

Factors Affecting Packed and Unpacked Fluid Milk Consumption in Wolaita Zone of SNNP Regional State, Ethiopia

Berhanu Kuma^{1*}, Derek Baker², Kindie Getnet³ and Belay Kassa⁴

¹Ethiopian Institute of Agricultural Research, P O Box 2003, Addis Ababa, Ethiopia

²International Livestock Research Institute (ILRI), P. O. Box 30709, Nairobi, Kenya

³International Water Management Institute, P. O. Box 5689, Addis Ababa, Ethiopia

⁴Haramaya University, P. O. Box 138, Dire Dawa, Ethiopia

***Corresponding author:** E-mail: berhanukuma@yahoo.com

ABSTRACT

This study was conducted to identify factors affecting packed and unpacked fluid milk consumption preferences of households in *Wolaita* zone. A total of 194 randomly sampled consumer households of 3 towns of *Wolaita* zone were studied using semi-structured questionnaire. All the data collected were analyzed using Multinomial Logit Model. The result obtained indicated that 78.4% of the households consumed only unpacked fluid milk, 7.7% of households consumed only packed fluid milk and 13.9% of households consumed both unpacked and packed fluid milk. Multinomial Logit model results showed that variables such as age of household heads, income level of households, households with at least a child under six years of age and milking cow, households who disagree with the statement 'packed fluid milk fattens children' and households who disagree with the statement 'advertisement influences people to buy more packed fluid milk', significantly affected consumption of unpacked fluid milk. Education status of household heads, young aged household heads, medical prescription, households who accept the statement 'sterilized milk contains preservatives' reported to have consumed packed fluid milk. Moreover, consumers who agree with the statement 'price of packed fluid milk is expensive compared with unpacked fluid milk' were less likely to consume packed fluid milk. The general implication is that a significant portion of unpacked fluid milk is reported to be consumed in the study area without quality and hygienic inspection. This situation seems to warrant the governments to introduce new policy tools to improve the hygiene and quality of unpacked fluid milk. Milk producing and processing companies need to design better pricing, promotion and advertising strategies for fluid milk consumption to attract consumers. Furthermore, fluid milk processing enterprises and importers need to improve their processing technological status aimed at reducing cost of processing and marketing to attract consumers.

Keywords: Consumer behavior, Fluid milk preference, Multinomial logit

INTRODUCTION

There is a significant difference between developed and developing countries in fluid milk consumption. The per capita fluid milk consumption in developed and developing countries is reported to be 60-170 and 2-80kg, respectively (USDA, 2007). In developed countries, low fat milk consumption has shown an increase while per capita consumption of whole milk showed decreased attribute to health concerns, aging population, educational status, and income level factors. In contrast, unpacked fluid milk takes a significant share of fluid milk consumption in Africa and Ethiopia is not exception to this situation (Alemu *et al.*, 2000). Cultural, educational, beliefs, attitudes and economic factors often limit fluid milk consumption. Moreover, the traditional perception of fluid milk as a product for children alone further limits its consumption in Ethiopia.

Currently there is a change in market organizational structure of fluid milk in Ethiopia due to private dairy enterprise development, growth in per capita income, involvement of foreign investment and access to promotional activities. Furthermore, the market oriented and liberalized economic policy resulted in increased importation and per capita consumption of packed fluid milk (FAOSTAT, 2003) indicating that consumers could make consumption choices among packed and unpacked fluid milk based on availability. However, household's consumption could be affected by socioeconomic and demographic characteristics and consumers' attitudes and beliefs towards price and health effects of the alternatives. Specifically, household income and size, and educational status, age and gender of the household head, cow ownership, advertisement, health related issues, medical prescription, market price, number of children under age six, and chemical composition of milk are hypothesized to affect household's decision in consumption of either packed or unpacked fluid milk.

Given the current structure of fluid milk consumption in Ethiopia, there is a need for empirical study to determine factors affecting packed and unpacked fluid milk

consumption preferences of households. To date considerable work has been conducted on factors affecting purchasing and consumption patterns of fluid milk (Asfaw, 2009; CSA, 2009). Other studies conducted focused on milk and milk products marketing, role of milk marketing cooperatives, market milk composition, role of milk in food security in rural and peri-urban economy, role of enzymes in converting milk into milk products, and role of milk pasteurization in preserving milk quality (Holloway and Ehui, 2002; Mohamed *et al.*, 2004; Gizachew, 2005; Sintayehu *et al.*, 2008; Agged *et al.*, 2010; Mohamed *et al.*, 2010; Muhammed *et al.*, 2010; Samy *et al.*, 2010). Therefore, the objective of this study was to identify factors affecting packed and unpacked fluid milk consumption preferences of households in *Wolaita* zone, Ethiopia.

Since households' consumption of packed fluid milk is increasing in Ethiopia, the result of this study provides some relatively new information about consumers' fluid milk consumption preferences. It also provides adequate information for countries supporting developing countries through Food Aid Program and HIV/AIDS related supports. In addition, it is of interest to milk processing firms, milk importing companies, government agencies that could use the information derived from in determining consumption strategies and support policy tools.

METHODOLOGY

The study was conducted in *Wolaita Sodo*, *Boditi* and *Areka* towns of *Wolaita* Zone located at about 330 km south of Addis Ababa. The sample size was determined by ungrouped one stage random likelihood sampling method (Collins, 1986) and proportional sampling method was employed on the basis of population size of the towns studied. The proportional shares of the towns in sampled population were 25% in *Boditi*, 51% in *Wolaita Sodo* and 24% in *Areka*. The major advantage of this sampling method is that it guarantees representation of defined groups in the population. Hence, it improves precision of inferences made to the full population. A total of 198 randomly sampled consumer households were

surveyed in July 2010. However, 4 households were found to be not consuming fluid milk as a result of which they were dropped from further analysis. Then the data set to 194 households were considered.

Participatory research was done to identify major explanatory variables affecting consumers' choice among fluid milk alternatives. Then a pilot survey was carried out on a group of randomly selected households in order to check suitability of designed questionnaire to socioeconomic and cultural setups. Using a semi-structured questionnaire, trained interviewers asked each consumer through face to face interview if he/she had been consuming packed or unpacked fluid milk during the last one month period. In addition, interviewers also collected data on household's socioeconomic, demographic characteristics (age, sex, education, household size, household income, occupation). Fluid milk consumption was also related to consumers' attitudes and perceptions about price and health effects of milk.

Results revealed that households had more than two choices for consuming fluid milk. If there are a finite number of choices (greater than two), Multinomial Logit estimation is appropriate to analyze the effect of exogenous variables on choices. The Multinomial Logit model has been used widely by researchers such as (Schup *et al.*, 1999; Ferto and Szabo, 2002). It is a simple extension of binary choice model and is the most frequently used model for nominal outcomes that are often used when the dependent variable has more than two alternatives. Accordingly, dependent variables were created from the data, which indicated the consumption of only unpacked fluid milk (1), only packed fluid milk (2) and both packed and unpacked fluid milk (3). Since the dependent variable has more than two choices, Multinomial Logit model is the most suitable to estimate the relationship between dependent and independent variables. The general form of the Multinomial Logit model as specified by (McFadden, 1973; Long, 1997):

$$P_{ki} = \frac{\exp(x_i' \beta_k)}{\sum_{K=1}^J \exp(x_i' \beta_j)} \quad \text{for } i = 1, 2, \dots, N; K = 1, 2, \dots, J \quad (1)$$

where P_{ki} is the probability that household i chooses to consume one of the k alternatives, x_i is explanatory variable vector that contains the set of factors about consumers' attributes, socioeconomic and demographic characteristics and β_j is vector of parameters relating to the explanatory variables to the valuation of k alternatives ($k = 1, 2, 3$).

The marginal effects and predicted probabilities are obtained from the logit regression results by the following equation:

$$\frac{\partial P_{ji}}{\partial X_{ji}} = P_{ji} (\beta_j - \sum P_{ki} \beta_k) \quad (2)$$

Where β and P represent the parameter and probability, respectively, of one of the choices. Marginal probability gives better indications and represents changes in the dependent variable for a given change in a particular regressor whereas holding other regressors at their sample means. The models are estimated under maximum likelihood procedures, which yield consistent, asymptotically normal and efficient estimates.

The independent variables, their definitions and descriptive statistics (arithmetic means and standard deviations) are shown in Table 1. It was hypothesized that households who have at least a child under age six are more likely to consume packed fluid milk due to child's health. It was hypothesized that households with large family size were less likely to consume packed fluid milk because of high expenditure. Household heads whose education status was higher than sample mean (9.8) were hypothesized more likely to consume packed fluid milk. It was hypothesized that high income level households are more likely to consume packed fluid milk. Aged household heads are traditional and less likely exposed to

information. As a result, it was hypothesized that they consume unpacked fluid milk. Female headed households were hypothesized to consume packed fluid milk due to family health. We expect that households who consider price as a significant factor have propensity to consume unpacked fluid milk. It was hypothesized that advertisement influences household choice of packed fluid milk. It was hypothesized that households who believe in the statement 'packed fluid milk fattens children' prefer to consume packed fluid milk. Households who accept the statement 'unpacked fluid milk is not healthy' were hypothesized to consume packed fluid milk due to family health. Households who believe that 'sterilized milk contains preservatives' tended to consume packed fluid milk. Households who have at least one member medically prescribed to consume milk were hypothesized to consume packed fluid milk due to stigma and discrimination. It was hypothesized that households who own cows are more likely to consume unpacked fluid milk.

RESULTS AND DISCUSSION

The average age of household heads was 42.23 and 76% of households were headed by male. The average household size was 5.42 which is higher than the average household size (5.06 persons) in the urban areas of Ethiopia (CSA, 2007). Fifty seven percent of households consisted of below 5 persons per household suggesting that nucleus family type was dominant in the study area. About 73% of households had at least a child under the age of six indicating high demand for fluid milk. About 16, 44 and 40% of household heads were illiterate, completed grades between 1 and 12 and greater than 12 grades, respectively. The average education level of household heads was 9.8 and 61% of the heads attended education level more than sample average. Generally, 84% of household heads had formal schooling. The major sources of income for households were house rent (10.6%), trading (29.4%), daily labor (5%) and governmental and nongovernmental employment (55%).

Average monthly income of households was US\$107¹ of which about 11.6% was spent on fluid milk. About 58% of households belonged to middle and high income groups. The ratio of fluid milk expenditure in total expenditure was 21, 29.1 and 50% in low, middle and high income groups, respectively. Households with low income spent almost 14.2% of their income on fluid milk consumption, whereas these ratios were 20 and 65.8% in middle and high income groups, respectively.

The perceived importance of attributes, beliefs, knowledge and importance ratings are presented in Table 1. About 77% of households agreed that price of packed fluid milk is expensive compared to unpacked fluid milk. This was an important attribute influencing consumers' choice. Interestingly, 67% of households believed that packed fluid milk fattens children while 33% disagreed with this statement. About 74% of households agreed that advertisement influences people so they buy more packed fluid milk and 51% of households agreed that sterilized milk contains preservatives. About 57% of households did not accept the statement unpacked fluid milk is not healthy but 43% agreed with the statement and hence had concern to feed hygienic and health milk to their family. About 11% of households had medical prescription from doctors to consume milk due to HIV/AIDS and gastritis cases. About 16% of households owned at least one milking cow.

¹ US\$ 1 = Birr 13.632 during the survey period. Birr is the currency unit of Ethiopia.

Table1. Definitions of variables and their descriptive statistics

Variable definition	Variable name	Mean (St. Dev)
Gender of household head (Male=1; Female=0)	GENDER	0.76(0.43)
Age of household head (Years)	AGE	42.2(12.1)
Number of members in a household	HSIZE	5.42 (2.17)
At least a child under six years of age (Yes=1; No=0)	CHILD	0.73 (0.74)
1 if the highest education level by household head is equal to 9.8 or greater and 0 otherwise	EDU	0.61 (0.49)
Household income (in 1000 birr)	INCOME	1.46 (0.94)
At least one household member who has medical prescription (Yes=1; No=0)	DORDER	0.11 (0.31)
Price of packed milk is expensive compared to unpacked milk (Agree=1; not agree=0)	PRICE	0.77 (0.39)
Packed milk fattens children (Agree=1; not agree=0)	FAT	0.67 (0.47)
Advertising influences people to buy more of packed fluid milk (Agree=1; not agree=0)	ADVERT	0.74 (0.39)
Sterilized milk contains preservatives (Agree=1; not agree=0)	PRESERV	0.51 (0.50)
Unpacked milk isn't healthy (Agree=1; Not agree=0)	HEALTH	0.43 (0.49)
Cow ownership (Yes=1; No= 0)	COWOWN	0.16 (0.37)

US\$ 1 = Birr 13.632 during summer 2010, results in parenthesis are standard deviation

The results indicated that the maximum percentage of households (78.4%) consumed only unpacked fluid milk (Table 2) while 7.7% of households consumed only packed fluid milk and 13.9% of them consumed both unpacked and packed fluid milk.

Table 2. Household fluid milk consumption choices

Milk consumption	N	Marginal Percentages
Only unpacked milk	152	78.4
Only packed milk	15	7.7
Both unpacked and packed milk	27	13.9
Total number of consumers	194	100

The results of Multinomial Logit analysis are presented in Table 3. The overall model is significant at $P < 0.01$ significance level as indicated by log pseudo likelihood value of 72.00. Moreover, based on the pseudo R^2 of 0.384, the model appears to have a good fit, especially for Multinomial Logit model and when the underlying data are cross sectional (Agged *et al.*, 2010). Age of household head, income of household, presence of a child under six years, packed milk fattens children and advertisement influences people to buy more of packed fluid milk have statistically significant coefficients for the unpacked fluid milk. Age of household head, education level of household head, medical prescription, price of packed milk is expensive compared with unpacked milk and sterilized milk contains preservatives appeared to have statistically

significant coefficients for packed fluid milk over both choices. Household size, education level of household head, medical prescription, packed milk fattens children and cow ownership were found statistically significant in explaining household choice of packed fluid milk over unpacked fluid milk. In a similar study conducted in Turkey (Kilic *et al.*, 2009) it was found out that young aged household heads, smaller household size, households with employed wife, higher income households, more educated household heads, and female headed households were more likely consumed packed fluid milk.

Results indicated that age of household head positively and significantly affected consumption of packed fluid milk. This shows that young household heads

consumed packed fluid milk than older aged heads. This is consistent with our hypothesis that old aged household heads are traditional and consume unpacked fluid milk. Households who have at least a child under the age of six consumed both types of fluid milk. This result is inconsistent with our priori expectations that households who have at least a child under age six consume packed fluid milk. Education of household head negatively and significantly affected packed fluid milk consumption. This is inconsistent with our priori expectations that highly educated household heads consume packed fluid milk. Income level of household negatively and significantly influenced consumption of unpacked fluid milk when both categories were taken as a base category. This indicates that households with higher income level appeared to consume both unpacked and packed fluid milk. Therefore, our hypothesis of higher income level households consume packed fluid milk was disproved. The price variable negatively related to packed fluid milk compared with unpacked. In fact, results showed that due to price concerns, many households consumed unpacked and both unpacked and packed fluid.

Regarding medical prescription to consume fluid milk, households who have at least a member prescribed by doctor to consume fluid milk consumed packed fluid milk because many of them were HIV/AIDS victims. They preferred this due to stigma and discrimination from milk producers and free access to packed fluid milk through Medhane Act (a non-governmental organization).

However, a few households who had medical prescription also consumed unpacked fluid milk. The variable packed fluid milk fattens children significantly and negatively affected consumption of unpacked fluid milk when both types were taken as base category and positively affected packed fluid milk when unpacked milk was taken as a reference category. These signs indicate that households who accept the statement 'packed fluid milk fattens children' consumed packed and both unpacked and packed fluid milk. The variable advertisement influences packed fluid milk consumption has negative and statistically significant coefficient to unpacked fluid milk than both unpacked and packed fluid milk. This shows that households who had exposure to milk advertisement consume both unpacked and packed fluid milk. The perception that sterilized milk contains preservatives has positive and statistically significant coefficients for packed fluid milk in both reference categories. Therefore, households who accept the statement 'sterilized milk contains preservatives' consumed packed fluid milk. The insignificant relationship between fluid milk consumption and gender of household head and health issue of fluid milk alternatives gives further evidence that fluid milk consumers are not affected from health and gender issues of milk. This suggests that consumers themselves are not particularly worried about quality and hygiene of unpacked fluid milk.

Table 3. Multinomial Logit Model results for fluid milk consumption choices

Variables	Unpacked milk vs. both unpacked and packed milk	Packed milk vs. both unpacked and packed milk	Packed milk vs. unpacked milk
INTERCEPT	5.643(2.315)**	-0.896(2.748)	-6.54(1.8)***
AGE	0.140(0.073)*	0.157(0.077)**	0.017(0.030)
HSIZE	-0.185(0.254)	-0.411(0.299)	-0.23(0.11)**
INCOME	-1.061(0.381)***	-0.567(0.540)	0.493(0.477)
GENDER	-0.828(1.069)	-0.898(1.189)	-0.070(0.742)
CHILD	-0.781(0.462)*	-0.224(0.637)	0.556(0.515)
EDU	-0.045(1.008)	-1.183(1.018)**	-1.14(0.517)*
DORDER	-0.743(1.186)	2.252(1.299)*	2.99(0.82)***
PRICE	0.742 (0.916)	-1.894(1.034)*	1.151(0.744)
FAT	-2.406(1.358)*	0.623(1.640)	3.03(0.97)***
ADVERT	-2.423(0.720)***	-1.256(1.094)	1.166(0.898)
PRESERV	0.963 (0.639)	2.078(0.919)**	1.114(0.760)
HEALTH	-0.253(0.565)	-0.352(0.517)	-0.098(0.502)
COWOWN	0.087(1.088)	1.056(0.697)	-0.97(0.39)**
	Prob > Chi square		(0.000)***
	Pseudo R-square:		0.384
	Log pseudo likelihood		-72.00
	Wald Chi square (26)		79.30

***, **, and * indicate significance at 1%, 5% and 10%, respectively. Numbers in brackets indicate robust standard error.

Since marginal effects and predicted probabilities give better indications, marginal effects are given in Table 4. Having at least a child under the age of six increased probability of consuming both unpacked and packed fluid milk by 5.28% and decreased probability of consuming only unpacked and only packed fluid milk by 3.74 and 1.54%, respectively. For household heads who had education level more than sample average, the probability of consuming both unpacked and packed fluid milk increased by 17.71% and the probability of consuming only unpacked and only packed fluid milk decreased by 13.8 and 3.91%, respectively. This finding implies that highly educated households are more concerned about safety and hygienic conditions of unpacked fluid milk and price of packed fluid milk, hence, have propensity to consume both unpacked and packed fluid milk. Income variable indicates that the probability of consuming only unpacked and only packed fluid milk decreased by 4.59 and 3.25%, respectively, while it increased both unpacked and packed fluid milk consumption by 7.84%. This finding does not support our prior expectation that higher income level households have a positive impact on

consumption of packed fluid milk. It is also inconsistent with the findings of many workers (Dong and Kaiser, 2001; Bus and Wosely, 2003; Kilic et al., 2009) who reported that income positively influenced probability that households consume packed fluid milk. Age of household head was found positively related with packed fluid milk, implying that being young aged increases probability of consuming only packed and only unpacked fluid milk by 0.13 and 0.3%, respectively. Households who had access to advertisement were by 3% more likely to consume packed fluid milk. On the other hand, households who accept the statement 'sterilized milk contains preservatives' were more likely consumed packed fluid milk (10.64%) and less likely consumed unpacked fluid milk (5.55%). Households responded to price difference which increased the probability of consuming unpacked and both unpacked and packed fluid milk by 10.53 and 12.65%, respectively and decreased probability for packed fluid milk by 2.12%. This confirms the hypothesis that existence of price difference stimulates households to consume unpacked and both unpacked and packed fluid milk. Although packed fluid milk consumers understand better why

packed fluid milk is expensive, many believe that they would buy more of it if the price was lowered. Households who believe in the statement 'packed milk fattens children' were 7.19 and 7.55% more likely to consume only packed and both unpacked and packed fluid milk, respectively and 14.74% less likely to consume only unpacked fluid milk. For households with at least a member who consumes milk by medical prescription, the probability of consuming only packed fluid milk increased by 13.48%, while it decreased the consumption of only unpacked and both unpacked and packed fluid milk by 12.47 and 1.01%, respectively.

These results suggest that socioeconomic and demographic characteristics, attributes and beliefs of a household and household head played an important role in fluid milk

consumption preferences among Ethiopian households. Similar results were reported by different authors (Bus and Wosely, 2003; Wham and Wosely, 2003; Stavkova and Turcinkova, 2005; Stavkova *et al.*, 2008; Kilic *et al.*, 2009) in other developing countries. In developed countries, many researches have been conducted on factors affecting fluid milk consumption behavior of households. Most of the studies have implied that low-fat milk consumption is positively related to income and whole milk consumption is negatively affected by income level. Furthermore, previous studies indicated that household size, presence of children in household and higher education levels positively affected low-fat milk purchase (Jensen, 1995; Schmit *et al.*, 2003).

Table 4. Marginal effects of milk consumption choices to the Multinomial Logit model

Variables	Unpacked fluid milk	Packed fluid milk	Both packed and unpacked fluid milk
AGE	0.0030	0.00132	0.00434
HSIZE	0.0743	-0.0289	-0.0454
INCOME	-0.0459	-0.0325	0.0784
GENDER	-0.00912	-0.0325	0.0416
CHILD	-0.0374	-0.0154	0.0528
EDU	-0.138	-0.0391	0.177
DORDER	-0.125	0.135	0.0101
PRICE	0.105	-0.0212	-0.127
FAT	-0.147	0.0719	0.0755
ADVERT	-0.069	0.0301	0.0395
PRESERV	-0.0555	0.106	-0.0510
HEALTH	-0.0775	0.00591	0.0716
COWOWN	0.0241	-0.00773	-0.0164

In conclusion, factors affecting packed and unpacked fluid milk consumption preferences of households were analyzed using Multinomial logit model. Findings revealed that better educated household heads, higher income level households, households with at least a child under six years of age, households who disagree with the statement 'price of packed fluid milk is expensive compared to unpacked fluid milk', households who agree with the statement 'packed fluid milk fattens children' consumed more of both unpacked and packed fluid milk. The results showed that young aged

households heads, households with at least a member prescribed by doctor to consume milk and who agree with the statement 'sterilized milk contains preservatives' consumed more of packed fluid milk. The results also revealed that a significant portion of fluid milk reported to be consumed unpacked without quality and hygienic inspection. It is suggested that governments should introduce new policy tools such as providing financial support at lower interest rate, reducing tax and encouraging investment on quality dairy products production and marketing. It is hoped that the result obtained could help both domestic and foreign companies to design pricing, promotion

and advertising strategies for fluid milk consumption. Fluid milk processing enterprises and importers need to improve their processing technological status aimed at reducing cost of processing and marketing to attract consumers.

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