2.338	.519	20.292	1	.000	10.363
X2: Taste	.113	1.306	.007	1	.931	1.119
X3: Flavour	2.165	1.153	3.527	1	.060	8.719
X4: Quality	17.076	4.019E4	.000	1	1.000	26070000
X5: Affordability (price)	-.949	1.069	.788	1	.375	.387
X6: Attractive package	-.571	.450	1.608	1	.205	.565
X7: Health benefits	1.486	1.447	1.056	1	.304	4.421
X8: Availability	-.501	.697	.516	1	.472	.606
X10: Old product	2.545	.387	43.228	1	.000	12.743
X12: Popularity	-.031	.476	.004	1	.947	.969
X13: Quantity	-.244	.466	.273	1	.601	.784
X14: Interesting advert	1.412	.570	6.143	1	.013	4.105
X15: Lot promotions	-1.413	.547	6.668	1	.010	.244
X19: Community type	-.198	.326	.369	1	.544	.821
X16: Gender	-.360	.278	1.680	1	.195	.698
X17: Age schooling (15-24yrs)	.405	.572	.500	1	.479	1.499
X17: Active working age (25-60yrs)	-.628	.580	1.174	1	.279	.533
X18: SEC AB	.447	.513	.759	1	.384	1.564
X18: SEC C	.287	.329	.762	1	.383	1.333
X20: Edu SHS or Above	-.026	.280	.009	1	.926	.974
Constant	-21.67	4.019E4	.000	1	1.000	.000

It can further be shown that at 5% significance level, there is a significant association between an individuals' choice of full cream milk as his preferred milk type and the flavour of a milk product

during shopping. In addition, an individual who considers flavour of a milk product important in choosing which milk brand to buy during shopping is 8.719 more likely to choose full cream milk as his preferred milk type as compared to those who do not consider flavour of a milk product important when shopping for milk. This means that most people turn to like the flavour of full cream milk products than the other types. There is a significant association between an individuals' choice of full cream milk as his preferred milk type and the age of the milk product in the market during shopping.

In addition, an individual who considers the age of a milk product important in choosing which milk brand to buy during shopping is 12.743 more likely to choose full cream milk as his preferred milk type as compared to those who do not consider as important the age of a milk product in the market. This confirms the analogy for the significance of the association between the brand name importance and full cream milk. Again at 5% significance level, there is a significant association between an individuals' choice of *full cream milk* as his preferred milk type and *how interesting the advert of a milk product is.*

In addition, the odd ratios show that an individual who attaches importance to *the nature of advert of a milk product* during shopping is 4.105 more likely to choose *full cream milk* as his preferred milk type as compared to those *who do not perceive the nature of advert of a milk product* as important when shopping for milk (see Table 2).

Table 2 further indicates that, at 5% significance level, there is a significant association between an individuals' choice of *full cream milk* as his preferred milk type and *the number of promotions organized for a milk product on the market*. Also, the odd ratios show that, an individual *to whom the number of promotions organized for a milk product on the market* is important in choosing which milk brand to buy during shopping is 0.244 times likely or 0.756 times less likely to choose *full cream milk* as his preferred milk type as compared to those to whom *the number of promotions organized for a milk product* is not important. This indeed makes sense because most of the brands that fall within the full cream milk range of products (Ideal milk, Nido and Peak milk) are well known to most consumers. Hence, they wouldn't need to run much promotions to induce consumers patronize their products considering the conservative nature of milk consumers. This is also consistent with the analogy for the significance of *brand names* and *how old a milk product has been on the market* in determining customers' choices of *milk type.*

However, there is no significant association between an individuals' choice of *full cream milk* as his preferred milk type and *taste of a milk product, quality a milk product, affordability of a milk product, package attractiveness of a milk product, health benefits of a milk product, level of availability of a milk product, popularity of a milk product,* and *the quantity of a milk product.* There was also no significant association between an individuals' choice of *full cream milk* as his preferred milk type and all the demographic variables that were included in the model.

In addition, even though there was no significant relation between the dependent variable and all these variables, analysis of the odd ratios brings out very interesting insights. It could be noted that, the odd ratios were smaller between the dependent variable and the following variables: *affordability of a milk product* (0.387), *package attractiveness of a milk product* (0.565), *level of availability of a milk product* (0.606), *how popular a milk product is* (0.969), *the quantity in a milk product* (0.784), *type of community (urban)* (0.821), *gender – male* (0.698), *age (25-60 years)* (0.533), and *highest level of education (SHS and above)* (0.974). This means that, an individual that considers these variables important in choosing which brands to buy have higher likelihood of having the other types of milks as their main brands than the full cream milk, even though it is insignificant. It could be observed that, except for the demographics, the other variables are largely

related to marketing activities around brands or products. This is real since it is these kinds of products that need much effort to push. It is also intuitive to note that, product affordability is largely not associated with full cream milks, even though not significant (see Table 2).

Conclusion

The 20 attributes examined contributes maximum optimal purchase decision of milk products. Using binary logistic regression model, it was observed that:

The level of awareness of brands increases, the level of inducement to try those brands or product also increases. For this reason, brands which have been on the market for a long time and have enjoyed some level of awareness and popularity, seem to have larger share of consumers, as in the case of: Ideal, Carnation tea creamer, Peak evaporated milks, and Nido milk powder. However, the relatively new brands of milk products, which have enjoyed some level of attention by their manufacturers in terms of increasing their awareness levels have also had a commensurate level of penetration into households. Brands such as Cowbell milk, Nido essential, Ideal powdered milk, Nunu milk and Vitamilk, falls into this category.

That, to a large extent the main reason behind the consumption of milk is the nutritional benefit derived from it. In addition, the taste it adds to a meal and the addiction developed for using milk were also cited as key reasons for consuming milk. To buttress this, most respondents also explained that the reason they chose to consume their main brands of milk is that they have a nice taste, and for their creaminess. But the issue of using the level of fat in choosing one's main brand came out not strongly enough. Full cream milks are consumed highly in the study area. This is because most of the milk brands which are consumed largely by the consumers are the old brands in the system thus are familiar with. These brands are largely driven by; consumers addiction or familiarity with them (how old brands are), taste, creaminess, brand names, flavour, and interesting advertisement of those products. In spite of this, most consumers were not aware of what the creaminess means in the products they enjoy most, as it was wrongly used to describe quality of the product.

With the current surge in cardio vascular related health issues in Ghana, the incidence of intense consumption of full cream or high fat milks could be one of the major contributing factors that has not been given the needed attention. Clearly, milk is good due to its nutritional benefits but care must be taken in choosing which type of milk to consume based on one's age and other relevant health factors. Tests to find out the level of awareness of the various types of milk and how respondents would react to the fat levels in milk when they are adequately educated showed that consumers are largely ignorant of the low-fat milk types. The adoption of the Food Standard Agency (FSA) strategy for boosting the consumption of low fat milk, that is, raising and maintaining consumer awareness and understanding the need to reduce saturated fat, alongside driving and supporting behaviour change towards healthier eating habits, would be a key part in working to promote the consumption of these low-fat milk

Recommendations

The study recommends the following steps to be taken:

That the health authorities should help to regulate and execute rigorous education for the milk consuming public about the need to be cautious about the types of milk they consume often, and to promote the consumption of the low-fat milk types to help control the surge in cardio vascular diseases. Consumers should also be encouraged to read the labels on the products they purchase to make them aware of what they consume. Consumers of fatty milk should be advised to engage

in regular exercise. Manufacturers who produce these low-fat milks should sensitize consumers through consistent advertisement about the health benefits, hence, increasing the awareness of the products and induce more persons to patronize.

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References

[1] Amarteifio, I. A., The Ghana Health Services, (2007), Hypertension is Ghana's number one killer disease, myjoyonline.com publication. (Accessed: 13/12/2016).

[2] Borboa, M. (2009), Posted in Health & Wellness / Diet & Fitness / Dieting & Nutrition. (Accessed: 20/08/2016).

[3] Ghana Health Service (2009). The Health Sector in Ghana, Facts and Figures 2009. (page 30).

[4] Heaney R., and John A. (2000). Calcium, Dairy Products, and Osteoporosis. Journal of the American College of Nutrition. 4 (3), 89-90.

[5] Nobre, H. (2011). Should consumers be in love with brands? An investigation into the influence that specific consumer-brand relationships have on the quality of the bonds that consumers develop with brands. Journal of Transnational Management, 16(4), 270–281. doi:10.1080=15475778.2011.623945

[6] Nunnally, J. L. (1967). Psychometric theory (1st ed.). New York, NY: McGraw Hill.

[7] Papatla, P., Zahedi, M. F., & Zekic-Susac, M. (2002). Leveraging the strengths of choice models and neural networks: A multiproduct comparative analysis. Decision Sciences, 33(3), 433–468.

[8] Peter, J. P. & Olson, J. C. (1987). Consumer Behavior: Marketing Strategy Perspective. Homewood, IL: Irwin.

[9] Radder, L., & Huang, W. (2008). High-involvement and low-involvement products: A comparison of brand awareness among students at a South African university. Journal of Fashion Marketing Management, 12(2), 232–243.

[10] Richardson, P. S., Dick, A. S., & Jain, A. K. (1994). Extrinsic and intrinsic cue effects on perceptions of store brand quality. Journal of Marketing, 58, 28–36.

[11] Ross, J. & Harradine, R. (2004). I am not wearing that! Branding and young children. Journal of Fashion, Marketing and Management, 8, 11–26.

[12] Sachiffman, L. G. and Kanuk, L. L. (2008). "Consumer Behaviour." 9th edition, Pearson prentice hall of India, New Delhi, pp. 23.

[13] Sharma, S. (1996). Applied Multivariate Techniques, John Wiley & Sons, Inc. pp 58 - 90.

[14] Sivasankaran, S and Sivanesan, R. (2013). Brand Preference of Packed Milk – Comparative Study on Rural and Urban Consumers in Kanyakumari District. International Journal of Business and Management Invention, volume 2, pp. 23-35

[15] Tabachnick, B. G., Fidell, L. S., & Osterlind, S. J. (2001). Using Multivariate Statistics. Boston, MA: Allyn & Bacon.

[16] Tang, Z., Lou, J., and Xiao, J. (2011). Antecedents of Intention to Purchase Mass Customized Products. Journal of Product & Brand Management, 20(4),316–326.