



Research Article

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Assessment of knowledge gap and constraints affecting consumption of standardized dairy products in Sidama and Gedeo Zone, Southern Ethiopia

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Abstract

The study was conducted in Sidama and Gedio zone, southern Ethiopia. Dale, Hawassa zuria and Hagere selam were selected from Sidama zone and Dilla zuria from Gedio zone. A total of 177 households were interviewed. A total of 34 % and 17 % of producers had knowledge about standard and Ethiopian dairy products standards in the studied districts respectively. Although the majorities of respondents follow standardized housing and feeding, very few of the respondents know about standard milk production (9%) and also hazard analysis critical control points (HACCP)(3%).The respondents indicated that they do not bother about safety in purchasing milk and milk products from different sources. Accordingly, 74%, 40%, 38% of respondents indicated that babies (0-3yrs), children and pregnant women were more vulnerable to dairy food borne illnesses respectively. The result also indicated that 24.7% of respondents utilize locally produced milk products and 15% utilizes imported milk products. Out of the interviewed producers 91% wash their hand, 77% wash cow udder and teat (30%). Lack of awareness (57%) and supply problem (51%) were the major constraints in consuming standardized milk products in the studied districts. Therefore, integrating private milk vendors in the formal marketing system through licensing and quality control, improvement of milk and dairy products quality since the consumption of contaminated milk and milk products poses potential hazard to the consumer, awareness creation and training, enforcement of regulatory quality standards and introduction of technological interventions are required.

Keywords: Standardized, Knowledge, Producers, Production, Consumption.

INTRODUCTION

Ethiopia leads the continent of Africa in cattle population and has the tenth largest in the world.^[1] Despite the country's large cattle population, the dairy sector is not developed to the expected level. The Ethiopian Central Statistics Agency (CSA) estimated that 3.33 billion liters of cow milk was produced in the year 2012 with an average daily production of 1.54 liters per cow.

The highly perishable nature of milk coupled with mishandling practices from production up to the consumption stage, the amount produced is subject to high post harvest losses. Moreover, quality deterioration occurs due to mishandling in the dairy chain affecting food safety and food security at the end.

Food safety and quality are growing concern all over the world particularly from human health point of view. In this respect, many countries are implementing quality control programs for all food items including animal products. The Quality and Standards Authority of Ethiopia (QSAE) is the National Standards Body established in 1970 that became fully functional in 1972 for quality control. According to the 2009 Catalog of ESs, there were a total of 129 standards for milk and milk products.^[2] The regulatory bodies, consumers and industries do the implementation of these standards. However, the existence of standard the actual implementation of the sated standard, the knowledge of the producer, and consumer towards the standards are very poor. Therefore, this document provides an overview of traditional standards and utilization of standardized milk and milk products and knowledge of concerned actors about standardization of milk and milk products.

According to Rey^[3] study result showed that, appropriate information will play a vital role to develop the dairy sector. A very little systematic research has been conducted in knowledge gap and constraints affecting consumption of standardized dairy products in the study district. Therefore, this study was conducted to support dairy development in the region through assessment of knowledge gap and constraints affecting consumption of standardized dairy products.

MATERIALS AND METHODS

Study areas

The study were conducted in Sidama and Gedio zone. Three potential woredas from sidama zone and one woreda from Gedio zone were selected. Sidama zone covers 6972.1 square kilometer and lies between 6.14 - 7.18 latitudes and 37.92-39.19 longitudes, with an elevation ranging 501-3000 meters above sea level. The annual mean temperature of the zone ranges between 10.1- 27^oc and the annual mean rainfall ranges 801-1600mm. The zone is currently divided in to 19 Woreda with the total population of 301, 9442.^[4] Three woredas from Sidama zone and one woreda from Gedio zone were selected. Hagere selam, Dale and Hawassa zuria from Sidama zone where as Dilla zuria from Gedio zone. Gedio zone divided in to 6 districts. The zone is located in 369km from Addis Ababa which is the capital city of Ethiopia and 90 km from Hawassa capital city of the region) in South Nation Nationality and People Regional State (SNNPRS). The total population of the zone is 843928. It has an altitude ranging from 1350 - 3000 m.a.s.l. and mean temperature of the zone between 12.6 - 22.5^oC.^[4]

Data collection

A total of 30, 60, 42 and 45 households from Dilla, H/selam, Yirgalem and Hawassa districts respectively. Therefore, a total of 177 households were interviewed by using semi structured questioner in the selected woredas. Parameters focusing on milking practice, availability of standard and utilization of standard over milk and milk products; knowledge on standardized dairy products, knowledge on HACCP, vulnerability of family members to dairy food born illnesses and the constraints in consuming standardized milk and milk products. The questionnaire were prepared in English and tested in the pilot areas and necessary adjustments were made before actual data collection.

Statistical analysis

Descriptive statistics of Statistical Procedures for Social Sciences (SPSS) version 20 were used for qualitative data.^[5]

RESULT AND DISCUSSION

Demographic Characteristics

The demographic characteristics of the respondents in the study areas are presented in Table 1. The average family size was 7.3 persons per household in the studied districts. Hawassa and Dilla woreda had higher family size than Yirgalem woreda (Table 1). This study result slightly higher than the study done by Tegegne^[6] and the National estimated values.^[7] The higher the family size is important for the contribution of labor for different dairy activities.^[7] As labor intensive activity, dairy needs labor force engaged in routine activities such as milk handling, processing and marketing. The educational level attained by the majority of the household heads was majorly falls between illiterate and

secondary school. It is known that the level of education of households can have a negative effect on the handling of the dairy cattle and its products. Unfortunately, most of the households sampled for the study were male headed households (60 %–93.3%). The average age of the household heads in the study sites ranged from 39.5% in H/selam to 47.4% years in Dilla, and it was within the range of the productive age category.

Producers' knowledge on standardized dairy products

The Knowledge of producers on standard dairy product are presented in Table 2. Although Ethiopian quality and standards authority had developed and revised dairy product standards in the year 2001 and 2005 respectively, only 33.8 % and 17 % of producers had knowledge about standard and Ethiopian dairy products standards in the studied districts respectively. Unfortunately this might be one reason for lower percent of producers knowledge on standard milk production (9%) and 3 % hazard analysis critical control points (HACCP).

Ethiopian Quality and Standards Authority (EQSA) had developed and revised dairy products standards to harmonized the Common Market for Eastern & Southern Africa (COMESA) accepted Standards.^[8] However, the study result revealed that, it was difficult to evaluate the knowledge of the interviewed individuals about dairy standards such as conditions, since very few of the respondents had knowledge (table 2). This is due to any dairy products produced and sold in the different markets in the country have no standard and grade^[9] Likewise, certification is not mandatory for milk and dairy products in the country as it is not included in Regulation No. 12/1999 of the Ethiopian Quality and Standards Authority, regular control on the industry is not practiced and is left for voluntary inspection.^[8] Such kind of condition may affect the good keeping quality properties of dairy and its products. Moreover, since the marketing of the raw milk by private milk vendors provides a cheap means to consumers but it does not guarantee quality. Therefore, efforts should be made to integrate private milk vendors in formal marketing system through licensing and quality control at the entry point.

Concern in purchasing milk and milk products from different sources

The respondents were asked to categorize their safety concern in purchasing milk and milk products such as not concerned at all, somewhat unconcerned, indifferent, somewhat concern and very concerned and how sensitive they were about the safety of milk they purchase (Figure 1 and 2). As figure 1 indicates that the majorities of consumers in all the studied districts were somewhat unconcerned in purchasing milk and milk products from producers where as when they buy from open market they are almost not concerned at all. The result from both figure indicates that consumers do not bother about safety in purchasing milk and milk products from different sources. Similarly, the study result indicted that, the respondents' level of understanding on the safety of milk and milk products and the risks on their health. This could be related with the frequent consumption of milk and milk products.

Table 1: Demographic characteristics in the study areas

Parameter	Dilla	H/selam	Yirgalem	Hawassa	Overall (N=177)
Education					
Degree & above	-	3.3	3.3	10	4.2
Diploma	3.3	3.3	6.7	13.3	6.7
Certificate	6.7	0	6.7	3.3	6.7
Secondary school	10	36.7	36.7	26.7	27.5
Elementary school	36.7	36.7	26.7	13.3	28.4
Read & Write	26.7	13.3	6.7	26.7	18.4
Illiterate	16.7	6.7	16.7	6.7	11.7
Average family size of respondents					
Mean	7.4	7.1	6.8	7.9	7.3
SE	0.7	0.6	0.4	0.5	0.5
Sex of respondents					
Male (%)	93.3	70	76.7	60	75
Female (%)	6.7	30	23.3	40	25
Age of respondents (years)					
Mean	47.4	38.9	42.6	42.1	42.8
SE	1.9	2.4	2.4	1.5	2.0
Parameter	Dilla	H/selam	Yirgalem	Hawassa	Overall (N=177)
Education					
Degree & above	-	3.3	3.3	10	4.2
Diploma	3.3	3.3	6.7	13.3	6.7
Certificate	6.7	0	6.7	3.3	6.7
Secondary school	10	36.7	36.7	26.7	27.5
Elementary school	36.7	36.7	26.7	13.3	28.4
Read & Write	26.7	13.3	6.7	26.7	18.4
Illiterate	16.7	6.7	16.7	6.7	11.7
Average family size of respondents					
Mean	7.4	7.1	6.8	7.9	7.3
SE	0.7	0.6	0.4	0.5	0.5
Sex of respondents					
Male (%)	93.3	70	76.7	60	75
Female (%)	6.7	30	23.3	40	25
Age of respondents (years)					
Mean	47.4	38.9	42.6	42.1	42.8
SE	1.9	2.4	2.4	1.5	2.0

Table 2: Knowledge of producers on standard dairy product

Knowledge assessment parameters	Dilla (N=30)	H/selam (N=60)	Yirgalem (N= 42)	Hawassa (N=45)	Over all (N=177)
Knowledge about Standard	50	25	2.4	57.8	33.8
Knowledge about Ethiopian dairy standards	30	11.7	5	24.4	17.78
Knowledge about proper standards during milk production	23.3	11.7	0	0	8.75
Knowledge about HACCP	3.3	3.3	0	4.4	2.75
Know what to do if the product is substandard	20	31.7	2.4	0	13.53

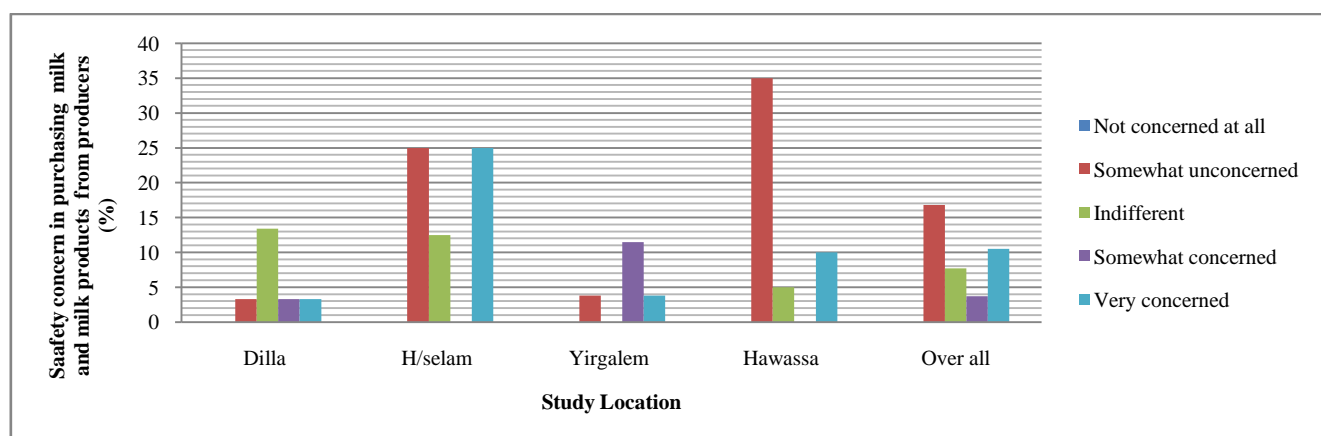


Figure 1: safety concern in purchasing milk and milk products from producers

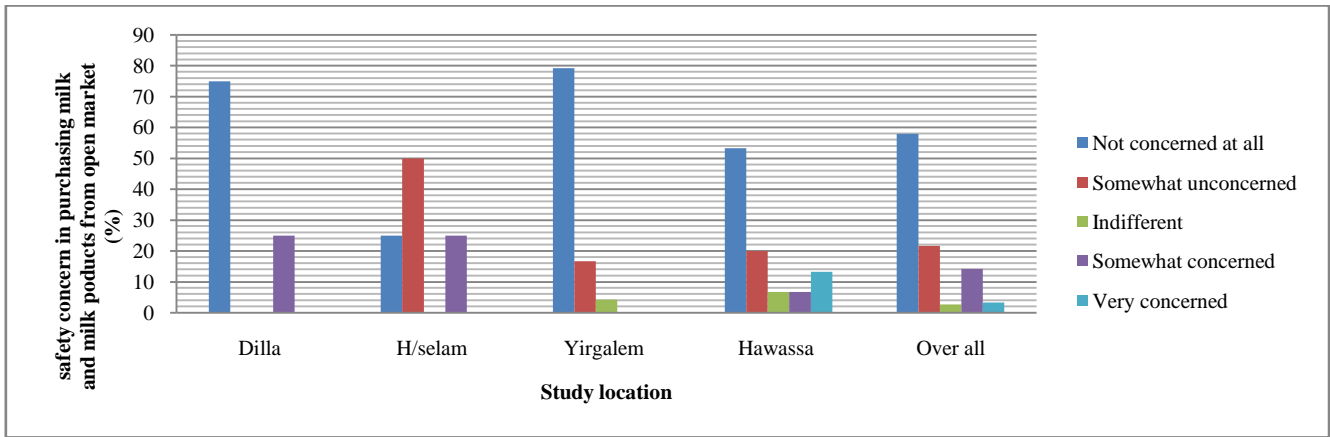


Figure 2: Safety concern in purchasing milk and milk products from open market

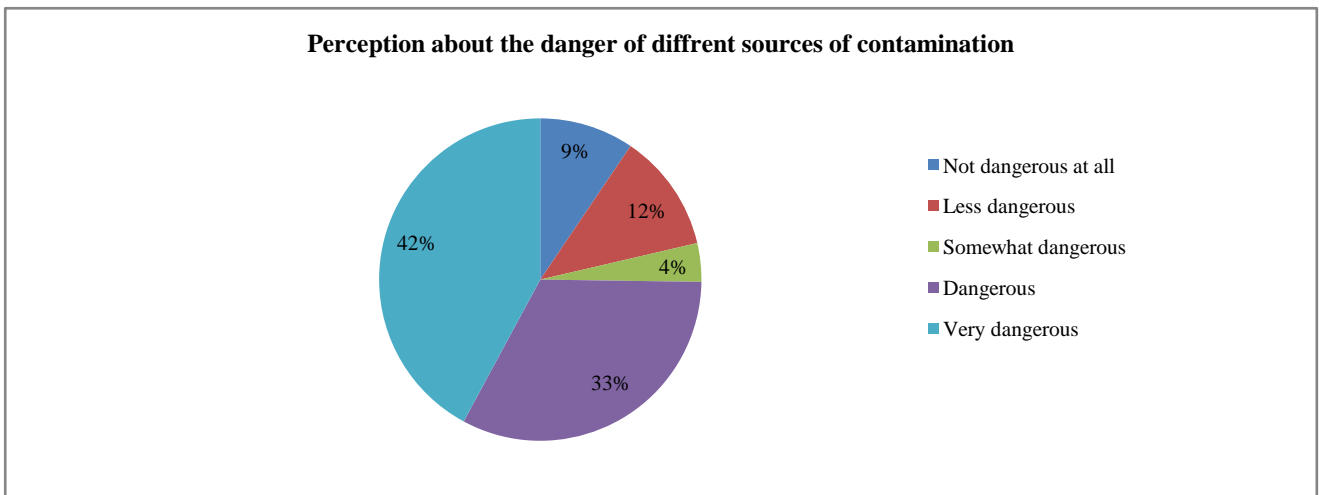


Figure 3: Perception about the danger of milk and milk product contamination

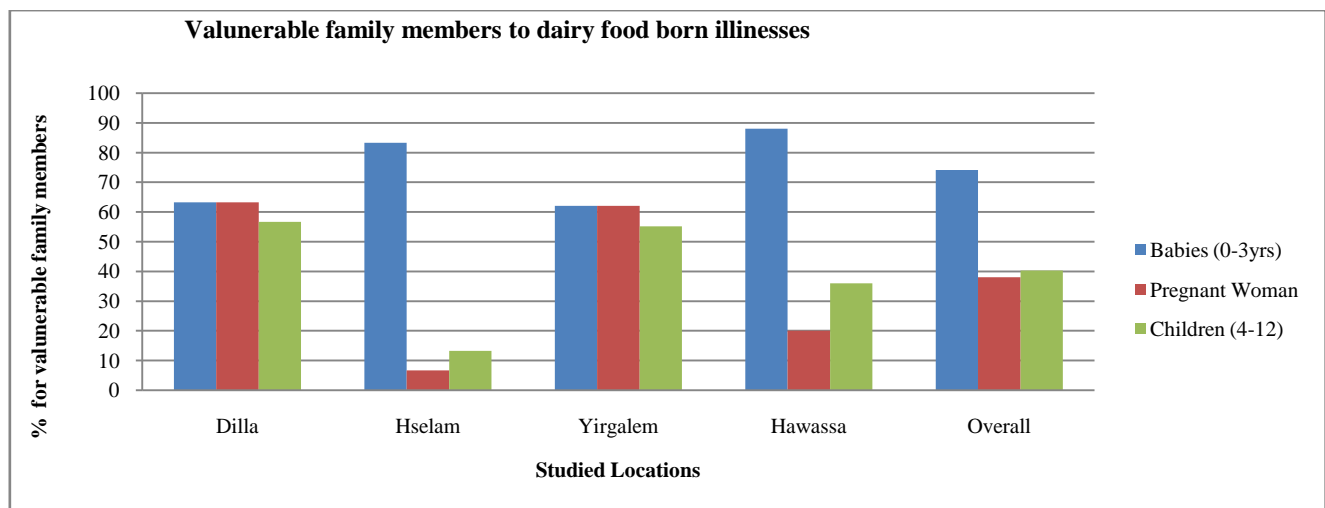


Figure 4: Vulnerable family members to dairy food borne illnesses

Perception about the danger of different sources of contamination:

It is known that milk and milk products have important role in feeding the rural and urban population of Ethiopia owing to its high nutritional value. knowing the perception of individual about the danger of different sources of contamination is very much important. The respondents categorized their perception towards danger of contamination in to five categories such as not dangerous at all, less

dangerous, somewhat dangerous, dangerous and very dangerous. Of the total 9, 12 and 4% respondents indicated that milk and milk product contamination not dangerous at all, less dangerous and somewhat dangerous respectively. This could be related with their level of awareness and knowledge on food safety. Contamination of milk and milk products is usually microbiological which is through bacteria. As it was reported that bacterial contamination of milk not only reduces the nutritional quality but also the consumption of such kind of milk

threatens health of the society.^[10] Therefore, individual's perception towards the danger and safety of milk and milk product should be changed through either awareness creation or through training.

Vulnerable family members to dairy borne illness

Food safety and quality are a growing concern particularly from human health point of view all over the world.^[8] Hence, milk and milk products are animal source foods that may expose to food borne illnesses if it is consumed in unsafe way. The current study revealed that overall babies (0-3yrs) are more vulnerable to dairy food borne illnesses followed by children and pregnant women. The vulnerability is more in Hagere selam and Hawassa zuria than other studied districts. The occurrence of dairy food borne illnesses might be due the frequent consumption of milk by babies, children (4-12yrs) and pregnant women. This might be because of larger quantities of milk was consumed by infants and children that increased their exposure rate to dairy borne illnesses.

Moreover, babies are more vulnerable in Hawassa and H/selam than Dilla and Yirgalem areas. The result for Hawassa might be due to more number of babies are consuming milk than children. Due to the rise of raw milk sailing price, the probability children drinking raw milk was decreasing and babies (0-3years) were given priority in these areas. Besides, in rural parts of Ethiopia, there is a culture of drinking unboiled raw milk which exposes them more too dairy food born illnesses. The vulnerability to food born diseases is due to poor knowledge of producers as well as consumers on the handling and sanitation of milk and dairy products. Consumer behavior and preferences can also have a bearing on exposure to dairy food born illnesses. According to FAO^[11], in some countries, consumers prefer to buy raw milk and boil it themselves rather than pay more for pasteurized, packaged milk, while other consumers in the same areas will choose to consume raw milk, because they believe that this milk is more pure, natural and healthy than industrialized milk (e.g. pasteurized, ultra high temperature [UHT]). The same trend was observed in the studied districts. The study of Wendafrash.^[12] indicated in his study that the increase in the incidence of food born illnesses in Ethiopia from 3.4 to 9.3% for the years 1985/86 to 1989/90. Since the increasing rate to food born

illnesses more to babies (0-3years) and children, a special attention should be given in changing un standardized milk and dairy products utilization particularly the government should establish market selling standardized dairy products.

Availability for traditional standards and Utilization of standardized milk products

The study result showed that, a total of 57%, 51% and 49% of respondents reported that there are availability of traditional standards for milk, butter and fermented milk (Ergo) respectively. According to AGP^[13] report, there was no mandatory Ethiopian Standards related to specifically to dairy production as well as dairy processing. However, this standards exists for unprocessed whole/raw cow milk (ES 3460: 2009), yogurt (ES 3468:2009) and butter (determination of moisture - ES ISO 8851-10- 1: 2009; none fat solids and fat contents - routine methods). About the total sampled households, 24.7% of respondents utilized locally produced milk products and only 15% of them utilized imported milk products. This could be either the consumers cannot afford buying standardized dairy products or standardized product may not be available in the nearer market and they may not have knowledge on the importance of standardized dairy products.

The reason for the lower percentage of utilization of standardized dairy products was also mentioned as problems in consuming standardized dairy product (table 6). The higher percentage in the utilization of both locally and imported standardized milk products in Hawassa as compared to other districts could be due to the availability and accessibility of products in different shops. The accessibility of standardized dairy products in Hawassa might be due to the city is more urbanized than the other three studied districts that there is increased demand due to the increased population. Different authors mentioned in their study that many developing countries market is dominated by unpasteurized, informally marketed milk produced by smallholders.^[14, 15] Therefore, attention should be given in increasing standardized dairy product production, availability and a cheap price for poor people to afford buying.

Table 3: Availability of traditional standards and utilization of standardized milk and milk products

Parameters	Dilla (N=30)	H/selam(N=6 0)	Yirgalem (N=42)	Hawassa (N=45)	Over all
Availability of traditional standards for milk and milk products					
Milk	83.3	61.7	16.7	66.7	57.1
Butter	83.3	61.7	14.3	44.4	50.9
Fermented milk (Ergo)	83.3	56.7	9.5	44.4	48.5
Cottage type cheese (Ayib)	-	35.0	-	15.6	25.3
Utilization of standardized milk products					
Locally produced milk products	3.3	21.7	7.1	66.7	24.7
Imported milk products	3.3	11.7	-	44.4	14.9

Milking Practice, Standardized Feeding and Housing

It is known that standardized feeding and housing are the most basic for proper husbandry practice of dairying. out of the total sampled 68% and 60% of interviewed respondents followed standardized housing and feeding in the studied areas respectively. Bedecha and Habetamu^[16] noted dairy housing with drainage system and ventilation was scored with the range of poor up to very good but the majorities are under good score.

Out of the interviewed producers, 91, 77 and 30% of them wash their hand, udder and teats with warm sanitizing solution respectively. This

finding in agreement with Haile that showed that about 82.5% of the small size farm owning households in Hawassa city are practicing udder washing before milking.^[17] About 46% of producers dry teats thoroughly, Use individual clean towel (38%) and Use collective towel (40%).in the studied districts. Moreover, the study result showed that checking udder and foremilk for mastitis /udder inflammation and udder for abnormal appearance was reported by 55 and 49% of the producers respectively. A similar report was also described in Shewangezaw and Addisu study conducted in Wolita sodd.^[18]

Hygienic quality milk production for consumers requires good hygienic practices (clean milking utensils, washing milker's hands, washing the

udder and use of individual towels) during milking and handling, before delivery to consumers or processors.^[19] Therefore Producers should practice proper milking procedures in order to minimize contamination and produce good quality milk. Moreover, use of clean water, use of

teat dip solution after milking and cooling milk immediately after milking was reported by 84%, 20% and 62% of interviewed producers in the study areas respectively.

Table 4: Milking practice

Parameters	Dilla (N=30)	H/selam(N= 60)	Yirgalem (N=42)	Hawassa (N=45)	Over all
Feeding and Housing					
Follow standardized housing system	83.3	53.3	57.1	77.8	67.9
Follow standardized feeding system	76.7	51.7	33.3	80	60.4
Prepare separate and clean milking area	70	28.3	31	57.8	46.8
Milking practice					
Hand wash	100	71.7	95.2	95.6	90.6
Udder wash	96.7	45	90.5	75.6	76.9
Wash teats with a warm sanitizing soln	66.7	16.7	4.8	33.3	30.4
Dry teats thoroughly	83.3	15	42.9	42.2	45.9
Use individual clean towel	86.7	10	9.5	44.4	37.7
Use collective towel	83.3	10	31.0	35.6	39.9
Check udder and foremilk for mastitis/udder inflammation	90	40	28.6	62.2	55.2
Check for abnormal appearances in milk	90	45	-	62.2	49.3
Use of clean water	100	60	83.3	93.3	84.2
Use of teat dip solutions after milking	66.7	3.3	2.4	6.7	19.8
Cool milk immediately after milking	80	50	69.0	51.5	62.6

Rules of milker

The current study indicated that more than 50% of milkers practiced cutting nail, avoid smoking and drinking alcohol, avoid spitting and also use hot water to clean the milking equipment. About 38 and 42% of the milkers cover their hair and wets their hand to facilitate the milk letdown respectively. Similarly, Tollossa^[20] indicated in his study that the milkers inserts their fingers into the milk to moisten the teat

whenever it got dry while milking. Covering milkers hair was given a lower emphasis in the studied districts. The majorities of the milkers in the studied districts relate safe handling and milking practice not more than keeping the sanitation of their hands and their milking equipment. A similar report was observed^[21] that covering hair and dressing gown during milking and handling of milk and milk products weren't observed in any of the visited farms. Therefore, awareness and training provision should be delivered for producers and milkers in particular.

Table 5: Rule of the milker

Milkers rule	Dilla (N=30)	H/selam (N=60)	Yirgalem (N=42)	Hawassa (N=45)	Over all
Milker must cover hair	16.7	41.7	47.6	46.7	38.18
Cutting nails often	43.3	81.7	81.0	68.9	68.73
No Smoking	70	80	85.7	80	78.93
No Drinking alcohol	73.3	73.3	76.2	86.7	77.38
Avoid spitting	60	80	50	84.4	68.6
Wetting hands by use of milk to facilitate milk letdown	23.3	58.3	38.1	48.9	42.15
Use hot water to wash milk equipment	20	73.3	52.4	68.9	53.65

Major constraints in consuming standardized milk products

There are a number of constraints related with the consumption of standardized milk products in the studied districts. Lack of awareness and supply problem were the major constraints in consuming standardized milk products reported by 57% and 51% of respondents respectively. Lack of awareness was the major problem in Dilla (83%) and Yirgalem districts (69%) than H/selam (47%) and Hawassa (29%). The expansion of awareness of producers on standardized product consumption might be related with the level of urbanization. It is known that Hawassa and Dilla are more urbanized than Yirgalem and H/selam and this might be the reason for high level of awareness.

Knowledge on HACCP of milk and milk products

Food safety is a growing global concern because of its importance to public health, and its impact on international trade. HACCP is

considered a scientific and systematic system for assuring food safety^[22], which can be applied throughout the whole food chain^[23]. It is known that the major foodborne disease outbreaks are associated with contaminated milk and dairy products. The current study showed that about 63%, 59% and 53% of the respondents know that milk should be produced in a hygienic manner, knows cooling is useful tool to keep the milk fresh and knows the sources for incoming raw material respectively. Knowing hygienic manner for milk production and cooling is necessary to keep the milk fresh, only about 7.5% of the respondents know about Hazard Analysis Critical Control Point (HACCP) in milk and milk products. The largest number of dairy-related foodborne illness outbreaks was attributed to contaminated raw milk.^[24] Moreover the current study revealed that about 28% and 27% of respondents had knowledge on milk and milk product chemical and microbiological hazard respectively. It is known that microbiological hazards introduced into milk during primary production and processing in unhygienic manner resulting the rise in the bacterial count of the milk. The source

of chemical hazards varies and may include air, soil, water, substances used in animal husbandry practices and animal feedstuffs. The concerns for the chemical hazard are environmental contaminants and adulterants added in milk, which may cause illness or adverse health effects.^[25] Therefore, since the consumption of contaminated milk and milk

products poses potential hazard to the consumer, special attention should be given to chemical and microbiological food-safety hazards. Especially awareness should be created on the consequent hazard analysis of milk and milk products for both producers and consumers.

Table 6: Major problems in consuming standardized milk products

Problem	Dilla(N=30)	H/selam(N=60)	Yirgalem	Hawassa	Over all
Supply problem	50	55	54.8	44.4	51.1
Lack of awareness	83.3	46.7	69	28.9	56.9
Economic problem	0	36.7	64.3	31.1	33.0
Cultural taboo	80	5.0	2.4	8.9	24.1
Religious taboo	80	3.3	2.4	8.9	23.7
Health Problem	73.3	26.7	2.4	-	25.6

Table 7: Knowledge on hazards

Parameters	Dilla	H/selam	Yirgalem	Hawassa	Overall
Know milk and milk products can have chemical hazards (%)	13.3	58.3	19	22.2	28.2
Know milk and milk products can have microbiological hazards (%)	10	48.3	14.3	33.3	26.5
Know about HACCP (%)	3.3	15	7.1	4.4	7.5
Know that milk must be produced in a hygienic manner (%)	36.7	83.3	69	62.2	62.8
Know that the source of incoming raw materials must be considered (%)	33.3	65	40.5	71.1	52.5
Know cooling is useful to keep milk fresh (%)	56.7	63.3	47.6	66.7	58.6

CONCLUSION AND RECOMMENDATION

Ensuring food safety to protect public health especially children's remains a significant challenge in developing countries. Moreover, problems of growing population, urbanization, lack of resources to deal with pre-and post harvest losses in food, and food hygiene issues mean that food systems in the country continue to be in problem, adversely affecting the quality and safety of food supplies. The current result showed that the majorities of sampled households have very poor knowledge on standardized dairy products. Besides very few of respondents were aware about the danger of different sources of contamination for milk and milk products. Additionally, majorities of consumers do not have concern about safety in purchasing milk and milk products from producers as well as from open market. Lack of awareness and supply problem were among the major constraints in consuming standardized milk and milk products.

Therefore, the government must remain vigilant in enforcing quality standards in milk and must recognize the important role of conveying the milk safety information to reduce the consumers' risks. Organize smallholder producers to form milk collection, processing and marketing group to ease quality control and create level of awareness of the public about clean and standardized milk and milk product utilization.

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