



Consumers' perception and attitudes towards packed milk products in northern Uganda

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ABSTRACT

While global milk consumption has been on the increase, milk consumption in Uganda has remained low, with per capita consumption currently standing at 62 liters which is below the minimum recommended by the World Health Organization per capita consumption of 200 litres. The low per capita consumption has been largely attributed to consumer fear for milk processing technologies. This study assessed consumers' perceptions and attitudes towards packed milk products. Data were collected from 400 milk consumers from two districts of Northern Uganda. We measure and estimated the Mean Attribute Scores (MAS) and Milk Quality Response Index (MQRI) to assess the level of consumer's perception of various milk quality attributes. Results indicate a positive perception of consumers towards packed milk products. MQRI based quality attributes significantly influenced consumer's acceptance of packed milk products. Consumers perceived packed milk products to be relatively better in terms of its quality attributes irrespective of socio-demographic characteristics. Milk processing and marketing companies could launch an awareness campaign to educate consumers on the utility of packed milk quality attributes while offering packed milk products at a fair price to the consumers. Future studies could focus on addressing the safety issues to maintain a positive attitude of consumers to increase packed milk product consumption.

Key words: Packed milk, determinants, consumer perception, food safety, consumer behavior, Uganda

RÉSUMÉ

Alors que la consommation mondiale de lait a augmenté, la consommation de lait en Ouganda est restée faible, la consommation par habitant se situant actuellement à 62 litres, ce qui est inférieur au minimum recommandé par l'Organisation mondiale de la santé pour la consommation par habitant de 200 litres. La faible consommation par habitant a été largement attribuée à la peur des consommateurs pour les technologies de transformation du lait. Cette étude a évalué les perceptions et les attitudes des consommateurs à l'égard des produits laitiers emballés. Des données ont été recueillies auprès de 400 consommateurs de lait de deux districts du nord de l'Ouganda. Nous mesurons et estimons les scores moyens des attributs (SMA) et l'indice de réponse de la qualité du lait (IRQL) pour évaluer le niveau de perception des consommateurs à l'égard de divers attributs de la qualité du lait. Les résultats indiquent une perception positive des consommateurs envers les produits laitiers emballés. Les attributs de qualité basés sur l'IRQL ont considérablement influencé l'acceptation par les

consommateurs des produits laitiers conditionnés. Les consommateurs perçoivent les produits laitiers conditionnés comme étant relativement meilleurs en termes d'attributs de qualité, quelles que soient les caractéristiques sociodémographiques. Les entreprises de transformation et de commercialisation du lait pourraient lancer une campagne de sensibilisation pour éduquer les consommateurs sur l'utilité des attributs de qualité du lait conditionné tout en offrant des produits laitiers conditionnés à un prix équitable aux consommateurs. Les études futures pourraient se concentrer sur la résolution des problèmes de sécurité afin de maintenir une attitude positive des consommateurs pour augmenter la consommation de produits laitiers emballés.

Mots clés: Lait conditionné, déterminants, perception du consommateur, sécurité sanitaire des aliments, comportement du consommateur, Ouganda

INTRODUCTION

Milk and dairy products constitute integral components of diets of both rural and urban communities (Fratkin, 2013; Wurzinger *et al.*, 2009). Because milk contains energy, protein, carbohydrate, cholesterol, vitamin, riboflavin, calcium, all of which are important nutrients for human health (Jones *et al.*, 2008; Sanders *et al.*, 2009; Dror and Allen, 2014). Milk consumption has positive effects on human health. For instance, milk has been found to reduce obesity (Barrea *et al.*, 2017); hypertension (Yuan *et al.*, 2013; Gopinath *et al.*, 2014); type 2 diabetes (O'Connor *et al.*, 2014; Moslehi *et al.*, 2015); cardiovascular disease (Markey *et al.*, 2014); improve metabolic disorder (Azadbakht *et al.*, 2005; Crichton *et al.*, 2011); bone health (Sanders *et al.*, 2009), and cancer (Davoodi *et al.*, 2013); and lower body fat (Metz *et al.*, 1988; Teegarden, 2005; Rosell *et al.*, 2006; Louie *et al.*, 2011; Chen *et al.*, 2012).

While global milk consumption has been on the increase (Kapaj and Deci, 2017), milk consumption in Uganda has grown more slowly compared to other livestock products like meat and eggs (Kearney, 2010). Per capita milk consumption in Uganda currently stands at 62 liters, up from 25 liters in 1986 (Ladu, 2018) which is below the minimum recommended by the World Health Organization per capita consumption (Balikowa, 2011). In Uganda, milk is consumed either as unpacked milk (locally processed) or, packed milk (industrially processed) (Staal and Kaguongo, 2003; Walstra

et al., 2003). Local milk has been part of the culture of Ugandans for decades. For instance, locally processed milk products is produced and consumed in all cultures in Uganda and is given different name depending on the culture. For instance, it is called *Omuzigo* in Buganda, *eshabwe amakamo* in Ankole, *adwarak* in Teso, and *Cak lukulu* in Acholi. Due to their cultural attachments, these locally processed milk products have given high local demands and hence have made their way to urban shops and supermarkets (Masembe, 2015).

Due to health and safety concerns, and the need to increase the shelf life of milk and milk products, various milk processing technologies have been introduced worldwide. Through these technologies, various milk products such as ghee, butter, yoghurt can be produced, stored and transported over long distances and for several days. However, consumer demands for these industrially processed milk products is still very low in Uganda, a factor which has largely attributed to cultural attachments and consumer fear for novel foods and food products (Shokrvash *et al.*, 2015; Haas *et al.*, 2016). Fear for processed food products could be attributed to suspicion that such products could be unsafe for them (Rahnama and Rajabpour, 2017). Consumer reluctance to consumed packed milk products implies that milk processing companies face a big challenge when in marketing these products to consumers (Gutkowska, 2016; Chemweno, 2020). Consumer's perceptions and attitudes towards

processed food products have been reported to be influenced by consumer characteristics (Martins *et al.*, 2019). Such characteristics include health consciousness, convenience, price, and sensory attributes (Jezewska-Zychowicz & Królak, 2015). This paper assessed consumers' perceptions and attitudes towards packed milk products and its associated socio-demographic factors.

MATERIALS AND METHODS

Study area. The study was conducted in Northern Uganda in the districts of Gulu and Lira between October and November of 2018. Northern Uganda has the lowest per capita milk consumption compared to other regions. This percentage is way below the WHO recommended minimum per capita consumption rate of 200 liters (Balikowa, 2011; and FBAM., 2014). The study targeted milk consumers within urban and peri-urban areas of Lira and Gulu Municipalities. These areas are chosen as they have a high proportion of milk consumers and they have access to different types of milk products.

Sampling design. The study participants were selected using a multi-stage sampling technique. Lira and Gulu municipalities were purposively selected because they are known. Consequently, each municipality was clustered into divisions that resulted in 50 households selected from each of four divisions in Lira and Gulu respectively. This resulted in a total sample size of 400 households. The sample size was determined using a simple random sample equation for infinite populations (N >10,000) according to (Naing *et al.*, 2006). This sample size determination approach was adopted because the population in the study area is above the threshold value of 10,000 (Lira district: 410,516; Gulu: 443,273) (UBOS, 2017). The sample size was determined using below formula.

$$n = \frac{Z^2 P(1-P)}{b^2} \dots\dots\dots \text{Eq (1)}$$

Where n= sample size
 Z = z statistics for level of confidence @ 95% = 1.96
 P = expected prevalence or proportion of milk

consumers = 40%
 b =precision @ 5% = 0.05

Sample size calculation

$$n = \frac{(1.96)^2 0.5(1-0.5)}{(0.05)^2} = 400$$

Accordingly, the study obtained the largest possible sample size with a fixed sampling error and reliability.

Data collection. Primary data was collected through face-to-face interviews by use of pre-tested structured questionnaires. Pre-testing of the questionnaires was done in the Gulu district, and adjustments made before the final questionnaire could be produced. This helped to ensure its validity and reliability of the instruments. During data collection, milk consumers were interviewed by fully trained research assistants. Data was collected on perceptions of consumers towards packed milk quality attributes such as food safety, nutrition, value, price, and packaging on a 5-point Likert scale (where 1= strongly agree and 5=strongly disagree). The classification framework for food quality attributes used was adopted from Caswell, (1998) with a slight modification that suited understanding of milk consumers. Data was also collected on consumer characteristics such as age, marital status, income levels, education levels, gender, distance to market, occupation, and household size.

Data analysis. Data were evaluated and checked for response errors and completeness. Complete data was coded, edited, and entered in the Statistical Package for Social Scientists (SPSS) version 21. To achieve predefined objectives, socio-demographic characteristics were analyzed using frequencies and percentages. Determinants of consumer perceptions were analyzed using Mean Attribute Scores (MAS), milk quality response index (MQRI), and ordered logistics regression as applied by (Ayyaz *et al.*, 2011). The multicollinearity was assessed using the Variance Inflation Factor (VIF); the VIF for each factor

was less than 10, indicating a good variance of coefficient in the data set.

Mean Attribute Score (MAS). Mean Attribute Score (MAS) was used to assess the respondent's perceptions of packed milk quality attributes such as on food safety, nutrition, value, price, and package. MAS indicated the importance of each of the milk quality attributes to the consumer. It was calculated for all respondents by aggregating the scores assigned to individual attributes (x_i where $i= 1, 2 \dots n$) and dividing the aggregate value by the number of respondents in the sample (N) according to the equation (2)

$$MAS = \sum X_i / N \dots\dots\dots Eq (2)$$

The MAS value ranges from 1 (strongly agree) to 5 (strongly disagree).

Milk Quality Response Index (MQRI). MQRI is an additive index which indicates the importance of individual attributes as a whole to an individual consumer (Ayyaz *et al.*, 2011). The formulation of the MQRI is based on the equation (3) and was used in the calculation.

$$MQRI = \sum a_{is} - X_s / aX \dots\dots\dots Eq (3)$$

In this equation, a denotes the integer score given

to an attribute (X_s) by the i th respondent ($i= 1, 2, 3 \dots n$) on the Likert scale and represents the number of attributes (X_s) by the i th respondent ($i=1, 2, 3 \dots n$) on the Likert scale and s represents the number of attributes ($s= 1, 2, 3 \dots m$) which were used to calculate the index. For the analysis, respondents score for s where $s = 21$ was used to estimate the MQRI. The term aX represents the maximum potential score that can be combined for a respondent for normalizing the value of the index. With this normalization process, the index values range from 0 (minimum) to 1 (maximum) with a certain mean and standard deviation.

To explore various socio-economic determinants of consumer perceptions towards milk quality attributes, ordinal logistic regression was employed. The model was considered appropriate where the dependent variable is in the form of more than two categories in ordered logic (Niu, 2016). The model specification is presented in equation (4).

$$MQRI = \beta_0 - \beta_1 X_1 - X_n + \dots + \beta_1 X_1 - X_n + \mu \dots\dots\dots Eq (4)$$

Where: MQRI is Milk Quality Responsive Index; X_n is a vector of independent variables including socio-demographic variables of age, gender, income, marital status, and education.

Table 1. Socio-demographic characteristics of packed milk consumers

Variable	Description	Mean	Percentage	SE
Gender	0=male, 1=female		61	0.253
Age	Age of the respondents in complete years	30.770		0.010
Marital status	1=married, 0=otherwise		60.7	0.240
Household size	Number of people living in the household	5.190		0.039
Occupation	1= employment, 0=otherwise		94.6	0.581
Education	Number of years spent in school	9.540		0.031
Income	Total monthly income (Ugxshs)	261,545.12a		0.000
Market distance	Average distance to the market (Km)	0.980		0.096
Consumption	Consumption of packed milk			
Consumed			66.8	
Not consumed			33.2	

^a US\$ is about 3700 Ugshs (Uganda shillings)

RESULTS

Socio-demographic characteristics. The majority (61%) of the participants were female, married, and on average, has 30 years of age. Most (94.6%) were mainly engaged in informal employment and earned on average UGX Shs 261,545 per month. The average household size was five persons and the average distance traveled to the market was 0.98 kilometers. About 33% of participants had never consumed packed milk products prior to the study. In terms of education, most respondents on average spent nine years at school to attain a formal level of education (Table 1).

Consumer's perceptions of packed milk products. Consumer perceptions of packed milk

products based on Mean Attribute Scores (MAS) for various milk quality attributes investigated (food safety, nutrition, value, price, and packaging) are presented in Table (2). On average the mean value of consumer perception towards packed milk products was 3.50. This is slightly above the mid-point on the 5-point Likert scale. However, on the individual subset attributes, the mean value for subsets value, price, and packaging had high scores 3.78, and 3.70, respectively. This mean that consumers perceive that packed milk provides the required food values and attractive packaging with fair prices motivate them to purchase. For subsets, food safety and nutrition, a moderate mean value of 3.21 and 3.29, respectively registered. This shows that their scores are slightly above the mid-point

Table 2. Consumer perception of packed milk products

Subset	Milk quality attribute	MAS
Food Safety	Packed milk is low in food-born pathogen	3.94
	Packed milk is low in heavy metal	2.87
	Packed milk is low in naturally occurring toxins	3.81
	Packed milk is low in food additives	2.23
	Subset	3.21
Nutrition	Packed milk is high in protein	3.38
	Packed milk is high in vitamins	3.36
	Packed milk is high in essential minerals	3.47
	Packed milk is low in fats and cholesterol	3.59
	Packed milk is low in carbohydrates	2.66
	Subset	3.29
Value	Packed milk is high in purity	3.82
	Packed milk is high in compositional integrity	3.20
	Packed milk has a good appearance	4.33
	Packed milk taste nice	4.13
	Packed milk is convenient and available	4.30
	Packed milk has better size and style	2.90
	Subset	3.78
Price and Package	Packed milk has a fair price	2.54
	Packed milk has good packaging material	3.86
	Packed milk has better labeling	4.16
	Packed milk has better and appealing information	4.24
	Subset	3.70
Overall Perception		3.50

on the scale, thus indicating that consumers were uncertain about packed milk either as being safe to consume or having nutritional values (Table 2).

Factors affecting consumer perception of packed milk products. To understand which socio-demographic factors influence consumers to purchase packed milk products, the Milk Quality Response Index (MQRI) was estimated and the results were used to run ordered logistic regression. The value of the index varied from 0.40 (the lowest) to 0.90 (the maximum), meaning that these are the range of consumers based their decisions either to consume packed milk or not. However, the first step towards conducting the

ordered logistic regression analysis was to develop ordered dependent variables (Harrell and Series, 2015). There were five dependent variables developed in respect to the values of MQRI that used the “lower” and “upper” limits as shown in (Table 3).

About 86% of packed milk consumers had fallen within the dependent variables 2 &3, that were developed using MQRI values in the range of 0.51 to 0.70 (Table 3). This mean that consumers considered dependent variable D2=price and packaging and D3=value as important quality attributes of packed milk products that could drive their positive perception towards its purchase.

Table 3. Consumer's perception of packed milk products

Dependent variable	Range of ordered variable based on MQRI	No. of respondents	Percentage
D=1	0.4 to 0.50	09	2.23
D=2	0.51 to 0.60	122	29.80
D=3	0.61 to 0.70	234	56.67
D=4	0.71 to 0.80	44	10.71
D=5	0.81 to 0.90	1	0.24

Note: D=1 Food safety, D=2&4 Price and Packaging, D=3 Value, D=5 Nutrition reflects the range of ordered MQRI given by consumers scored in MAS

Table 4. Influence of socio-demographic factors on MQRI of consumer perception

Variables	Estimate	Standard Error	Sig	95% confidence Level	
				Lower Bound	Upper Bound
MQRI=1	-5.537	0.806	0.000***	-7.116	-3.957
MQRI=2	-4.013	0.510	0.000***	-5.013	-3.013
MQRI=3	-2.682	0.425	0.000***	-3.514	-1.850
MQRI=4	-1.102	0.396	0.005**	-1.879	-0.325
MQRI=5	-0.941	0.395	0.017*	-1.715	-0.166
AGE	-0.410	0.227	0.858NS	-0.486	0.405
GEN	0.241	0.225	0.284NS	-0.200	0.683
INC	-0.164	0.341	0.630NS	-0.833	0.505
MRS	-0.228	0.229	0.318NS	-0.676	0.220
EDU	-0.187	0.264	0.478NS	-0.705	0.330

***, **, * represents statistical significance at 1, 5 and 10 percent, respectively whereas NS indicates non-significance

The ordered logistic regression was estimated to assess the extent to which each of the five explanatory variables used to develop the MQRI influences consumer perceptions towards the quality of packed milk products. Results indicate that none of the five independent variables (age, gender, income, marital status, and education) significantly predicted consumer perception towards packed milk based on products. This implies that the socio-demographic profile of consumers does not inform their perceptions to purchase packed milk.

Results from ordered dependent variables MQRI =1 (0.000), MQRI=2 (0.000), MQRI=3 (0.000), MQRI=4 (0.005) and MQRI=5 (0.017) had negative significant influence on consumer perception towards packed milk products. This indicates that consumers perceived packed milk products in terms of the quality attributes where consumption increases with higher ordered categories (Table 4).

DISCUSSION

Consumers' perceptions play a vital role in influencing the purchase of packed milk products. This is based on the process of forming an opinion by consumers on certain product attributes that a consumer attaches priority in the product selection (Jhansi, 2015). Overall, the results of this study indicate that consumers had positive perceptions towards quality attributes of packed milk. However, they did not believe that packed milk products are safe. This could be due to a lack of awareness of food safety parameters regarding packed milk products. Consequently, they would not be willing to consume products whose safety they are not sure of. Previous studies conducted by (Kariyawasam *et al.*, 2006; Ayyaz *et al.*, 2011), also showed that consumers perceived packed milk relatively better due to various quality attributes. The similarity is explained by the fact that the study population might have had similar perceptions that allow them to demand products that are safe to consume and produced through transparent procedures.

Regarding the attribute on nutrition, consumers did not believe that packed milk had good

nutritional properties for which they could derive some benefits. This suggests that consumers did not believe that packed milk contains nutritional values in terms of vitamins, proteins, and minerals that are required for healthy living compared to other food products such as processed meat, edible oils and fats, processed fish among others (Varela *et al.*, 2015). The results could be explained by the fact that milk consumers lack nutritional knowledge due to the underutilization of nutritional information of what nutrients packed milk contains (Soederberg & Cassady, 2015). Accordingly, they are not willing to consume products they perceive not to provide nutritional values good for a healthy living. This finding is in support of the work reported in previous study (Kaya, 2016), which indicates that nutritional values were the critical driver of consumer perceptions of food quality and acceptance. A typical convergence between the current study and that of Kaya, (2016) is the low level of education attained of the respondents. This suggests that because of limited education of consumers, they may not be able to understand certain aspects of nutrition facts labeled on packed milk products.

Nevertheless, consumers perceive that packed milk provides the required food values that motivate them to purchase. This suggests that consumers believe that packed milk products provide food values necessary for consumption. This result can be explained by the fact that consumers perceived packed milk in terms of net benefits he/she would receive when they decide to purchase the product. As a result, consumers tend to weigh product benefits against the cost incurred in the purchase and only buy products when benefits exceed costs. These findings are in support of previous studies such as (Boer, 2016; Kaya, 2016), who found that product benefits may be linked to function, convenience, and aesthetics. Indeed, the current study looks similar as consumers could locate packed milk products conveniently accessible and available in most shopping centers within the urban centers where the study population was drawn.

Meanwhile, for the price and packaging attribute, consumers believe that the packaging design was

appealing and would, therefore, motivate them to purchase the product. Consumers perceive packed milk to have better packaging design that facilitates making purchase decisions. This result can be explained by the fact that a consumer accepts to buy a certain product if he/she is satisfied that the product price is fair enough to acquire that value. Additionally, packaging and labeling stimulate consumer behavioral intentions. Consequently, consumers were willing to purchase packed milk products because of their attractive packaging and labeling. The findings concur with the results of a previous study (Binninger, 2015), which revealed that stimulating behavioral intentions can be achieved by making the value of the product appealing with useful information on quality and price. This similar situation is exhibited among packed milk products consumers' in the markets in Northern Uganda, where their products were attractive that could easily persuade consumers to make purchase decisions.

Further results from the ordered logistics analysis show that socio-demographic characteristics of the consumers such as age, income, education, gender, and marital status do not inform their perception about packed milk products. This contrasts with previous studies of Vukasovi (2016) and Ayyaz *et al.* (2011), who found that socio-economic factors significantly influenced consumers' perceptions of packed milk products. The observed differences among study findings could be linked to the context under which various studies were conducted. For instance, the current study was conducted among milk consumers in northern Uganda where consumers might not be exposed to certain kinds of innovations in the milk processing industry typical of a developing country situation. On other hand, previous studies were carried out in major cities in developed countries where such innovations are commonplace. Differences could also exist in consumer's trust in the authenticity of the packed milk products being promoted in the market place (Coppola *et al.*, 2014).

CONCLUSION

The study aimed at assessing consumers'

perceptions and attitudes towards packed milk products in Northern Uganda. This study find that overall perceptions of consumers were positive. The positive perception was reflected in packed milk quality attributes of value and packaging. Meanwhile, Consumers had reservations for milk quality attributes on food safety and nutritional component. MQRI based quality attributes significantly influenced consumer's acceptance of packed milk products. Socio-demographic factors of MQRI on consumer perception did not influence consumers' perception towards the consumption of packed milk products. This study provides an opportunity to milk processing companies to launch an awareness campaign to educate packed milk consumers. Educating consumers about the utility of packed milk quality attributes could improve packed milk products acceptance in northern Uganda, a typical location where information on innovations in the milk processing industry is not common.

From a scientific public health perspective, the study informs the government on how to improve and enforce existing food safety regulations and standards of packed milk supply chains in line with international standards. Secondly, training on various aspects of food safety could be arranged for all participants of milk supply chain actors to ensure that pure and hygienic packed milk products are available to consumers. While the study findings were promising to food processing companies, it is worth mentioning some of the study limitations. While this study focused on perceptions and attitudes of consumers towards packed milk products quality attributes, it did not consider assessing consumer's perceptions and opinions about certifications, food safety labels, and product labelling in general. As such, future studies could assess consumer's lack of confidence in the certifying institutions, food safety labels, and product labelling in general. This will ensure that the positive attitude towards packed milk products has sufficient impact to enable consumers to choose packed milk products that are rich in essential nutrients. An important issue that should be considered by both the private sector

and government promoting dairy development in northern Uganda.

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STATEMENT OF NO CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this paper.

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