Internship

Training

At

Public Health Foundation of India

Community acceptance of available milk and assessment of its quality in Peri urban area of South West Delhi

by

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PG/15/062

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Post Graduate Diploma in Hospital and Health Management 2015-17

IIHMR DELHI

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. PurnimaRai**student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from **International Institute of Health Management Research, New Delhi** has undergone dissertation at **Public health Foundation of India**, from 1st February 2017 to 30th April 2017.

The Candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical. The Internship is in fulfillment of the course requirements. I wish her all success in all his future endeavors.

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May 12, 2017

The certificate is awarded to

Dr. Purnima Rai

in recognition of having successfully completed her dissertation on project

Community acceptance of available milk and assessment of its quality in Peri urban area of South West Delhi

(1st Jan 2017 to 10th May 2017)

Public Health Foundation of India

She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning

We wish him/her all the best for future endeavors.

Dr. Manish Kakkar
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Certificate of Approval

The following dissertation titled **"Cross sectional study on Community acceptance of available milk and assessment of its quality in Peri urban area of South West Delhi"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

Name	Signature
Dr. S K Patel	
Dr. B S Singh	
Dr. Dhananjay	

Certificate from Dissertation Advisory Committee

This is to certify that Dr. Purnima Rai, a graduate student of the **Post- Graduate Diploma in Health and Hospital Management** has worked under our guidance and supervision. She is submitting this dissertation titled "**Community acceptance of available milk and assessment of its quality in Peri urban area of South West Delhi**" in partial fulfillment of the requirements for the award of the **Post- Graduate Diploma in Health and Hospital Management**.

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

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CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled **Community acceptance of available milk and assessment of its quality in peri urban area of South West Delhi"** at "**Public Health Foundation Of India**" under **RCBP Program under Roadmap to Combat Zoonoses in India (RCZI)** and submitted by **Dr. Purnima Rai** Enrollment No. **PG/15/062** under the supervision of **Dr. Sanjiv Kumar (Director, IIHMR), Dr. Dhananjay Srivastava (Associate professor, IIHMR) and Prof. Divya Aggarwal (Assistant Professor, IIHMR)** for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from 1st January 2017 to 14th May 2017embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

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FEEDBACK FORM

Name of the Student : Dr. Purnima Rai

Dissertation Organization: PUBLIC HEALTH FOUNDATION OF INDIA

Area of Dissertation: Research Capacity building Programme under RCZI

Attendance: 100%

Objectives achieved : Yes

Deliverables: Identified the perception, preference and quality of milk in peri-urban area of south west Delhi.

Strengths: Receptive and proactive attitude

Suggestions for Improvement: None

Suggestions for Institute: None

Signature of the Officer-in-Charge

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PREFACE

The PGDHM course is well structured and integrated course of business studies. The main objective of practical training is to develop skills in studies by supplement to the theoretical study of business management in general. Professors give us theoretical knowledge of various subjects in the institute. But we are practically exposed of such subjects when we get the training in the organization. It is the training through which we came to know that what an organization is and how it works. During this whole training, I got exposure rich and diverse experience and came to know also about the management practices in real and how it differs from those of theoretical knowledge.

It is very beneficial to learn research tools and health care delivery system at various levels. I observed the qualitative research techniques with the help of Research Capacity Building Program (RCZI) with Public Health Foundation of India. I understood various functions of health systems by interactions with key stakeholders, policy makers, researchers, academicians and veterinary officials.

During my training period I had an overview of qualitative researchand did my study and assessment according to the specified format.

I have tried to put my best efforts to complete this task on the basis of skills that I have achieved during my studies in the institute.

ACKNOWLEDGEMENT

The internship opportunity I had with **Public Health Foundation of India supported by ILRI (International Livestock Research Institute)** was a great chance for learning and professional development. Bearing in mind my exposure, I want to use this opportunity to express my deepest gratitude and special thanks to **Dr. Manish Kakkar, Principal Investigator**, who in spite of being already committed with his professional commitments, provided me requisite inputs and timely help to keep me on the correct path and allowing me to carry out my project at this esteemed organization.

I express my deepest thanks to **Mr. Abhimanyu Singh Chauhan,** my Supervisor at PHFI, who has been supportive all along my tenure in the organization and allowed me the freedom to express myself. I would also like to thank Dr. Johanna Lindahl(ILRI), **Dr. Jessi Joseph** & **Dr. Anjana Tomar** for guiding me in decision making & and providing the necessary advices / guidance for achieving the objectives. I choose this moment to acknowledge their contribution gratefully.

Special words of thanks to **Dr. Devender Sadana** for his invaluable opinion, friendly guidance, constant encouragement and valuable suggestions.

I am glad to acknowledge **Dr. Sanjiv Kumar,** Director, IIHMR Delhi, **Prof. (Dr.) Ashok Agarwal**, DEAN academic and Students Affairs, IIHMR Delhi , **Dr. Dhanajay Srivastava**, Associate Professor IIHMR Delhi, **Prof. Divya Agarwal**, Assistant professsor and **Dr. Vivek K. Pathak** (Research Officer) IIHMR Delhi, for incorporating right attitude towards learning and for their timely help, support and guidance.

I would also like to thank all of my study participants (Scientists, Veterinarians, Scholars, Municipality officials, small scale dairy farmers, large scale dairy farmers and other officials from NDRI, NBAGR, Karnal city District of Haryana) who have been cooperative in participating and responding well during the assessment/interviews.

I perceive this opportunity as a big milestone in my career development. I will strive to use gained skills and knowledge in the best way possible, and will continue to work further on their improvement, in order to attain desired career objectives.

Hoping for a sustained and positive cooperation and interaction with all of you in the future.

Sincerely,

Dr. Purnima Rai

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INTRODUCTION

Milk is considered to be a balanced food rich in fats, proteins, vitamins and minerals as it provides complete nutrition in a balanced proportion. The most common animals from which milk is derived include cows, buffalos, goat, and sheep. The various types of packaged milk include full cream, skimmed, toned, double toned etc. depending on the fat content of the milk. The common brands of milk in India include mother dairy, Amul, Gopalji, Nandi milk etc.

According to a report by Indian Express, almost 70% of milk sold in India is "adulterated" as it does not match the standards laid down by FSSAI. Adulterants are the contaminants that degrade the quality of milk and are harmful to the human health.

In India, The Food Safety and Standards Authority of India established under Food Safety and Standards Act, 2006 lays down science based standards for articles of food and ensures availability of safe and wholesome food for consumption.

Table 1: FSSAI standards for different classes and designations of milk

Class of milk	**Designation**	**Min. % of milk fat**	**Min. % of milk solids not fat**
Buffalo milk	Raw, Pasteurized, boiled, flavored, sterilized	5.0-6.0	9.0
Cow milk	Raw, Pasteurized, boiled, flavored, sterilized	3.0-4.0	8.5
Goat or sheep milk	Raw, Pasteurized, boiled, flavored, sterilized	3.0-3.5	9.0
Mixed milk	Raw, Pasteurized, boiled, flavored, sterilized	4.5	8.5
Standardized milk	Pasteurized, flavored and sterilized	4.5	8.5

Recombined milk	Pasteurized, flavored and sterilized	3.0	8.5
Toned milk	Pasteurized, flavored and sterilized	3.0	8.5
Double toned milk	Pasteurized, flavored and sterilized	1.5	9.0
Skimmed milk	Raw, boiled, pasteurized, flavored and sterilized	Not more than 0.5%	8.7
Full cream milk	Pasteurized and sterilized	6.0	9.0

***Source*-www.foodsafetyhelpline.com**

Adulteration of milk is an important issue being addressed by FSSAI. Some of the com mon adulterants such as water, starch, urea, glucose/ invert sugar etc. can be tested at home. Other adulterants that require sophisticated instrumentation have to be sent to a food testing lab for evaluation.

Milk added with water is considered to be adulterated. It is considered lower quality as it lowers the % of fat, vitamins and other essential minerals, and it is unsafe if the added water is not of drinking water quality. FSSAI has laid down standards to create uniformity in the quality of milk imported from different states.

We now have hybrid cattle and quality of milk is changing naturally. Hybrid cattle and environmental changes have rendered the old standards useless. Fat and SNF standards differ across states. In Punjab, Chandigarh, and Haryana, for example, the % of recommended fat is 4%;it is 3% for Mizoram and Odisha and 3.5% for the rest of India. For SNF, earlier criteria were 8.2% (Hindustan times report).

Adulteration or adding unwanted ingredients to foods may be intentional or unintentional. The first is done deliberately to increase profits. Adulteration may also be incidental due to lack of knowledge and lack of hygiene. Adulteration is defined as “the process by which the quality or the nature of a given substance is reduced”. To avoid getting caught, the adulterators add certain

substances to the 'watered' milk to improve its thickness, taste, density and viscosity. The common adulterants are formalin, urea, starch, neutralizers (NaHCO3, Na2CO3, NaOH, Ca $(OH)_2$ etc.), detergents, sodium chloride, skim milk powder, sucrose, glucose/dextrose and hydrogen peroxide. Some of these are referred to solid non-fats (SNF) and are used to cover the quantity of natural fats missing in the 'watered' milk. Some common adulterants in milk are:

- **Detergents (pulverized soap):** It is added to milk to emulsify and dissolve the oil in water giving a frothy solution, the characteristic white color of milk. It leads to gastrointestinal complications.

- **Urea:** It is added to provide whiteness, increase the consistency of milk and for leveling the contents of solid-not-fat (SNF) as are present in natural milk. The presence of urea in milk overburdens the kidneys as they have to filter out more urea content from the body.

- **Hydrogen Peroxide:** It is added to prolong the freshness of the milk. Peroxide damages the gastrointestinal cells which can lead to gastritis and inflammation of the intestine.

- **Starch:** It improves milk's thickness. High amounts of starch can cause diarrhea due to the effects of undigested starch in the colon. It's accumulation in the body may prove fatal for diabetic patients.

- **Carbonates and Bicarbonates:** It is added to prevent spoilage.It's regular intake can cause disruption in hormone signaling that regulate development and regulation.

- **Sugar and Salt:** It is added to get the natural taste of milk. It causes irreversible damage in people suffering from high blood pressure and diabetes. It can be fatal for those who have kidney troubles.

There is a paucity of literature in the context of the quality assessment of packaged and unpackaged milk and perception of the community regarding packaged and unpackaged milk.

REVIEW OF LITERATURE

Consumer's perception plays an important role in influencing the purchase of any particular product. It is basically an opinion forming process based on certain product attributes that a consumer attaches priority in product selection. Consumers now demand products that are safe to consume and are produced and distributed through transparent procedures. Mean attribute score of consumers for overall food safety subset comprising of various safety attributes of packed milk was 3.27 on the scale. This implied that consumers had a low level of agreement with the statements that packaged milk was safe to consume. This is mainly due to the lack of awareness of food safety parameters. Socio-economic characteristics of the respondents are considered very important in consumer studies. These characteristics provide useful background information for in-depth understanding of the behavior of consumers. According to a study in Pakistan, results show that education and income of the respondents do not have a significant effect on the consumer behavior. The consumers had a liking for packed milk regardless of their education and income. The results clearly imply that fairly younger, married and male consumers irrespective of income and education level prefer to purchase packed milk due to its relatively better quality attributes with respect to value, safety, nutritional value, and packaging.(1)

According to a study conducted in Ludhiana, as the income level goes on increasing, the percentage of people using packaged milk also goes on increasing because they do not mind paying a little more for perceived better quality of the product. Ease and payment in delivery are the major reasons as told by consumers, for buying unpackaged milk.(2)

According to a study in Turkey on consumer's perception and attitude towards packaged milk, the results state that

communication tools and visual media available to the entire community are more effective than some factors such as the level of education and the level of income in determining attitudes towards products(3)

According to a study conducted in Kenya on the Role of Pasteurized Hawked milk in the transmission of Brucellosis in Eldoret Municipality the monthly reports from Trans –Nzoia district veterinary office, the average case prevalence rate for bovine brucellosis was among the top ten cattle diseases with 8.5%prevalence.Consumption of raw or unpasteurized milk can be a source of human infection. In spite of its potential to transmit brucellosis, milk is one of the animal products consumed by many families, most of whom are not producers of the commodity, especially those residing in towns and urban centers. In this study, a majority of the households (77.5%) used unpasteurized milk sold by hawkers. According to local people's perception, brucellosis has become a disease of great public health concern in this area and its transmission is to a great extent linked to the consumption of hawked milk(4)

OBJECTIVES

- To understand the perception and preference of community regarding the acceptance of packaged and unpackaged milk.
- To assess the quality of milk with respect to the adulterants in packaged and unpackaged milk.
- To assess the difference in the quality of milk (packaged/unpackaged) at the level of Vendor/Hawker and end user.

METHOD

- **Study Design**
  Cross-sectional descriptive study.

- **Study Area**
  Kangan Heri is situated in South West Delhi having approximately 900 houses. Most of the households had livestocks.

- **Study population**
  Females. They carry out the household activities and decide on what grocery items should be bought.

- **Sample size**

  Number of milk samples:

  1. Household samples- A sample size of 100 was chosen according to the available resource and time.

  2. Packaged milk- Under each brand of milk there are subcategories like toned, double toned, full cream. Regardless of the number of samples of brands of packaged milk collected from the household a packet of packaged milk was bought from the local market. For example, for 10 samples of milk collected from the household under the brand name of "Mother Dairy" and subcategory "full cream" only 1 packet of Mother Dairy full-cream was bought from the local market. Therefore depending on the brand and its type the sample size varied.

  3. Unpackaged milk- One sample of milk from each hawker selling milk in the study area. The sample size of milk obtained from the hawker depended on how many households out of sample size of 100 used unpackaged milk and from which hawker they bought the milk.

- **Sampling Technique**
  Convenient sampling was used for collecting the data.

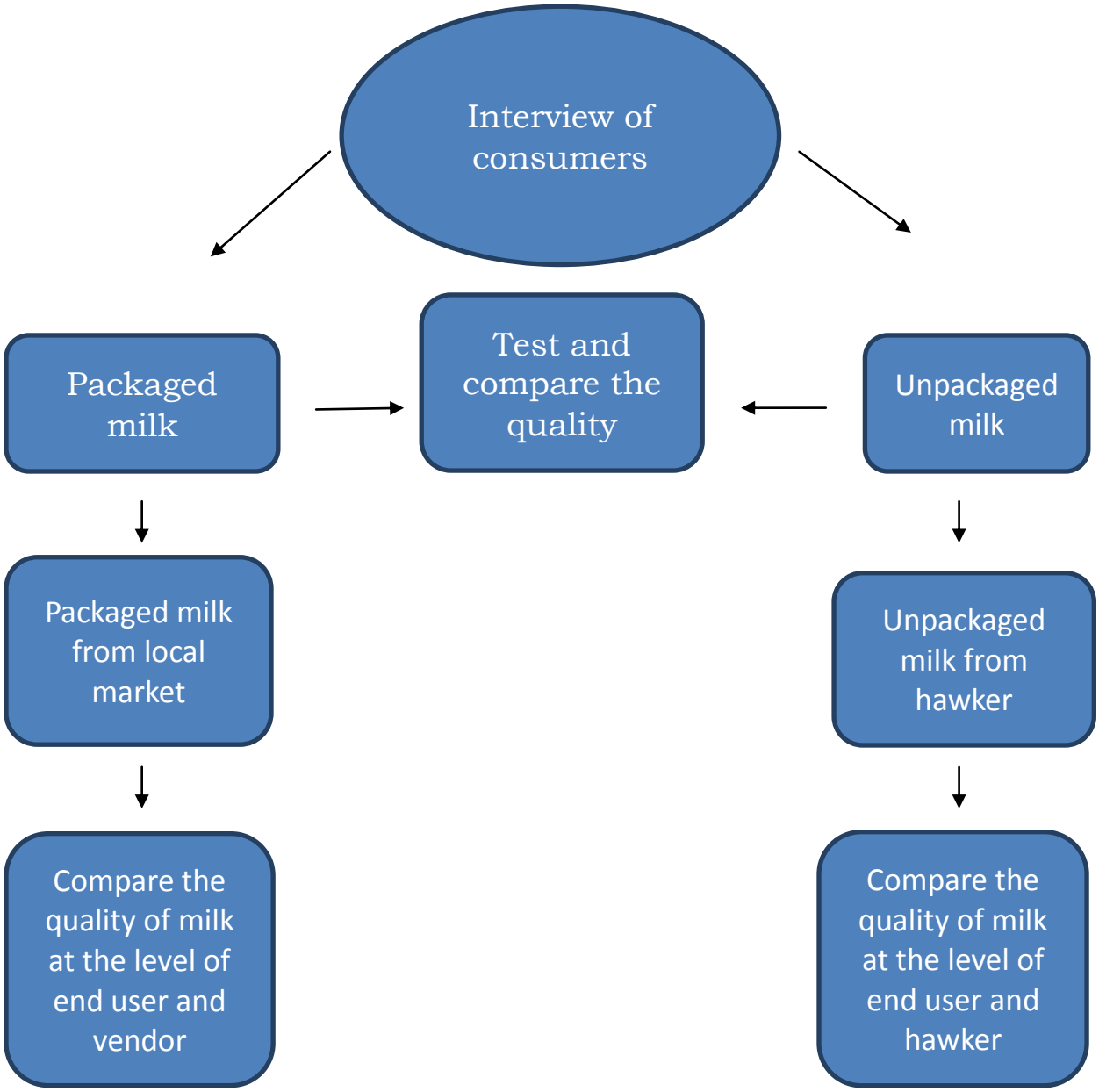
- **Data collection tool**
  A semi structured questionnaire was used to collect the data. The questionnaire contains questions pertaining to socio demographic factors and perceived quality and preference of available milk. The questionnaire was originally made in English.
  The socio economic status of the respondents was calculated using **Kuppu Swamy's Socio economic scale** which contained 3 questions i.e Education of the head, Occupation of the head and Family's monthly income. After calculating the score the socio

economic status of the respondent was decided as Upper class, Middle upper middle, Lower middle, Lower upper lower and Lower class (see Annexure II)

- **Data Collection Process**
  The procedure started by interviewing the households using questionnaire to get information regarding the socio demographic factors, preference and perception of the community regarding milk. The milk samples were collected from 100 households. The milk samples collected from the households was put in the sterile containers. The collected milk samples were tested for the quality with respect to each below-mentioned adulterants (the list of adulterants that were tested is mentioned in the milk testing kit section below) using the milk testing kit. This helped in assessing the quality of packaged and unpackaged milk.

  The packaged milk samples were bought from the local market of the study area. These samples were tested for the quality with respect to the adulterants using the milk testing kit. This helped in comparing the quality of packaged milk at the level of local market/ Vendor and at the level of the end user (Households).

  The unpackaged milk samples were bought from the hawkers supplying milk in the study area. These samples were tested for quality with respect to the adulterants using the milk testing kit. This will help in comparing the quality of unpackaged milk at the level of Hawker and at the level of the end user (Households).



- **Milk testing kit**
  An innovative technology by Defence Food and Research Laboratory (DFRL) to test the quality of milk. The milk testing kit is called 'Test o milk kit'. This test kit gives immediate results within 5 minutes. The test strips can detect an adulteration level at not less than 0.5%.It helps in detecting the presence of added adulterants. Any change in the color of strip implied the presence

of adulterant. Each Milk testing kit contains 80 testing strips (10 strips for each adulterant). Following adulterants were tested-

- ❖ Urea
- ❖ Starch
- ❖ Hydrogen peroxide
- ❖ Boric acid
- ❖ Neutralizers
- ❖ Detergents/Pulverised soap

- **Ethical consideration**

  Each brand name was coded to maintain the confidentiality.
  Participants were made aware of the study.
  Informed Consent from the participants was taken.
  Proper counseling of the respondents and dissemination of results was done

- **Limitations**
  The results cannot be generalised on the whole community because of the smaller sample size and convenient sampling technique.

  Samples of unpackaged milk from the Hawkers were not collected on the same day when milk samples were collected from households.

  Samples of packaged milk from the local market were not collected on the same day when milk samples were collected from the households

- **Pilot test**
  Pilot testing was done on 8 households using the attached questionnaire (See Annexure II) to test the response rate of the study population in the study area and also to test the effectiveness of the questionnaire in assessing the perceived quality, preference and quality of packaged and unpackaged milk. In pilot testing the socio-economic scale according to

Kuppu Swamy and Standard of living index was used to test which of the two is more effective.

RESULTS

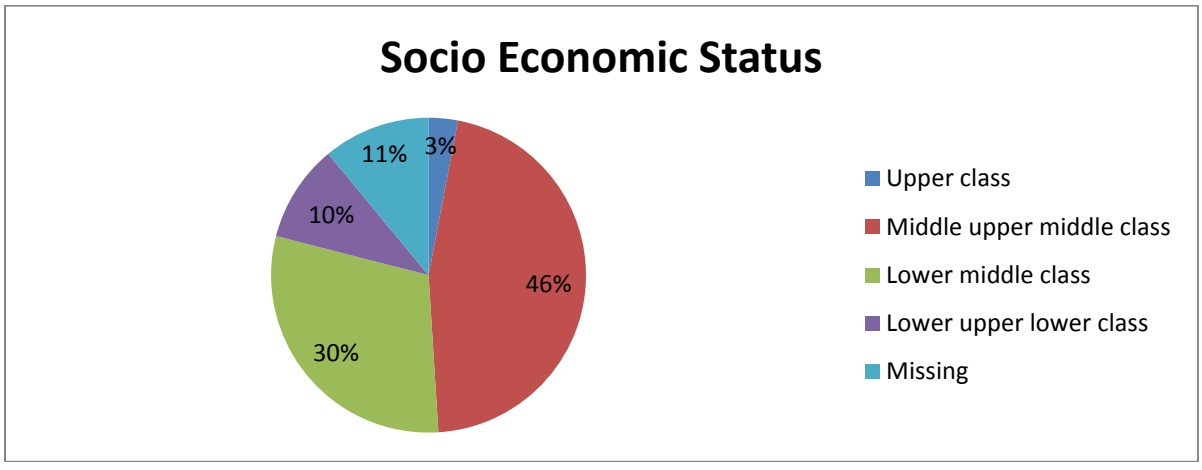
- **Socio demographic factors**

All the respondents were females.
All the respondents were married
All the respondents were Housewives
Socio economic status was calculated using Kuppu Swamy's Socio economic scale-
The table below shows that upper class and middle class preferred packaged milk while the lower class preferred unpackaged milk

socio economic status of the respondent * Type of milk Cross tabulation

Count

		Type of milk			
			Packaged milk	Unpackaged milk	Total
socio economic status of the respondent		11	0	0	11
	Upper class	0	3	0	3
	Middle upper middle class	0	28	18	46
	lower middle class	0	17	13	30
	Lower upper lower class	0	3	7	10
Total		11	51	38	100



- **Compliance rate**
  Out of a sample size of 100 Households, 89 respondents gave consent to participate in the study. Remaining 11 respondents refused to participate in the study

Table 1.1 shows compliance rate of the respondents

Compliance of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	89	89.0	89.0	89.0
	no	11	11.0	11.0	100.0
	Total	100	100.0	100.0	

- **Preference of the type of milk**
  Out of 89 respondents who accepted to participate in the study, 51 preferred packaged milk over unpackaged milk. Remaining 38 preferred unpackaged milk.

Table 1.2 shows type of milk preferred by community

Type of milk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		11	11.0	11.0	11.0
	Packaged milk	51	51.0	51.0	62.0
	Unpackaged milk	38	38.0	38.0	100.0
	Total	100	100.0	100.0	

- **Brand of Packaged milk**
  Out of 51 respondents who preferred packaged milk, 32 respondents used 'Brand A', 9 used 'Brand B' and 10 respondents used 'Brand C'. All the three brands have been coded for ethical reasons.

Table 1.3 shows Brand of the Packaged milk used

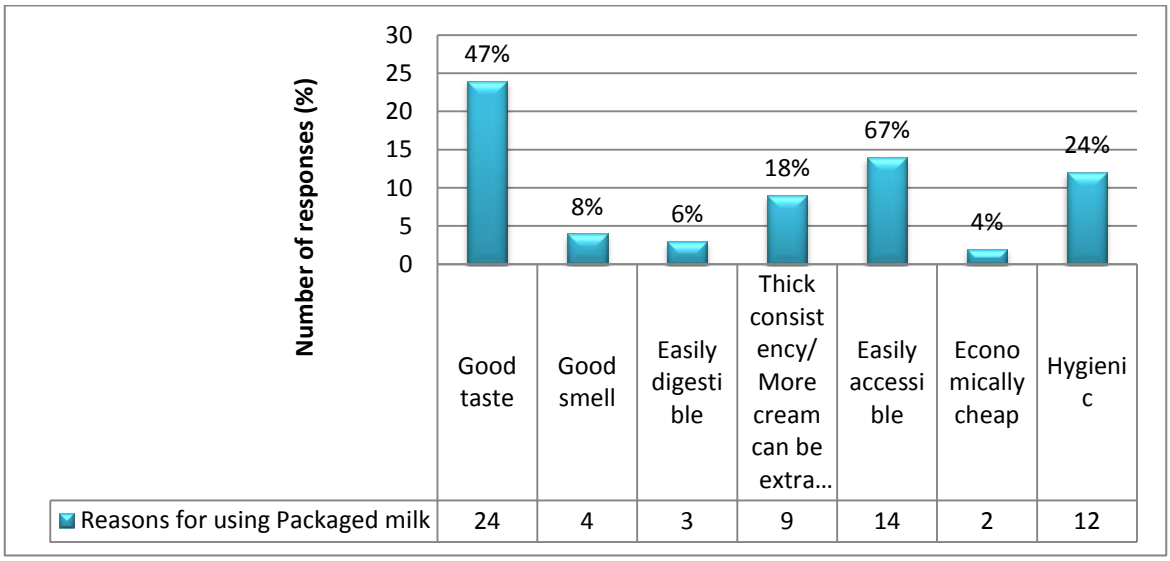
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		11	11.0	17.7	17.7
	Brand 'A'	32	32.0	51.6	69.4
	Brand 'B'	9	9.0	14.5	83.9
	Brand 'C'	10	10.0	16.1	100.0
	Total	62	62.0	100.0	
Missing	99	38	38.0		
Total		100	100.0		

- **Reasons for using Packaged milk**
  Out of all the reasons listed in the table 1.4 below a majority of the respondents preferred packaged milk because of its good taste, easy accessibility and hygienic value followed by thick consistency, good smell, easily digestible and economically cheap.

Table 1.4 shows reasons for using Packaged milk

		Responses		Percent of Cases
		N	Percent	
Reasons for using Packaged milk[a]	Good taste	24	35.3%	49.0%
	Good smell	4	5.9%	8.2%
	Easily digestible	3	4.4%	6.1%
	Thick consistency/More cream can be extracted	9	13.2%	18.4%
	Easily accessible	14	20.6%	28.6%
	Hygienic	12	17.6%	24.5%
	Economically cheap	2	2.9%	4.1%
Total		68	100.0%	138.8%

Graph 1 shows reasons for using Packaged milk



- **Adulterants present in Packaged milk**

  Major adulterants present in packaged milk at the level of End User (see Table 1.8 below) are Neutraliser followed by Detergent/ Pulverised soap and Urea. Only 8% of the samples contained no added adulterant.

Table 1.8 shows adulterants present in Packaged milk at the level of End user

		Responses		Percent of Cases
		N	Percent	
Adulterants in Packaged milk (End user)[a]	Urea	7	10.3%	13.7%
	Detergent/ Pulverised soap	15	22.1%	29.4%
	Neutraliser	42	61.8%	82.4%
	No adulterant	4	5.9%	7.8%
Total		68	100.0%	133.3%

a. Dichotomy group tabulated at value 1.

Major adulterants present in packaged milk bought from the local market are Neutraliser followed by Detergent/ Pulverised soap and Urea. Only 8% of the samples did not contain any adulterant.

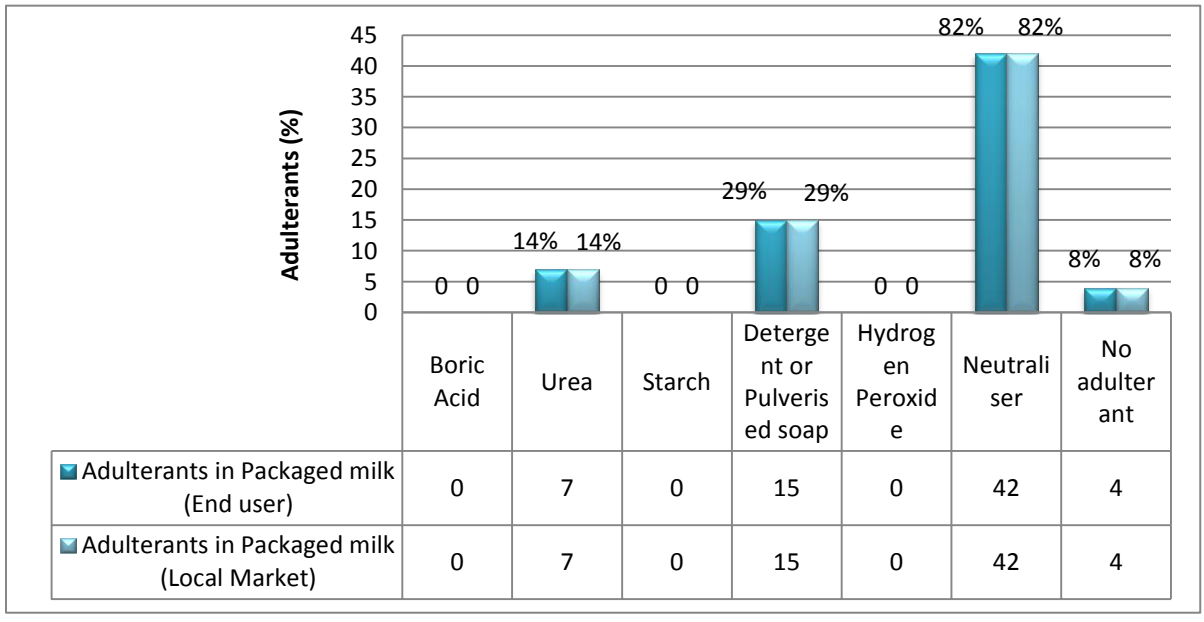
Table 1.9 shows adulterants present in Packaged milk bought from the local market

		Responses		Percent of Cases
		N	Percent	
Adulterants in packaged milk[a]	Urea	7	10.3%	13.7%
	Detergent/ Pulverised soap	15	22.1%	29.4%
	Neutraliser	42	61.8%	82.4%
	No adulterant	4	5.9%	7.8%
Total		68	100.0%	133.3%

a. Dichotomy group tabulated at value 1.

There is no difference in the presence of adulterants in packaged milk (see Graph 2 below) at the level of End users and Local market. Major adulterants found at both levels are Neutraliser, Detergent/ Pulverised soap and Urea.

Graph 2 shows the difference in the presence of adulterants in packaged milk at the level of End user and Local market



	Boric Acid	Urea	Starch	Detergent or Pulverised soap	Hydrogen Peroxide	Neutraliser	No adulterant
Adulterants in Packaged milk (End user)	0	7	0	15	0	42	4
Adulterants in Packaged milk (Local Market)	0	7	0	15	0	42	4

- **Sources of Unpackaged milk**
  There are 2 major sources of Unpackaged milk (Table 1.10). First, respondents who own cattles do not buy milk from other sources. Second, respondents who bought unpackaged milk from Hawkers.

Table 1.10 shows sources of Unpackaged milk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Own cattle	24	63.2	63.2	63.2
	Hawker	14	36.8	36.8	100.0
	Total	38	100.0	100.0	

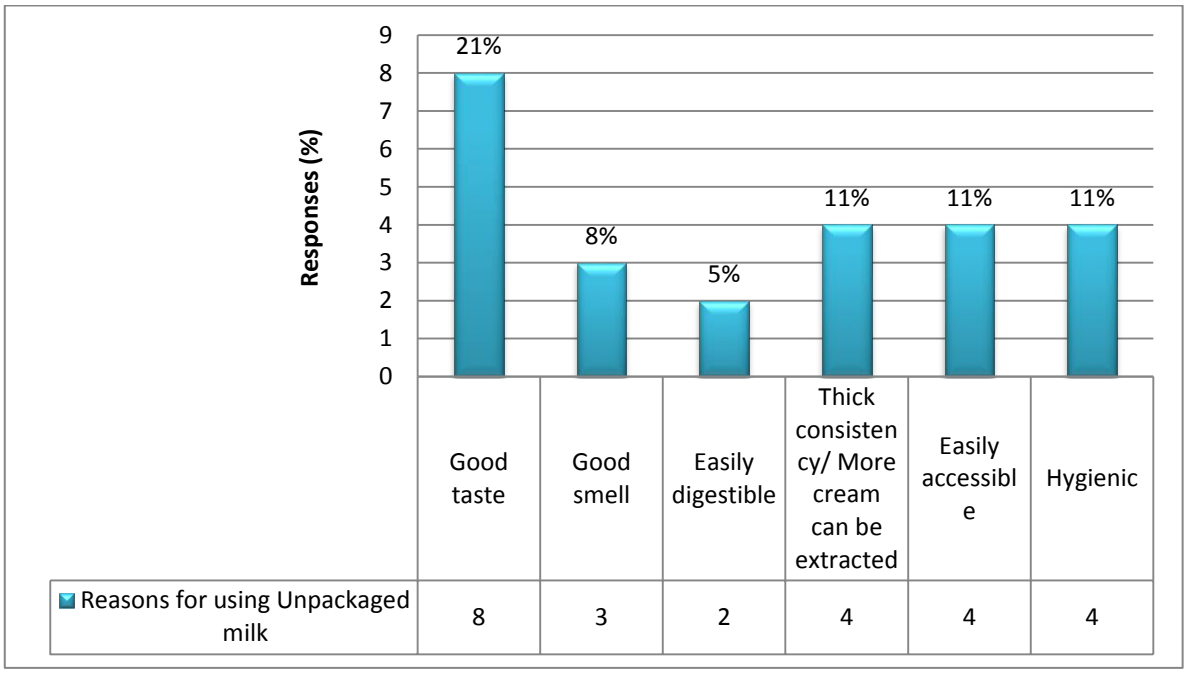
- **Reasons for using Unpackaged milk from Hawkers**
  Out of all the reasons listed in the table 1.11 below a majority of the respondents preferred unpackaged milk because of its good taste, accessibility, thick consistency and hygienic value followed by good smell and easily digestible.

Table 1.11 shows reasons for using Unpackaged milk

		Responses		Percent of Cases
		N	Percent	
Reasons for using Unpackaged milk[a]	Good taste	8	32.0%	57.1%
	Good smell	3	12.0%	21.4%
	Easily digestible	2	8.0%	14.3%
	Thick consistency/ More cream can be extracted	4	16.0%	28.6%
	Easily accessible	4	16.0%	28.6%
	Hygienic	4	16.0%	28.6%
Total		25	100.0%	178.6%

a. Dichotomy group tabulated at value 1.

Graph 3 shows reasons for using Unpackaged milk



- **Adulterants present in Unpackaged milk**
  Major adulterants present in unpackaged milk at the level of End User (listed in Table 1.12 below) are Urea followed by Neutraliser and Detergent / Pulverised soap

Table 1.12 shows adulterants present in Unpackaged milk at the level of End User

		Responses		Percent of Cases
		N	Percent	
Adulterants in Unpackaged milk[a]	Urea	10	43.5%	71.4%
	Detergent / Pulverised soap	4	17.4%	28.6%
	Neutraliser	9	39.1%	64.3%
Total		23	100.0%	164.3%

a. Dichotomy group tabulated at value 1.

Major adulterants present in unpackaged milk at the level of Hawker (listed in Table 1.13) are Urea followed by Neutraliser and Detergent / Pulverised soap

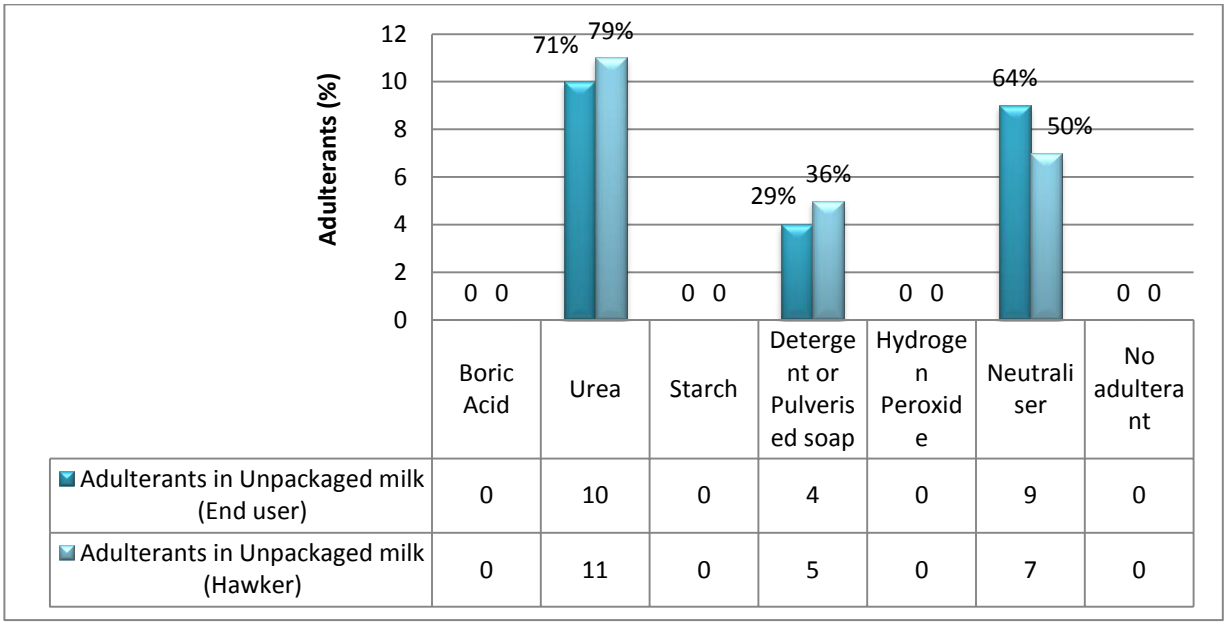
Table 1.13 shows adulterants present in Unpackaged milk at the level of Hawker

		Responses		Percent of Cases
		N	Percent	
Adulterants in unpackaged milk[a]	Urea	11	47.8%	78.6%
	Detergent/ Pulverised soap	5	21.7%	35.7%
	Neutraliser	7	30.4%	50.0%
Total		23	100.0%	164.3%

a. Dichotomy group tabulated at value 1.

There is slight difference in the presence of adulterants in unpackaged milk (see Graph 4 below) at the level of End users and Hawker. Major adulterants found at both levels are Urea, followed by Neutraliser and Detergent / Pulverised soap

Graph 4 shows the difference in the presence of adulterants in Unpackaged milk at the level of End user and Local market



	Boric Acid	Urea	Starch	Detergent or Pulverised soap	Hydrogen Peroxide	Neutraliser	No adulterant
Adulterants in Unpackaged milk (End user)	0	10	0	4	0	9	0
Adulterants in Unpackaged milk (Hawker)	0	11	0	5	0	7	0

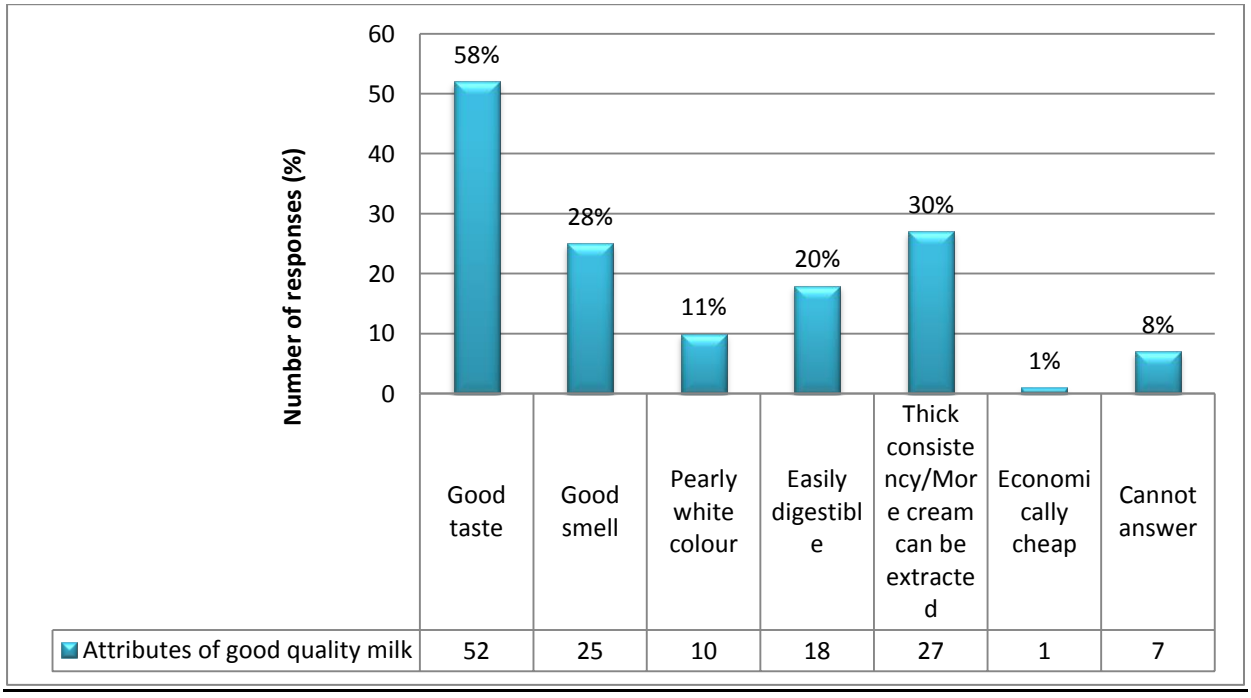
- **Attributes of a Good quality milk**
  Out of 89 respondents 82 respondents could answer attributes of good quality milk. Respondents perceive good quality milk to possess traits (listed in Table 1.14 below) such as Good taste, thickness in consistency, good smell followed by pearly white colour, easily digestible and economically cheap.

Table 1.14 shows attributes of a good quality milk

		Responses		Percent of Cases
		N	Percent	
Attributes of a good quality milk[a]	Good taste	52	37.1%	59.1%
	Good smell	25	17.9%	28.4%
	Pearly white colour	10	7.1%	11.4%
	Easily digestible	18	12.9%	20.5%
	Thick consistency/ More cream can be extracted	27	19.3%	30.7%
	Economically cheap	1	0.7%	1.1%
	Cannot answer	7	5.0%	8.0%
Total		140	100.0%	159.1%

a. Dichotomy group tabulated at value 1.

Graph 5 shows attributes of a good quality milk as perceived by community



CONCLUSION

Preference and perception of community

- 57% the respondents preferred packaged milk over unpackaged milk.
- Community perceives good taste as traits of good quality milk followed by good smell, easily digestible, pearly white colour and economically cheap.

Quality of milk (presence of adulterants)

- Only 8% packaged milk samples contained no adulterant.
- No samples of unpackaged milk were found to have no adulterant.
- Presence of Neutraliser in packaged milk followed by detergent and urea.
- Presence of Urea in unpackaged milk followed by detergent and neutraliser.

Difference in the quality of milk at the level of vendor/ hawker and end user

- There is no difference in the presence of adulterants in Packaged milk at the level of End user and Local market/ vendor
- There is a slight difference in the presence of adulterants in unpackaged milk at level of End user and Hawkers

REFERENCES

1. Ayyaz S, Badar H, Ghafoor A. Level and Determinants of Consumers' Perception of Packed Milk in Pakistan. 2011 [cited 2016 Dec 14];17. Available from: http://www.au.edu.pk/jbe/vol3-issue-1/A4-Hammad.pdf
2. Goyal P, Banga G, Kumar B, Chahal H. Preferences for packaged and unpackaged milk-A study of consumers in Ludhiana. 2010 [cited 2016 Dec14];3(2):4. Available from: http://www.researchjournal.co.in/upload/assignments/3_195-198.pdf
3. Haspolat Kaya I. Consumers' Perception and Attitudes toward Packaged Milk in Turkey—A Descriptive Study. Food Nutr Sci [Internet]. 2016 [cited 2016 Dec 14];7(7):405–16. Available from: http://www.scirp.org/journal/fns
4. Kakai R, Namanda AT, Otsyula M. The role of unpasteurized hawked milk in the transmission of brucellosis in Eldoret municipality, Kenya. J Infect Dev Ctries [Internet]. 2009 [cited 2016 Dec 14];3. Available from: https://www.academia.edu/3535579/The_role_of_unpasteurized_hawked_milk_in_the_transmission_of_brucellosis_in_Eldoret_municipality_Kenya
5. MANUAL OF METHODS OF ANALYSIS OF FOODS FOOD SAFETY AND STANDARDS AUTHORITY OF INDIA MINISTRY OF HEALTH AND FAMILY WELFARE GOVERNMENT OF INDIA NEW DELHI 2012. 2012 [cited 2016 Dec 14];8:162. Available from: http://www.fssai.gov.in/Portals/0/Pdf/15Manuals/FOOD ADDITIVES.pdf
6. Fssai.gov.in. 2016 [cited 11 December 2016]. Available from: http://www.fssai.gov.in
7. FSSAI News, Updates & Compliance Training - Food Safety Helpline [Internet]. Food Safety Helpline. 2016 [cited 11 December 2016]. Available from: http://www.foodsafetyhelpline.com

ID No._____

ANNEXURE I

Informed Consent

I am Dr. Purnima Rai, student of International Institute of Health Management Research, Dwarka, New Delhi. I am conducting research on community acceptance of available milk and assessment of its quality. This questionnaire is intended to get information from you regarding your perception and preference of available milk. Samples of milk would be collected from you to check its quality with respect to the adulterants. The information you provide and the photographs taken would be kept confidential. Participation is voluntary. You can withdraw your participation if you do not feel comfortable at any point of the time. The contact number of the Institute would be provided to you in case you have any query. The results of the tests would be communicated to you once the study is completed.

If you accept to participate in this study

Sign here_____ Date_____

Please mention-

Consent accepted_____ Consent rejected_____

ANNEXURE II **ID No._____**

Household milk consumption questionnaire

1. Name of the head(optional)	
2. Name of respondent (optional)	
3. Mobile number(optional)	
4. Gender	Male/Female
5. Age	
6. Marital status	Married /Unmarried
7. Occupation	
8. What type of milk do you use?	Packaged /Unpackaged/both
9. If you use packagedmilk, may I know the brand and type?	
10. What is the reason for not using packaged/unpackaged milk?	
11. What is the reason for using packaged/unpackaged milk?	
12. What according to you are the attributes of a good quality milk?	

Kuppu Swamy's Socio-economic scale

A. EDUCATION OF HEAD	SCORE
• Professional or Honours	7
• Graduate or Post Graduate	6
• Intermediate or Post High School Diploma	5
• High School Certificate	4
• Middle School Certificate	3
• Primary School Certificate/literate	2
• Illiterate	1
B. OCCUPATION OF HEAD	**SCORE**
• Profession	10
• Semi Profession	6
• Clerical, Shop owner, Farmer	5
• Skilled Worker	4
• Semi Skilled Worker	3
• Unskilled Worker	2
• Unemployed	1

C. **FAMILY INCOME PER MONTH**	**SCORE**
• >39,020	12
• 19,510-39,019	10
• 14,633-19,509	6
• 9,755-14,632	4
• 5,853-9,754	3
• 1,971-5,852	2
• <1970	1

SCORING

Total score	**Socio economic class**
26-29	Upper(I)
16-25	Middle Upper middle(II)
11-15	Lower middle(III)
5-10	Lower Upper lower(IV)
<5	Lower(V)

Date_____

Milk sample (Households)

Milk sample ID	
Quantity of milk	
Temperature of milk sample	• Cold(refrigerated) • Normal (room temperature) • Boiling
Time of sample collection	
Time of sample processing	

Date_____

Milk Sample (Vendors/Local Market)

Milk sample ID	
Quantity of milk	
Time of sample collection	
Time of sample processing	

OBSERVATION TABLE

Sample ID: _____ **Date of Testing: _____**

Note down your observation and tick the right colour accordingly.

Adulteration test	Colour change to be observed in	Natural	Adulterated
Boric Acid	Strip	No change	Deep orange
Urea	Strip	No change	Yellow
Starch	Milk	No change	Blue sediments
Detergent or pulverized soap	Strip /Milk	Light yellow	Blue Yellow Green
Hydrogen Peroxide	Strip /Milk	No change	Dusty yellow
Neutralizer	Strip/Milk	Light orange	Light pink