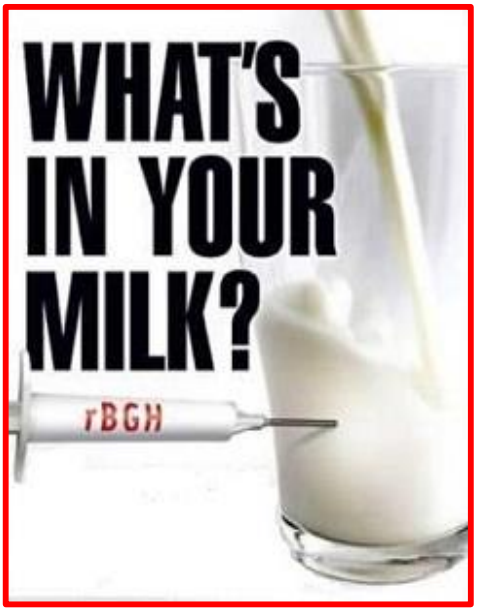
STUDENTS OF

MSB Educational Institute

presents a research project on



By: Alefiyah Bootwala, Naqiyah Pittalwala, Na'ama Shajapurwala,

Rashida Mandasaurwala and Munira Tinwala

Mentors: Ms.Rashida Poonawala and Ms.Tasneem Badshah

CONTENTS

1. ABSTRACT

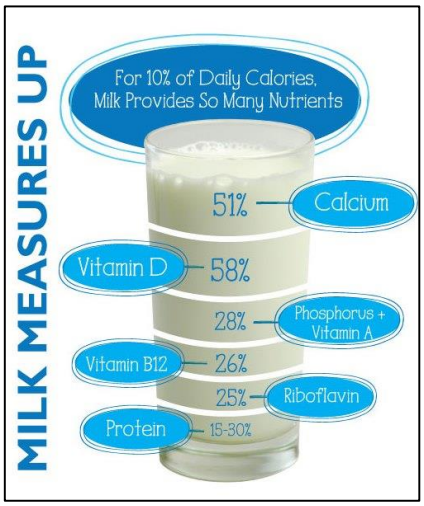
Milk is an important source of nutrients; unfortunately, today it is being adulterated reducing its nutritional value. Was there a correlation between the type of packaging and the level of adulteration? We had some sleuthing to do and malpractices to expose. Hence our research question, "How does different packaging affect the price and level of adulteration of milk sold in the market?" Armed with secondary data we conducted a series of experiments to detect the various adulterants present in milk. Through questionnaire, we were able to study the level of awareness in the public domain. Ms. Arwa Sabuwala a nutritionist with Parsi dairy farm, Mumbai was interviewed for her inputs. The results of the experiment showed that loose milk had the most adulterants, so did flavoured milk. Plastic pouch milk too was adulterated with formalin. Tetra packed milk was totally unadulterated. Our findings were conclusive and our hypothesis was confirmed, that milk in tetra pack packaging was the safest for consumption and milk sold loose was the most contaminated. Moreover, price was not a criterion for the type of packaged milk purchased. Unfortunately, 75% of the consumers did not know what to do if the milk was adulterated. Our project will help people by making them aware about the ill effects of consuming adulterated milk, give them knowledge of simple tests to detect adulterants in milk and help them choose a proper packaging with minimum or least adulterants.

2. INTRODUCTION

As kids, most people have heard phrases along the lines of "drink your milk so you'll grow big and strong!" While many people simply rolled their eyes and finished their milk, the truth is that milk does provide valuable nutrients that kids need during their development.

Milk is an important source of nutrient required for growth in infants and children and for maintenance of health in adults. Milk is a perfect food, readily digested and absorbed. It is a sole natural food for infants and children.

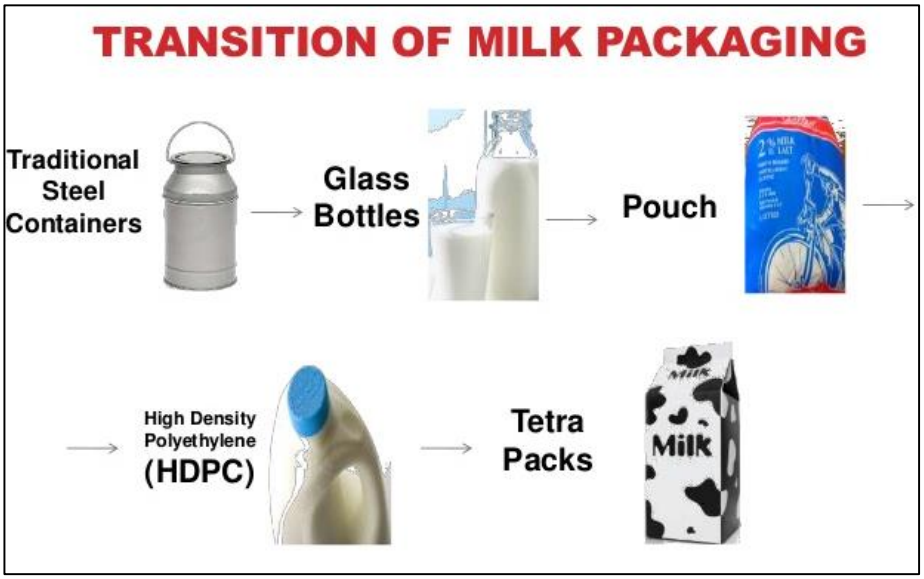
A glass of unadulterated whole milk will give around 146 kcals: 8gms of fat and protein with 257mg of calcium. Calcium and other vitamins and minerals in milk make it an important part of a healthful diet for Indian people of all ages. The benefits of drinking milk include strengthening bones, improved cardiovascular and oral health.



But these days it is being adulterated with harmful substances which enhance its quantity and characteristics but reduces its quality. Adulterants are mainly added to increase the shelf life of milk

Normally, the adulteration in food is done either for financial gain or lack of proper hygienic conditions of processing, storing, transportation and marketing. This ultimately leads to the stage that the consumer is either cheated or becomes victim of diseases. It is equally important for the consumer to know the common adulterants and their effects on health.

Milk sold in markets are available in different Packaging, to name a few,
Loose milk sold directly by the vendor.
Milk bottles are bottles used for milk. They may be reusable glass bottles used mainly for doorstep delivery of fresh milk by milkmen. More recently, plastic bottles have been commonly used for milk. These are often made of high-density polyethylene (HDPE), are used only once, and are easily recyclable.
Milk bags are plastic bags that contain milk. They are usually stored in a pitcher or jug with one of the corners cut off to allow for pouring.
Tetra packs: The unique process of pasteurizing milk at an ultra-high temperature, and then packaging it in the Tetra pack shelf safe carton, results in milk that is shelf safe. Tetra packs don't require refrigeration until they're opened. This eco-friendly packaging keeps the milk safe and maintains the protein, calcium and other important nutrients.



Now which milk among the above packaging is adulterated, set us thinking????

On the basis of information given above,

Our research question is, "How does different packaging affect the price and level of adulteration of milk sold in the market"

We all agreed upon, why we wanted to work on the above question was because we had some notions in our minds which needed answers. The personal reasons **or** major thoughts we wanted to clarify were:

- **My daily glass of milk has harmful adulterants like urea, boric acid, Formalin, starch etc., which are harmful to my health.**

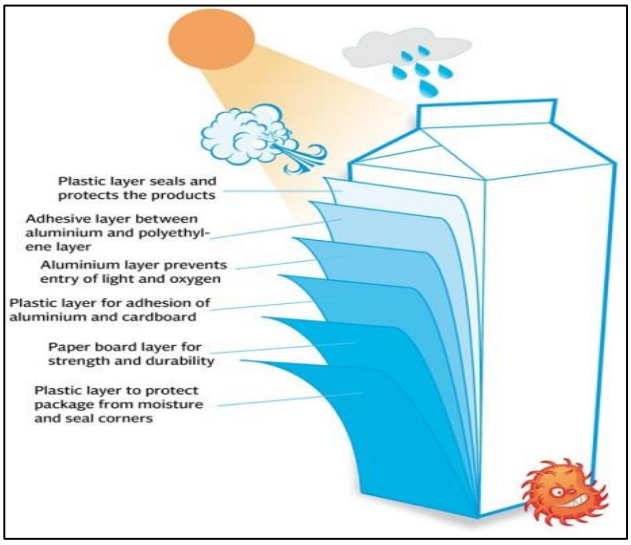
- **My grandmother says that milk sold in tetra packs have higher levels of preservatives added to it.**

It has been reported regularly in the media and newspaper that milk adulteration is rampant in many parts of our country. Some very recent news references have been cited below,

A news article published in The Indian express on March 4, 2016, written by Dipti Singh highlights how a resident association has been successful in putting a stop to the recurring problem of milk adulteration in the Borivali-Dahisar belt.

Also The Times of India Dated 6th March, 2016 carried an article which said that the Supreme court wants stringent punishment of life imprisonment for milk adulteration.

Therefore, we think that milk sold in Tetra packs will be least contaminated because it is very easy to adulterate/ tamper with milk sold in other packaging.



CONCLUSION

Milk is an important source of nutrient required for growth in infants and children and for maintenance of health in adults. It is a sole natural food for infants and children. But these days it is being adulterated with harmful substances which enhance its quantity and characteristics but reduces its quality.

Through our survey and tests it is clear that milk sold in markets is not as pure as we think. It is being adulterated with water, detergents, salt, urea, formalin etc.., which have a harmful effect on human health. With the complete analysis of the scenario we conclude that public health is an important issue but adulteration in food is commonly practiced in the market. Consumers are unaware of this.

We concluded that loose milk had most adulterants and tetra packed milk was the safest. The packaging of milk did affect its level of adulteration, also price was not found to be a factor which affected adulteration as loose milk was priced more than tetra pack.

But with proper awareness among the people and understanding of the criticality of the issue, adulteration can be prevented. If consumers know about the adulteration practices and proper techniques to avoid them, the practice of adulteration would itself be minimized.

Hence our hypothesis was proved to be right, that milk sold in Tetra packs will be least contaminated because it is very easy to adulterate / tamper with milk sold in other packaging.

3. METHODOLOGY

In order to answer the stated research questions, test hypothesis, and evaluate outcomes, data collection is the ultimate tool. The choice of appropriate data collection methods should be based on the research questions and the possible data sources. Inferences based on imagination or guesswork cannot provide correct answers to our questions. Data forms the basis for testing our hypothesis. Thus the scientific process of measurement, analysis, testing and inferences depends on the availability of data and their accuracy.

In order to achieve our project goals, the following were our objectives.

1) To determine the water content and tests to detect various adulterants in the milk available in the local market.
2) To evaluate the trend of adulteration and test public knowledge about various packaging of milk.
3) To design an awareness campaign to make people aware of milk adulteration with the help of an expert.

OBJECTIVE 1

To determine the water content and testing to detect various adulterants in the milk available in the local market.

To achieve this objective, we used the method of **EXPERIMENTATION** **and** **SECONDARY DATA**

We collected **SECONDARY DATA** about the various test to be conducted to detect adulterants in milk and based on this information we formulated our strategy for conducting tests in our school laboratory.

We collected 5 milk samples of each type of packaging and found its chemical composition through various chemical tests. We test milk for 10 different adulterants. We repeated these tests on two different days. From the chemical composition of milk using a total of 10 samples of each type of packaging, we found the amount of water present in milk. Chemical composition also tells us the various adulterants present in those samples of milk. From this we found the harmful effect of consuming these adulterants through milk.

The following tests were conducted in our school laboratory between 8th September and 16th September 2016 and most of the required chemicals were available in our laboratory. The apparatus required were test tubes and lactometer. For some of the chemicals which were not available in our school laboratory and also to have accurate test results we used a readymade kit for testing milk adulteration called **'TEST-O-MILK'**

We have attached the observation and inference chart and the format for recording our test results in the appendix for reference.

TESTS FOR DETECTING 10 COMMON ADULTERANTS IN MILK.

1) Test for detection of hydrogen peroxide
Take 5 ml milk in a test tube and then add 5 drops of paraphenylene diamine and shake it well. Change of the colour of milk to blue confirms that the milk is added with hydrogen peroxide.

2) Test for detection of boric acid
Take 20 ml of milk in a porcelain dish and add 1.4 ml of conc. hydrochloric acid and mix it thoroughly. Dip a strip of turmeric paper in the acidified milk. Appearance of characteristic red colour on the turmeric paper indicates the presence of boric acid or borax.

3) Test for detection of water
Lactometer is used to check the water dilution. Measured value is compared with the standard value.

4) Test for detection of urea
Take 5 ml milk in a test tube + 5 ml dimethyl amino benzaldehyde solution, shaken well Yellow color develops. It shows the presence of added urea.

5) Test for detection of formalin
Take 10 ml of milk in a test tube. Add 5 ml conc. sulphuric acid through the sides of the test tube without shaking. If a violet or blue ring appears at the intersection of the two layers, it shows the presence of formalin.

6) Test for detection of detergent
Take 5 ml milk + few drops of bromocresol purple solution appearance of faint violet color indicates the presence of detergent in milk.

7) Test for detection of skimmed milk
If the addition of nitric acid drop by drop in to the test milk sample results in the development of orange color, it indicates the milk is adulterated with skim milk powder. Samples without skim milk powder shows yellow color.

8) Test for detection of starch
Take 5ml milk in test tube, boil than cool and added 1 to 2 drops of iodine solution appearance of blue color which indicates the presence of starch.

9) Test for detection of salt
5 ml of silver nitrate reagent is taken in a test tube. Add 2-3 drops of potassium dichromate reagent. Add 1 ml of milk in the above test tube and mix thoroughly. If the contents of the test-tube turn yellow in color, then milk contains salt. If it turns to chocolate or reddish brown in color, the milk sample is free from salt.

10) Test for detection of soap
Take 10 ml of milk in a test tube and dilute it with equal quantity of hot water and then add 1 – 2 drops of phenolphthalein indicator. Development of pink colour indicates that the milk is adulterated with soap.

OBJECTIVE 2.

To evaluate the trend of adulteration and test public knowledge about various packaging of milk.

To fulfill this objective, we used the method of **OBSERVATION** and **QUESTIONNAIRE**.

By observation of the results of the chemical tests of the 10 samples of each type of packaging conducted above we were able to find out the trend of adulteration in various packaging of milk and also the presence of preservatives, if any, in the milk samples.

By using a preplanned set of questions in our questionnaire, we collected responses of 75 people which gave us information related to various packaging of milk. We conducted this **survey** between 29th August and 3rd September 2016.The questionnaire is attached in the appendix for reference.

OBJECTIVE 3.

To design an awareness campaign to make people aware of milk adulteration with the help of an expert.

The most important objective of our project was to spread awareness. As some harmful adulterants were found in the milk sample we made people aware about these adulterants, the packaging which is more safe and the diseases caused by these adulterants by distributing pamphlets.

To further maximize our efforts, we **INTERVIEWED** **Ms. Arwa Sabuwala** a **nutritionist** with **M/s. Parsi Dairy Farm – Mumbai** a renowned milk and milk product outlet, who helped us learn better ways of creating awareness among people and some tests to be conducted at home so that even a layman can identify adulterated milk. We met her on 16th September 2016 at 1:00 pm in her office. The set of interview questions are attached in the appendix for reference.

The strategies that we have discussed helped us in uncovering the appropriate data about different types of adulterations present in milk and the viability of different types of packaging. With this data we made people aware about the harmful effects of those adulterants in milk so that an appropriate step can be taken by them.

Following are some of the diseases caused by consuming adulterated milk.

DISEASES CAUSED BY ADULTERATED MILK	
Common Adulterants found in milk	**Diseases caused**
Water dilution	This not only reduces its nutritional value, but contaminated water can also cause additional health problems.
Urea	Vomiting, nausea and gastritis.
Starch	Solid milk paste can cause stomach diseases
Detergent	The detergent contains sodium, can act as slow poison for those suffering from hypertension and heart ailments.
Caustic Soda	Dangerous for people suffering from hypertension and heart ailments. Harms the mucosa of the food pipe, especially in kids
Salt	Decreases the nutritious value of the milk
Formalin	Causes more severe damage to the body like liver damage
Oil	Gives creamy texture to the milk but at the same time is very bad for consumption
Other synthetic compounds	The other synthetic compounds impair the functioning of various organs of the body, cause heart problems, cancer, and sometimes death.

Timeline for our project

Time period	Task completed.
16th July to 26th July	Brainstorming for research question
27th July to 6th August	Rationale and Citations
7th August to 16th August	Introduction
17th August to 26th August	Methodology and collection of secondary data
27th August to 6th September	Collection of data through questionnaire
7th September to 16th September	Experimentation in laboratory and Interview with Expert
17th September to 26th September	Compilation and completion of project

4. FINDINGS AND RESULTS

We have approached towards the objectives of our project as mentioned in the Methodology Section. We have obtained the following results:

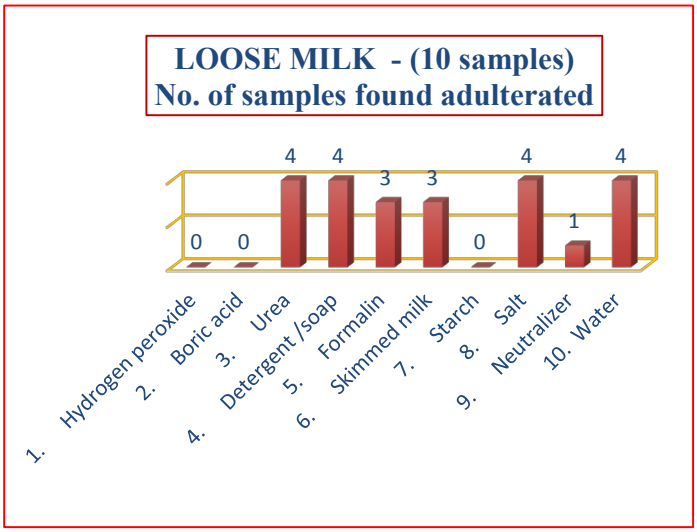
Objective 1:

To determine the water content and testing to detect various adulterants in the milk available in the local market.

As mentioned in our methodology section for objective 1, we have collected the fresh milk samples for different types of packaging mentioned above. We did various chemical tests (mentioned in methodology) on these samples for indication of various milk adulterants like hydrogen peroxide, boric acid, urea, detergents, formalin, skimmed milk, starch, salt, neutralizer and water.

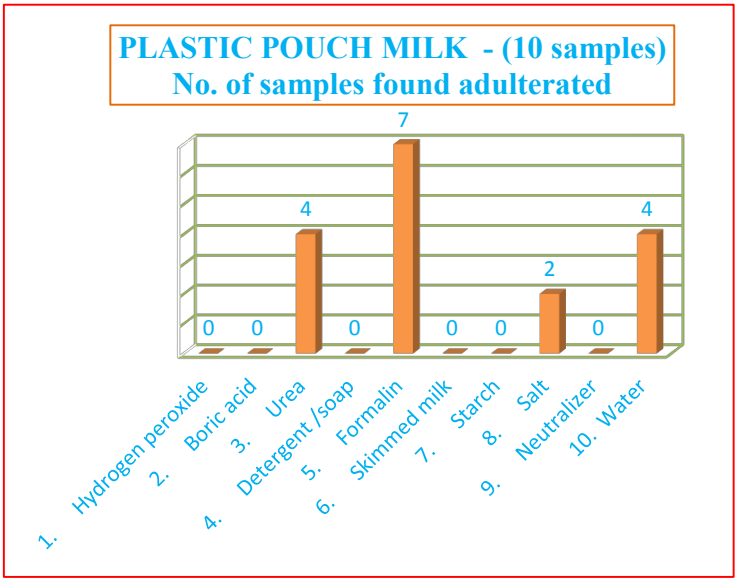
Following results were obtained:

LOOSE MILK	
Name of Adulterant	No. of samples adulterated
1. Hydrogen peroxide	0
2. Boric acid	0
3. Urea	4
4. Detergent /soap	4
5. Formalin	3
6. Skimmed milk	3
7. Starch	0
8. Salt	4
9. Neutralizer	1
10. Water	4



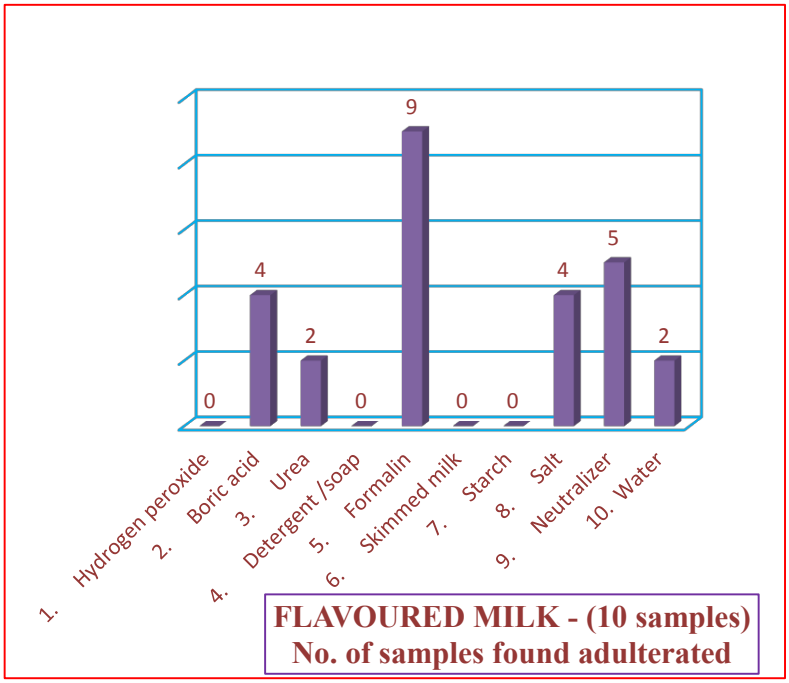
- **After analysing 10 samples of loose milk we found presences of urea, detergent, salt, skimmed milk, neutralizer and water in some of the samples.**

PLASTIC POUCH MILK	
Name of Adulterant	No. of samples adulterated
1. Hydrogen peroxide	0
2. Boric acid	0
3. Urea	4
4. Detergent /soap	0
5. Formalin	7
6. Skimmed milk	0
7. Starch	0
8. Salt	2
9. Neutralizer	0
10. Water	4



- **After analysing 10 samples of milk in plastic pouches we found presences of urea, Formalin, salt, and water in some of the samples.**

FLAVOURED MILK	
Name of Adulterant	No. of samples adulterated
1. Hydrogen peroxide	0
2. Boric acid	4
3. Urea	2
4. Detergent /soap	0
5. Formalin	9
6. Skimmed milk	0
7. Starch	0
8. Salt	4
9. Neutralizer	5
10. Water	2



❖ **After analysing 10 samples of flavoured milk in bottles we found presences of urea, boric acid, Formalin, salt, neutralizer and water in some of the samples.**

TETRAPACK MILK	
Name of Adulterant	No. of samples adulterated
1. Hydrogen peroxide	0
2. Boric acid	0
3. Urea	0
4. Detergent /soap	0
5. Formalin	0
6. Skimmed milk	0
7. Starch	0
8. Salt	0
9. Neutralizer	0
10. Water	0

❖ **After analysing 10 samples of milk in Tetra pack we found no adulterants.**

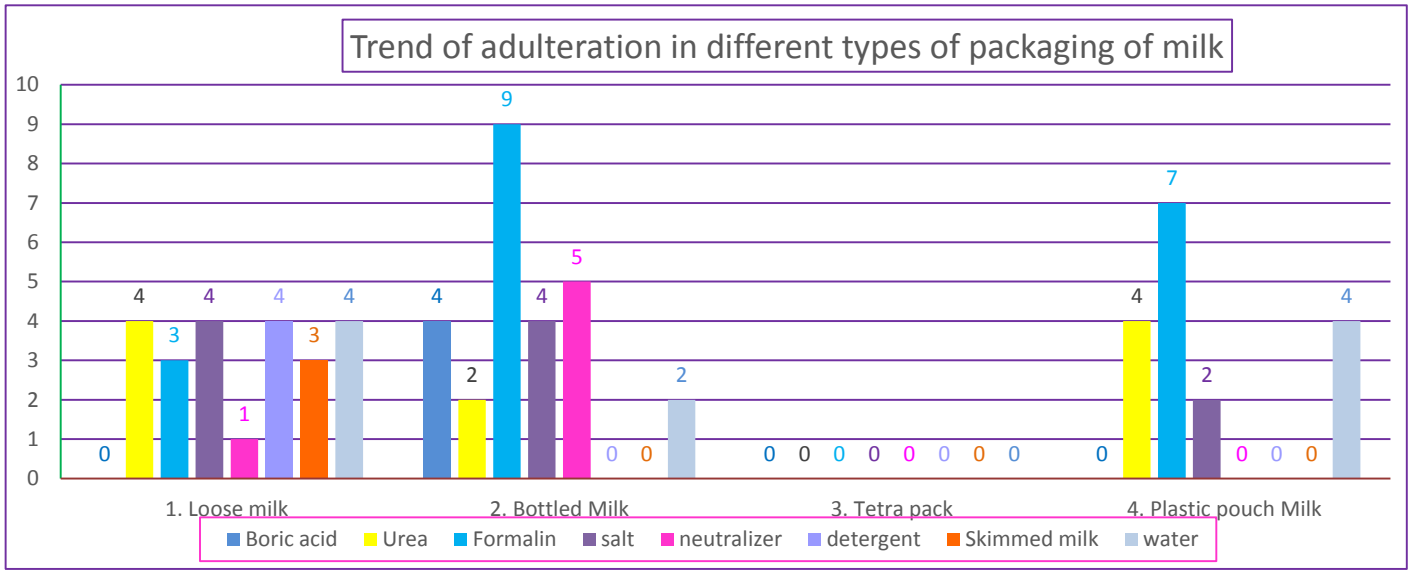
From this information we can infer that-

- ❖ **Most adulterated milk was milk sold loose and flavoured milk in bottles. Dangerous adulterants like urea, detergent, boric acid and neutralizer were found in the samples**
- ❖ **Milk in plastic pouch was mostly adulterated with formalin a preservative and some samples had salt.**
- ❖ **Water was a common adulterant in the above 3 Packaging of milk.**
- ❖ **We found no adulterants in tetra packed milk.**

Objective 2:

To evaluate the trend of adulteration and test public knowledge about various packaging of milk.

After recording the observations for samples of each type of packaging, we analyzed it in the form of a histogram chart to see the relative package-wise adulteration trend.



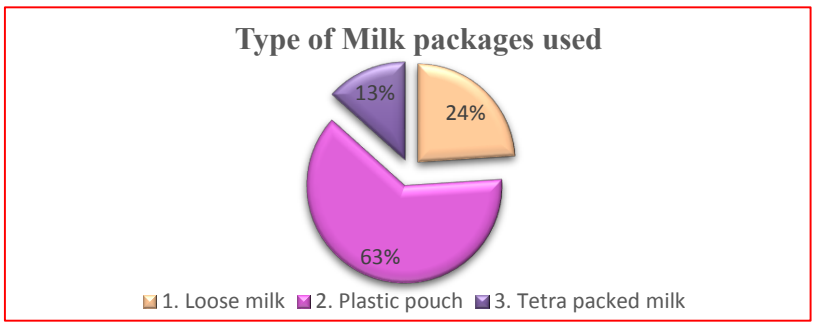
This graph infers the trend of adulteration as follows:

- **Adulteration practices are high in flavoured milk bottles.**
- **Excessive adulteration was found in loose milk samples.**
- **Milk from tetra pack samples was free from any harmful adulterants.**

To test public knowledge about adulteration and various packaging, we conducted a survey by using a preplanned set of questions. We collected responses of 75 people which gave us the following results:

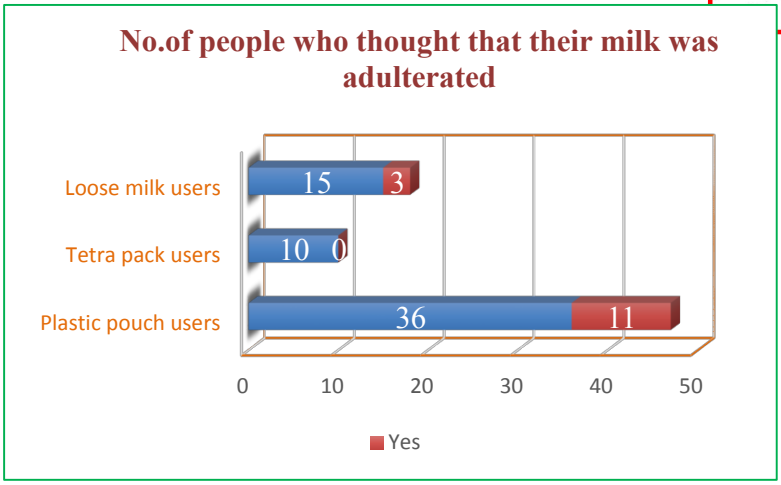
Type of milk packages used- (out of 75 responses)		%
1. Loose milk	18	13%
2. Plastic pouch milk	47	63%
3. Tetra packed milk	10	13%

Formula used for percentage calculation:
(No. of responses * 100) / Total responses



- **After studying survey questions of 75 sample sizes, we found that only 10 used Tetra packed milk and most of them used milk in plastic pouch.**

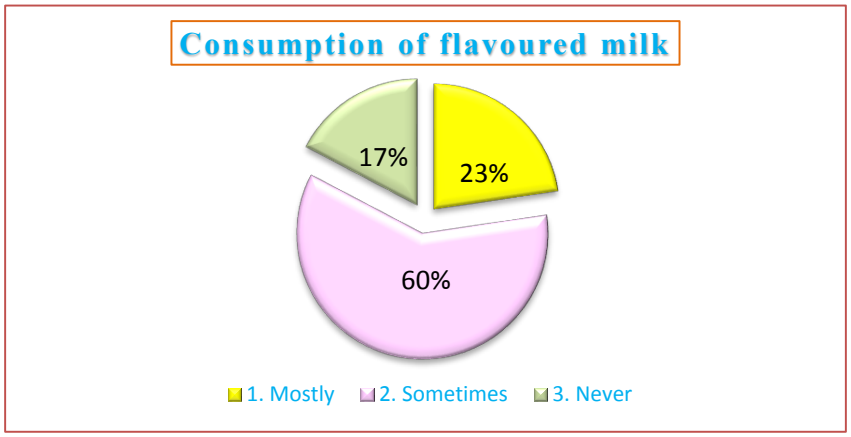
No. of people who thought that their milk was adulterated		
	NO	Yes
Plastic pouch users	36	11
Tetra pack users	10	0
Loose milk users	15	3



- **After studying survey questions, we found that out of the 18 users of loose milk only 3 felt that their milk was adulterated.**

Consumption of flavoured milk- (out of 75 responses)		%
1. Mostly	17	23%
2. Sometimes	45	60%
3. Never	13	17%

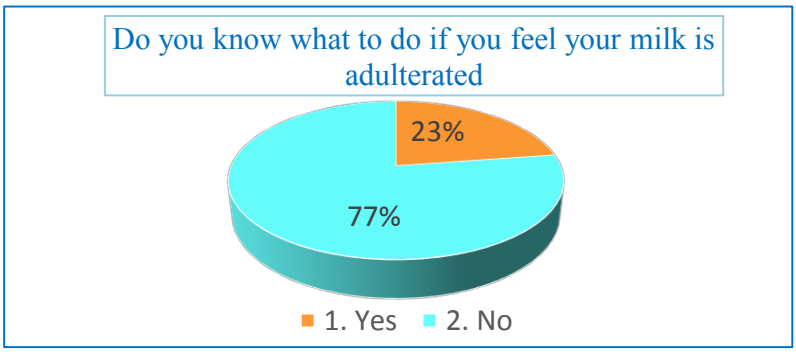
Formula used for percentage calculation:
(No. of responses * 100) / Total responses



- **After studying survey questions of 75 sample size, we found that about 60% consumers drank flavored milk.**

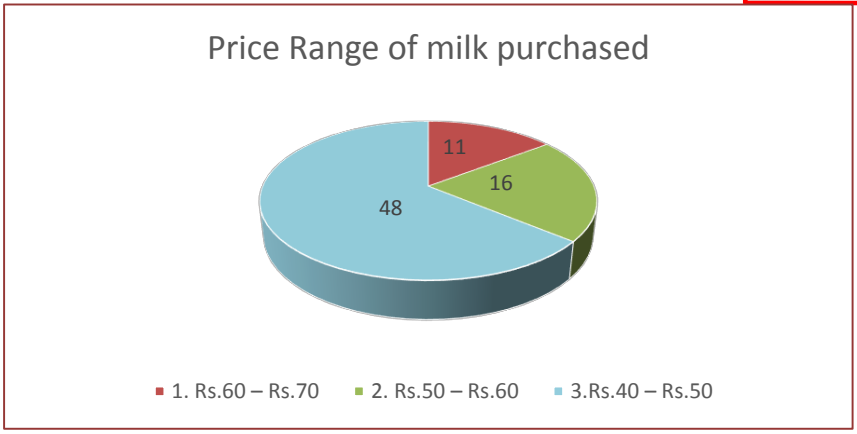
Do you know what to do if you feel your milk is adulterated		%
1. Yes	17	23%
2. No	58	77%

Formula used for percentage calculation:
(No. of responses * 100) / Total responses



- **After studying survey questions of 75 sample size, we found that about 77% consumers did not know what to do if they feel that their milk was adulterated.**

Price range of milk purchased	
Price range/litre	**No. of consumers**
1. Rs.60 – Rs.70	**11**
2. Rs.50 – Rs.60	**16**
3.Rs.40 – Rs.50	**48**



- **After studying survey questions of 75 sample size, we found that average price range of milk purchased per litre is Rs.40 – Rs.50.**

After surveying and testing the milk samples, the results were quite shocking. People only expected water to be present as an adulterant in their consumed milk but for some cases tests indicated the presence of other adulterants that are harmful for health. Therefore, this contradictory information shows that consumers are unaware of these adulteration practices.

We also inferred that

- **Tetra packed milk was least adulterated, while loose milk was the most adulterated**
- **Flavoured milk was also found to be adulterated**
- **Most of the consumers are unaware about their milk being adulterated**
- **Consumers do not know what to do if they find that they are consuming adulterated milk**
- **From the survey we learnt that majority of the consumers are open to accept a particular type of packaging if it is safer than others**
- **Although the average purchase price ranges between Rs.40 to Rs.50, price was not a criterion influencing their purchase**

OBJECTIVE 3.

To design an awareness campaign to make people aware of milk adulteration with the help of an expert.

The most important objective of our project was to spread awareness. In order to achieve this objective, we distributed pamphlets highlighting the harmful effects of adulterants found in milk.

We interviewed **Ms. Arwa Sabuwala** a **nutritionist** with **M/s. Parsi Dairy Farm – Mumbai** a renowned milk and milk product outlet, who helped us know some tests to be conducted at home so that even a lay man can identify adulterated milk. She also discussed the escalation process in case the milk is found to be adulterated by a consumer. She told us about the official website where complaints can be registered ---- **www.fssai.gov.in/feedback.aspx.**

This information was included in the **pamphlet.** A copy of the pamphlet is attached in the appendix.

5. DISCUSSION

From the above findings we conclude that packing does affect the presence of adulterants in the milk that is sold in the market, but price is not the deciding factor for the presence of adulterants.

Thus we conclude that loose milk was considered to be safer because it was highly priced but it had the maximum adulterants, contrary to the expectations of consumers.

Thus this answers our research question **"How does different packaging affect the price and level of adulteration of milk sold in the market".**

Also our hypothesis that milk sold in Tetra packs will be least contaminated because it is very easy to adulterate/ tamper with milk sold in other packaging, was **proved to be right** as the results of the tests conducted on the tetra packed milk samples had no adulterants.

We proved that our hypothesis was right, but there may have been certain **factors** which might have **influenced our results** like:

- We may have failed to follow the exact procedures specified for the experiments.
- We may have unintentionally transmitted our expectations to match our results.
- The sample size selected by us for our questionnaire may not be a true representation of the entire population.
- People may not have answered our questionnaire sincerely.

Having said the above, we still feel that our research can **help people** by making them aware about

- The ill effects of consuming adulterated milk.
- The knowledge of simple tests to detect adulterants in milk.
- Choosing a proper packaging with minimum or least adulterants.

To completely rule out using adulterated milk, we all need to follow certain steps like

- Checking the expiry date of milk whenever we purchase milk.
- Conducting the easy, "do at home tests" on milk mentioned in our pamphlets.
- Using a Lactometer which is easily available in the market to test the water content in milk.
- When in doubt use readymade kits to test milk adulteration which is easily available in the market.
- Complaining to government authorities at the following website --**www.fssai.gov.in/feedback.aspx,** if we feel that the milk supply is adulterated.

As students even after our research is over, we will try to continue to create awareness by **writing articles** about milk adulteration in our school bulletins. To create further awareness in the city we will try to publish our article on milk adulteration in the local newspaper.

After conducting the tests on milk we had new questions in our minds about the presence of adulterants in various milk products. We would also like to do research on **"How does adulterated milk affect the milk products sold in the local market".**

6. REFLECTIONS

Naqiyah Pittalwala

The most enjoyable part of this project for me was the time when we met in the laboratory to test milk samples. Another enjoyable part was going to interview Ms. Arwa Sabuwala, a nutritionist, about milk. Managing time was never really a problem but finding a research question at first wasn't really easy. We had a problem getting an appointment with the officer of FSSAI department, but unfortunately the respective person did not respond. Then we thought about interviewing a nutritionist instead and fortunately we managed that. I wouldn't like to change anything as the project had been perfect for me. From this project I learnt that teamwork is really important and how well you can perform in anything only if you take interest and put your heart into it.

Alefiyah Bootwala

Everything about this project was enjoyable like discussing plans, conducting surveys, experimentation and taking interview. This project itself would be one of the most memorable part of my school life. Managing time was difficult because we also had a lot of other projects, book completions and tests in our way. We had to miss some periods in school and our breaks too. While we went for interview, rain became a problem for us. Also getting appointment of the nutritionist was not an easy task. In spite of so many hurdles, I have thoroughly enjoyed doing this project but I would have really liked to take interview of the officer of FSSAI department which was apparently not possible for us. I've also learnt a number of new things like- what actually research is, managing time, this project has also improved my speaking skills as I conducted surveys and took an interview. I've also learnt many new things about the milk I drink every day. It has really opened my mind to many new things and has answered many questions which always kept me wondering.

Munira Tinwala

This research project organized by my school is really helpful indeed. It helped me in many ways like I found out something which I never knew before, I started to read books and newspapers for news which became my habit, I amalgamated with my colleagues and a lot of self-independence and development took place in me. The most enjoyable part in this project was that we got to answer our problems not just by studying on Google or books, but practically by doing it by our self. Like we tested for common adulterants in milk in our school lab, we got to take expert advice from nutritionist and much more. I enjoyed with my teacher finding solutions to my quarries and working about with her. It was fun learning new and exciting things which were unknown by us. Yes, we did struggles like many tests, book completion, coming to school on Saturdays ruining our sleeps, coming to school in rains and so much work. But to achieve something you need to lose something.

Rashida Mandasaurwala

The research project decided by us was of detecting the adulteration in milk was very interesting and knowledgeable. We learnt many things from the research project like how to interact with people, take interviews and do survey. It was great teamwork and collective effort. There were some difficulties such as rainy weather, managing time with teachers and other people, missing classes, internet problems etc. The most enjoyable was going to meet the nutritionist and taking her advice. Making pamphlets to create awareness regarding adulteration in milk was also a funfilled activity.

Na'ama Shajapurwala

The most enjoyable part in this project was getting an interview appointment with the nutritionist. I was really delighted because everyone was praising me as I fixed the appointment. I was lagging behind in completion of books because of the project. It was very difficult to get questionnaire filled as people were not very cooperative. The 1 thing that I would like to change was missing my break time for the project. I learnt how to talk to people confidently. This project was really good and I had a lot fun doing it.

7. APPENDIX

Here we have attached all our forms, filled results sheet, scanned questionnaire copy, photographs and citations. Which have been mentioned in the serial order and with page nos. in our CONTENT page.

a) Citations

1) Written by **Dipti Singh** | Mumbai | Published: March 4, 2016

Mumbai Residents' group out to stop milk adulteration

http://indianexpress.com/article/cities/mumbai/nlrrf-borivli-mumbai-residents-group-out-to-stop-milk-adulteration/

2) Amit Anand Chaudhary, (Aug 6th, 2016), The Times of India, Milk cheats should get life term: SC

TIMES NATION

THE TIMES OF INDIA, MUMBAI | SATURDAY, AUGUST 6, 2016

NO POLITICAL VENDETTA BEHIND SHUTTING AMETHI IIIT CAMPUS, SAYS HRD MINISTER JAVADEKAR | 19

'YEH PADOSI HAI KI MANTA HI NAHIN': HOM RAJNATH'S JIBE AT PAKISTAN IN PARLIAME

Milk cheats should get life term: SC

Asks State Govts To Consider Amending Law To Curb Adulteration

AmitAnand.Choudhary
@timesgroup.com

GLASS OF WOES

- Court said adulteration could adversely affect the growth of future generations
- It pointed to UP, Bengal and Odisha which have already amended laws, making the offence punishable by life term
- The bench referred to a 2011 FSSAI report, which said that over 68% of milk sold in the market was found adulterated. All samples in Bihar, Odisha, Chhattisgarh and Bengal were found adulterated

New Delhi: Expressing concern over the alarming level of milk adulteration in the country, the Supreme Court on Friday favoured stringent punishment of life imprisonment for the offence which, at present, is punishable by only up to six months in jail or fine.

A bench of Chief Justice T S Thakur and Justices R Banumathi and U U Lalit said there is an urgent need to tackle the menace of growing sale of adulterated and synthetic milk. It said milk adulteration could adversely affect the growth of future generations as it was the staple diet of children and infants.

Asking the Centre and states to consider amending the present lenient law, the bench said UP, West Bengal and Odisha had already amended the law making adulteration punishable by up to life imprisonment and there was nothing wrong in following their footsteps for a stringent law. "It will be in order, if the Centre considers making suitable amendments in the penal provisions at par with the provisions contained in the state amendments to the IPC. It is also desirable that the Centre revisits the Food Safety and Standards Act to revise the punishment for adulteration making it more deterrent in cases where the adulterant can have an adverse impact on health," it said.

The court directed the government to spread awareness about the hazardous impact of milk adulteration and methods for detection of common adulterants in food. It directed the Centre and state governments to evolve a complaint mechanism for checking corruption and other unethical practices. "Adulteration of milk and its products is a concern and stringent measures need to be taken to combat it," the bench said and referred to a 2011 report of Food Safety and Standards Authority of India (FSSAI) which said over 68% of milk sold in the market was found to be adulterated.

The report said cases of milk adulteration was rampant with all samples in Bihar, Chhattisgarh, Odisha, West Bengal, Mizoram, Jharkhand and Daman and Diu found to have been adulterated.

The court passed the order on a bunch of petitions filed by people from different states seeking its direction to governments to provide for stringent punishment for milk adulteration. Advocate Anurag Tomar contended that milk contaminated with synthetic material was posing serious threat to the life and health of consumers.

b) Survey questionnaire

MSB EDUCATIONAL INSTITUTE

RESEARCH PROJECT QUESTIONNAIRE

This questionnaire is part of a research project and is designed to seek public opinion for the evaluation of the trend of adulteration in milk and knowledge of various packaging of milk sold to people.

We, the students of MSB Educational Institute would be glad to have your contribution to test public knowledge about the same.

Thank you.

Date: _____

Age: _____

Sex: _____

1) How many litres of milk does your family consume in a day? _____

2) How much milk does each family member consume daily?
   - ☐ 1-2 glasses
   - ☐ more than 2 glasses

3) Why do you think consumption of milk is necessary?
   - ☐ Healthy for your body
   - ☐ Supplies the required amount of calcium
   - ☐ Contains required vitamins

4) What type of milk do you use?
   - ☐ Loose
   - ☐ Packaged

If Using Loose Milk

5) Price of loose milk Rs./ltr. _____

6) Purchase point

☐ Home delivery ☐ Shop ☐ Dairy booth

7) Reason for using loose milk

- ☐ price
- ☐ taste
- ☐ unadulterated
- ☐ home delivery
- ☐ credit facility
- ☐ freshness
- ☐ any other reason _____

8) Reason for not using packaged milk

- ☐ price
- ☐ not fresh
- ☐ adulterated
- ☐ synthetic
- ☐ low quality
- ☐ not good for children
- ☐ any other reason _____

9) Do you think the water content in your milk is more than specified?

☐ Yes ☐ No ☐ Don't know

If Using Packaged Milk

5) Price of packaged milk Rs./ltr. _____

6) Purchase point

☐ Home delivery ☐ Shop ☐ dairy booth

7) Type of packaging purchased

☐ Plastic pouch ☐ Tetra pack ☐ Bottled

8) Do you observe the expiry date on the package?

☐ Yes ☐ No

9) Reason for using packaged milk

- ☐ price
- ☐ taste
- ☐ unadulterated
- ☐ home delivery
- ☐ quality
- ☐ any other reason _____

For Both

10) Does price affect your decision of the type of milk you buy?
☐ Yes ☐ No ☐ May be

11) Are you satisfied with the quality of milk supplied?
☐ Yes ☐ No ☐ Somewhat

12) Do you think price affects the quality of milk?
☐ Yes ☐ No ☐ May be

13) Do you think packaging affects the quality of milk?
☐ Yes ☐ No ☐ May be

14) Do you drink flavoured bottled milk?
☐ Mostly ☐ Sometimes ☐ Never

15) What do you think your milk is adulterated with?
☐ Water ☐ Milk powder ☐ Urea ☐ Detergent
☐ Unaware ☐ any other_____

16) Are you aware of the ill effects of consuming adulterated milk?
☐ Yes ☐ No

17) How often has consuming adulterated milk affected your family's health?
☐ Not even once ☐ A few times ☐ Many times

18) According to you, which type of packaging of milk can be easily adulterated?
☐ Loose ☐ Plastic pouch ☐ Bottled ☐ Tetra Pack

19) Would you consider buying a particular type of packaged milk if it is safer than the others?
☐ Yes ☐ No ☐ May be

20) Do you know what to do if you feel that the milk you are consuming is adulterated?
☐ Yes ☐ No ☐ Don't know

~~~~~~~~~~~~~~~~~~~~~~
~~~~~~~~~~~~~~~~~~~~~~

c) Questions for expert

MSB EDUCATIONAL INSTITUTE

Interview Questions for Nutritionist

This interview is part of a research project and is designed to seek expert opinion to acquire knowledge to create awareness among people about the nutritional values of milk and about alternatives to regular milk.

We also aim at learning some techniques to identify adulterated milk easily.

We, the students of MSB Educational Institute would be glad to have your contribution about the same.

Thank you.

Date: _____

Name: _____ Designation: _____

1) Why is it necessary to include milk in our daily diet?

_____
_____
_____
_____

2) What are the alternatives to regular milk?

_____
_____
_____
_____

3) What are the common adulterants found in milk?

_____
_____
_____
_____

4) How does consuming adulterated milk affect human health?

_____
_____
_____
_____

5) According to you, which type of packaging of milk can be easily adulterated?

_____

_____

_____

_____

6) What do you know about synthetic milk?

_____

_____

_____

_____

7) Are there any techniques to identify adulterated milk?

_____

_____

_____

_____

8) What should people do if they find that their daily supply of milk is adulterated?

_____

_____

_____

_____

9) As part of this research project we are planning to distribute pamphlets to create awareness among people about milk adulteration. What do you think about the same?

_____

_____

_____

_____

10) Would you like to add any information in the pamphlet?

_____

_____

_____

_____

_____

_____

~~~~~~~~~~~~~~~~~
~~~~~~~~~~~~~~~~~

d) Observation and inference chart

TABLE OF OBSERVATION AND INFERENCE

Adulterant	Test	Observation	Inference
1. Hydrogen peroxide	Take 5 ml milk in a test tube and then add 5 drops of paraphenylene diamine and shake it well.	appearance of **dusty yellow** colour.	confirms the presence of **Hydrogen peroxide**.
2. Boric acid	Take 5 ml of milk in a test tube to which 1 ml of concentrated HCl is added and mixed well. Dip a strip of turmeric paper in the acidified milk.	appearance of Deep orange colour on the turmeric paper.	confirms the presence of Boric acid or Borax.
3. Urea	Take 5 ml of milk and mix well with 5 ml paradimethyl amino benzaldehyde (16%).	The solution turns **Yellow** in colour	confirms the presence **Urea**.
4. Detergent /soap	Take 5 ml of milk in a test tube and add 0.1 ml of bromocresol purple solution.	appearance of **Violet** colour	confirms the presence of **Detergent** in milk.
5. Formalin	Take 10 ml of milk in a test tube. Add 5 ml conc. sulphuric acid through the sides of the test tube without shaking.	**Violet** or **Blue ring** appears at the intersection of the two layers.	confirms the presence of **Formalin**.
6. Skimmed milk	If the addition of nitric acid drop by drop in to the test milk sample.	appearance of **orange** colour. or appearance of **yellow** colour.	**Orange** colour confirms the presence of skimmed milk powder. Samples with out skim milk powder shows **Yellow** colour.
7. Starch	Take 5ml milk in test tube, boil than cool and added 1 to 2 drops of iodine solution.	appearance of **Blue** colour	confirms the presence of Starch.
8. Salt	5 ml of silver nitrate reagent is taken in a test tube. Add 2-3 drops of potassium dichromate reagent. Add 1 ml of milk in the above test tube and mix thoroughly.	appearance of **yellow** colour, or appearance of **Chocolate or Reddish brown** colour.	**yellow** colour confirms the presence of salt. **Chocolate** or **Reddish brown** in colour, the milk sample is free from salt.
9. Neutralizer	Take 5 ml of milk in a test tube and add 5 ml alcohol followed by 4-5 drops of rosalic acid.	appearance of **Pinkish red** colour.	confirms the presence of **Neutralizers (Na_2CO_3 or $NaHCO_3$)**
10. Water	With a lactometer the specific density of milk is measured. The **normal density** of the milk ranges from **1.028 to 1.033** g/ml.	The reading for density of milk is recorded.	**Decrease** in Lactometer reading indicates **addition of water**. **Increase** in lactometer reading indicates **addition of skimmed milk or removal of fat.**

e) Form to fill lactometer reading

TABLE FOR RECORDING TEST RESULTS

Date: _____ ***LACTOMETER READING FOR DAY 1***

Tested by Name: _____

↓ Decrease in lactometer reading indicates addition of water

↑ Increase in lactometer reading indicates removal of fat or addition of skimmed milk

Type of packaged milk	OBSERVATION and INTERPRETATION after testing		
	Less than Normal (< 1.028)	Normal (1.028 to 1.033)	More than Normal (> 1.033)
1. LOOSE MILK			
Sample1			
Sample2			
Sample3			
Sample4			
Sample5			
2. PLASTIC POUCH MILK			
Sample1			
Sample2			
Sample3			
Sample4			
Sample5			
3. FLAVOURED MILK			
Sample1			
Sample2			
Sample3			
Sample4			
Sample5			
4. TETRA PACK MILK			
Sample1			
Sample2			
Sample3			
Sample4			
Sample5			

f) Form to fill Loose milk, Plastic pouch, flavoured milk and Tetra packed milk readings

TABLE FOR RECORDING TEST RESULTS

LOOSE MILK SAMPLE (5 SAMPLES) DAY 1

Date: _____

Tested by Name: _____

ADULTERANT	Colour change to be observed	OBSERVATION and INTERPRETATION after testing	
		Natural	Adulterated
1. Hydrogen peroxide Sample1	Appearance of **dusty yellow** colour.	☐ No Change	☐ Dusty yellow
Sample2		☐ No Change	☐ Dusty yellow
Sample3		☐ No Change	☐ Dusty yellow
Sample4		☐ No Change	☐ Dusty yellow
Sample5		☐ No Change	☐ Dusty yellow
2. Boric acid Sample1	Appearance of Deep orange colour on the turmeric paper.	☐ No Change	☐ Deep orange colour
Sample2		☐ No Change	☐ Deep orange colour
Sample3		☐ No Change	☐ Deep orange colour
Sample4		☐ No Change	☐ Deep orange colour
Sample5		☐ No Change	☐ Deep orange colour
3. Urea Sample1	The solution turns **Yellow** in colour	☐ No Change	☐ Yellow colour
Sample2		☐ No Change	☐ Yellow colour
Sample3		☐ No Change	☐ Yellow colour
Sample4		☐ No Change	☐ Yellow colour
Sample5		☐ No Change	☐ Yellow colour
4. Detergent /soap Sample1	appearance of **Violet** colour	☐ No Change	☐ Violet colour
Sample2		☐ No Change	☐ Violet colour
Sample3		☐ No Change	☐ Violet colour
Sample4		☐ No Change	☐ Violet colour
Sample5		☐ No Change	☐ Violet colour
5. Formalin Sample1	**Violet** or **Blue ring** appears at the intersection of the two layers.	☐ No Change	☐ Blue colour
Sample2		☐ No Change	☐ Blue colour
Sample3		☐ No Change	☐ Blue colour
Sample4		☐ No Change	☐ Blue colour
Sample5		☐ No Change	☐ Blue colour

6. Skimmed milk **Sample1**	Appearance of **orange** colour. or Appearance of **yellow** colour.	☐ Yellow colour	☐ Orange colour
Sample2		☐ Yellow colour	☐ Orange colour
Sample3		☐ Yellow colour	☐ Orange colour
Sample4		☐ Yellow colour	☐ Orange colour
Sample5		☐ Yellow colour	☐ Orange colour
7. Starch **Sample1**	Appearance of Blue colour.	☐ No Change	☐ Blue colour
Sample2		☐ No Change	☐ Blue colour
Sample3		☐ No Change	☐ Blue colour
Sample4		☐ No Change	☐ Blue colour
Sample5		☐ No Change	☐ Blue colour
8. Salt **Sample1**	appearance of **yellow** colour, or Appearance of **Chocolate or Reddish brown** colour.	☐ Chocolate colour	☐ Yellow colour
Sample2		☐ Chocolate colour	☐ Yellow colour
Sample3		☐ Chocolate colour	☐ Yellow colour
Sample4		☐ Chocolate colour	☐ Yellow colour
Sample5		☐ Chocolate colour	☐ Yellow colour
9. Neutralizer **Sample1**	Appearance of **Pinkish red** colour.	☐ No Change	☐ Pinkish red colour
Sample2		☐ No Change	☐ Pinkish red colour
Sample3		☐ No Change	☐ Pinkish red colour
Sample4		☐ No Change	☐ Pinkish red colour
Sample5		☐ No Change	☐ Pinkish red colour

Date: _____
Tested by Name: _____

TABLE FOR RECORDING TEST RESULTS
PLASTIC POUCH MILK SAMPLE (5 SAMPLES) DAY 1

ADULTERANT	Colour change to be observed	OBSERVATION and INTERPRETATION after testing	
		Natural	Adulterated
10. Hydrogen peroxide **Sample1**	Appearance of **dusty yellow** colour.	☐ No Change	☐ Dusty yellow
Sample2		☐ No Change	☐ Dusty yellow
Sample3		☐ No Change	☐ Dusty yellow
Sample4		☐ No Change	☐ Dusty yellow
Sample5		☐ No Change	☐ Dusty yellow
11. Boric acid **Sample1**	Appearance of Deep orange colour on the turmeric paper.	☐ No Change	☐ Deep orange colour
Sample2		☐ No Change	☐ Deep orange colour
Sample3		☐ No Change	☐ Deep orange colour
Sample4		☐ No Change	☐ Deep orange colour
Sample5		☐ No Change	☐ Deep orange colour
12. Urea **Sample1**	The solution turns **Yellow** in colour	☐ No Change	☐ Yellow colour
Sample2		☐ No Change	☐ Yellow colour
Sample3		☐ No Change	☐ Yellow colour
Sample4		☐ No Change	☐ Yellow colour
Sample5		☐ No Change	☐ Yellow colour
13. Detergent /soap **Sample1**	appearance of **Violet** colour	☐ No Change	☐ Violet colour
Sample2		☐ No Change	☐ Violet colour
Sample3		☐ No Change	☐ Violet colour
Sample4		☐ No Change	☐ Violet colour
Sample5		☐ No Change	☐ Violet colour
14. Formalin **Sample1**	**Violet** or **Blue ring** appears at the intersection of the two layers.	☐ No Change	☐ Blue colour
Sample2		☐ No Change	☐ Blue colour
Sample3		☐ No Change	☐ Blue colour
Sample4		☐ No Change	☐ Blue colour
Sample5		☐ No Change	☐ Blue colour

15. Skimmed milk **Sample1**	Appearance of **orange** colour. or Appearance of **yellow** colour.	☐ Yellow colour	☐ Orange colour
Sample2		☐ Yellow colour	☐ Orange colour
Sample3		☐ Yellow colour	☐ Orange colour
Sample4		☐ Yellow colour	☐ Orange colour
Sample5		☐ Yellow colour	☐ Orange colour
16. Starch **Sample1**	Appearance of Blue colour.	☐ No Change	☐ Blue colour
Sample2		☐ No Change	☐ Blue colour
Sample3		☐ No Change	☐ Blue colour
Sample4		☐ No Change	☐ Blue colour
Sample5		☐ No Change	☐ Blue colour
17. Salt **Sample1**	appearance of **yellow** colour, or Appearance of **Chocolate or Reddish brown** colour.	☐ Chocolate colour	☐ Yellow colour
Sample2		☐ Chocolate colour	☐ Yellow colour
Sample3		☐ Chocolate colour	☐ Yellow colour
Sample4		☐ Chocolate colour	☐ Yellow colour
Sample5		☐ Chocolate colour	☐ Yellow colour
18. Neutralizer **Sample1**	Appearance of **Pinkish red** colour.	☐ No Change	☐ Pinkish red colour
Sample2		☐ No Change	☐ Pinkish red colour
Sample3		☐ No Change	☐ Pinkish red colour
Sample4		☐ No Change	☐ Pinkish red colour
Sample5		☐ No Change	☐ Pinkish red colour

Date: _____
Tested by Name: _____

TABLE FOR RECORDING TEST RESULTS
FLAVOURED MILK SAMPLE (5 SAMPLES) DAY 1

ADULTERANT	Colour change to be observed	OBSERVATION and INTERPRETATION after testing	
		Natural	Adulterated
19. Hydrogen peroxide Sample1	Appearance of **dusty yellow** colour.	☐ No Change	☐ Dusty yellow
Sample2		☐ No Change	☐ Dusty yellow
Sample3		☐ No Change	☐ Dusty yellow
Sample4		☐ No Change	☐ Dusty yellow
Sample5		☐ No Change	☐ Dusty yellow
20. Boric acid Sample1	Appearance of Deep orange colour on the turmeric paper.	☐ No Change	☐ Deep orange colour
Sample2		☐ No Change	☐ Deep orange colour
Sample3		☐ No Change	☐ Deep orange colour
Sample4		☐ No Change	☐ Deep orange colour
Sample5		☐ No Change	☐ Deep orange colour
21. Urea Sample1	The solution turns **Yellow** in colour	☐ No Change	☐ Yellow colour
Sample2		☐ No Change	☐ Yellow colour
Sample3		☐ No Change	☐ Yellow colour
Sample4		☐ No Change	☐ Yellow colour
Sample5		☐ No Change	☐ Yellow colour
22. Detergent /soap Sample1	appearance of **Violet** colour	☐ No Change	☐ Violet colour
Sample2		☐ No Change	☐ Violet colour
Sample3		☐ No Change	☐ Violet colour
Sample4		☐ No Change	☐ Violet colour
Sample5		☐ No Change	☐ Violet colour
23. Formalin Sample1	**Violet** or **Blue ring** appears at the intersection of the two layers.	☐ No Change	☐ Blue colour
Sample2		☐ No Change	☐ Blue colour
Sample3		☐ No Change	☐ Blue colour
Sample4		☐ No Change	☐ Blue colour
Sample5		☐ No Change	☐ Blue colour

24. Skimmed milk **Sample1**	Appearance of **orange** colour. or Appearance of **yellow** colour.	☐ Yellow colour	☐ Orange colour
Sample2		☐ Yellow colour	☐ Orange colour
Sample3		☐ Yellow colour	☐ Orange colour
Sample4		☐ Yellow colour	☐ Orange colour
Sample5		☐ Yellow colour	☐ Orange colour
25. Starch **Sample1**	Appearance of Blue colour.	☐ No Change	☐ Blue colour
Sample2		☐ No Change	☐ Blue colour
Sample3		☐ No Change	☐ Blue colour
Sample4		☐ No Change	☐ Blue colour
Sample5		☐ No Change	☐ Blue colour
26. Salt **Sample1**	appearance of **yellow** colour, or Appearance of **Chocolate or Reddish brown** colour.	☐ Chocolate colour	☐ Yellow colour
Sample2		☐ Chocolate colour	☐ Yellow colour
Sample3		☐ Chocolate colour	☐ Yellow colour
Sample4		☐ Chocolate colour	☐ Yellow colour
Sample5		☐ Chocolate colour	☐ Yellow colour
27. Neutralizer **Sample1**	Appearance of **Pinkish red** colour.	☐ No Change	☐ Pinkish red colour
Sample2		☐ No Change	☐ Pinkish red colour
Sample3		☐ No Change	☐ Pinkish red colour
Sample4		☐ No Change	☐ Pinkish red colour
Sample5		☐ No Change	☐ Pinkish red colour

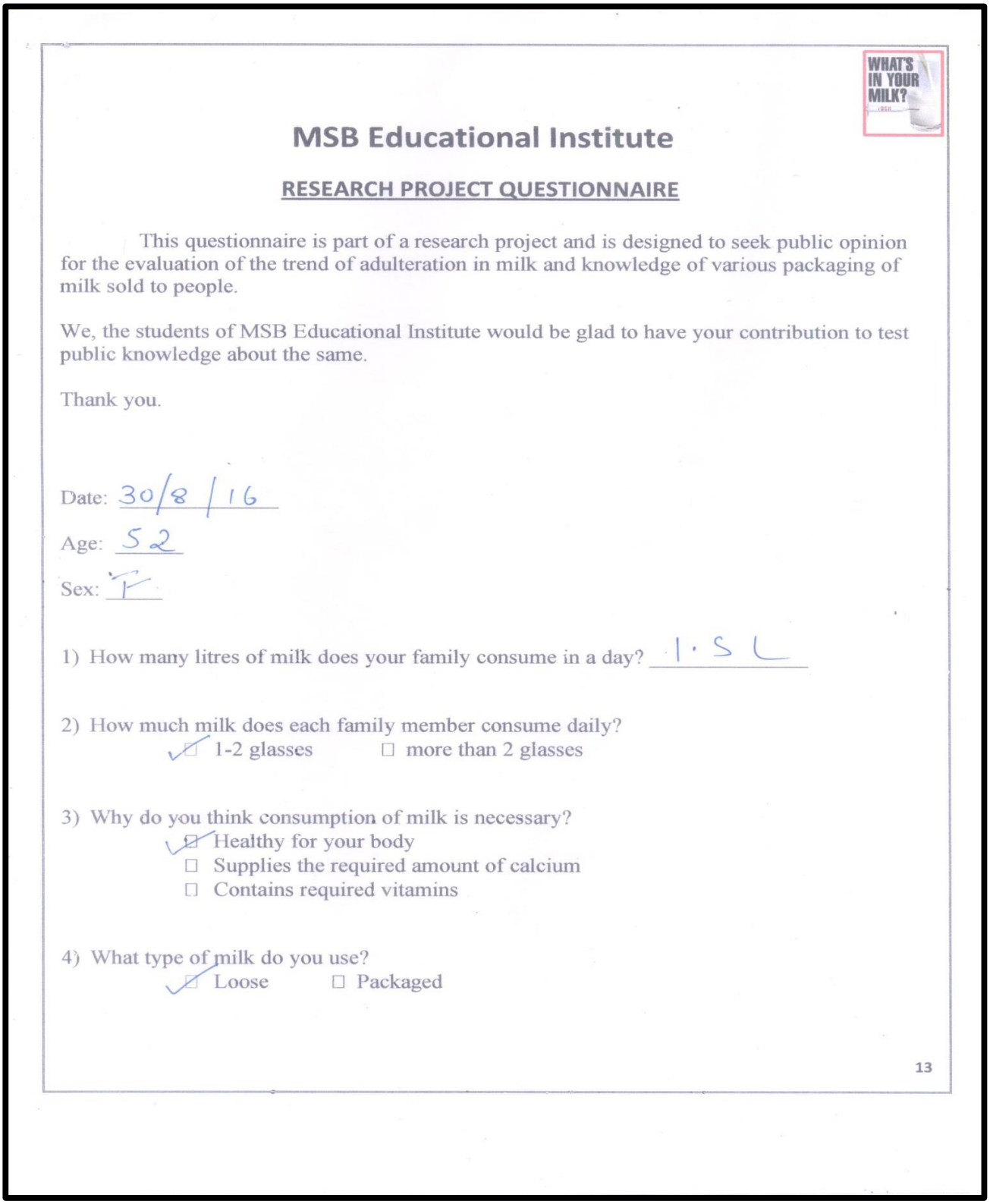
Date: _____
Tested by Name: _____

TABLE FOR RECORDING TEST RESULTS
TETRA PACK MILK SAMPLE (5 SAMPLES) DAY 1

ADULTERANT	Colour change to be observed	OBSERVATION and INTERPRETATION after testing	
		Natural	Adulterated
28. Hydrogen peroxide Sample1	Appearance of **dusty yellow** colour.	☐ No Change	☐ Dusty yellow
Sample2		☐ No Change	☐ Dusty yellow
Sample3		☐ No Change	☐ Dusty yellow
Sample4		☐ No Change	☐ Dusty yellow
Sample5		☐ No Change	☐ Dusty yellow
29. Boric acid Sample1	Appearance of Deep orange colour on the turmeric paper.	☐ No Change	☐ Deep orange colour
Sample2		☐ No Change	☐ Deep orange colour
Sample3		☐ No Change	☐ Deep orange colour
Sample4		☐ No Change	☐ Deep orange colour
Sample5		☐ No Change	☐ Deep orange colour
30. Urea Sample1	The solution turns **Yellow** in colour	☐ No Change	☐ Yellow colour
Sample2		☐ No Change	☐ Yellow colour
Sample3		☐ No Change	☐ Yellow colour
Sample4		☐ No Change	☐ Yellow colour
Sample5		☐ No Change	☐ Yellow colour
31. Detergent /soap Sample1	appearance of **Violet** colour	☐ No Change	☐ Violet colour
Sample2		☐ No Change	☐ Violet colour
Sample3		☐ No Change	☐ Violet colour
Sample4		☐ No Change	☐ Violet colour
Sample5		☐ No Change	☐ Violet colour
32. Formalin Sample1	**Violet** or **Blue ring** appears at the intersection of the two layers.	☐ No Change	☐ Blue colour
Sample2		☐ No Change	☐ Blue colour
Sample3		☐ No Change	☐ Blue colour
Sample4		☐ No Change	☐ Blue colour
Sample5		☐ No Change	☐ Blue colour

33. Skimmed milk **Sample1**	Appearance of **orange** colour. or Appearance of **yellow** colour.	☐ Yellow colour	☐ Orange colour
Sample2		☐ Yellow colour	☐ Orange colour
Sample3		☐ Yellow colour	☐ Orange colour
Sample4		☐ Yellow colour	☐ Orange colour
Sample5		☐ Yellow colour	☐ Orange colour
34. Starch **Sample1**	Appearance of Blue colour.	☐ No Change	☐ Blue colour
Sample2		☐ No Change	☐ Blue colour
Sample3		☐ No Change	☐ Blue colour
Sample4		☐ No Change	☐ Blue colour
Sample5		☐ No Change	☐ Blue colour
35. Salt **Sample1**	appearance of **yellow** colour, or Appearance of **Chocolate or Reddish brown** colour.	☐ Chocolate colour	☐ Yellow colour
Sample2		☐ Chocolate colour	☐ Yellow colour
Sample3		☐ Chocolate colour	☐ Yellow colour
Sample4		☐ Chocolate colour	☐ Yellow colour
Sample5		☐ Chocolate colour	☐ Yellow colour
36. Neutralizer **Sample1**	Appearance of **Pinkish red** colour.	☐ No Change	☐ Pinkish red colour
Sample2		☐ No Change	☐ Pinkish red colour
Sample3		☐ No Change	☐ Pinkish red colour
Sample4		☐ No Change	☐ Pinkish red colour
Sample5		☐ No Change	☐ Pinkish red colour

g) Scanned copy of filled questionnaire



WHAT'S IN YOUR MILK?

MSB Educational Institute

RESEARCH PROJECT QUESTIONNAIRE

This questionnaire is part of a research project and is designed to seek public opinion for the evaluation of the trend of adulteration in milk and knowledge of various packaging of milk sold to people.

We, the students of MSB Educational Institute would be glad to have your contribution to test public knowledge about the same.

Thank you.

Date: 30/8/16

Age: 52

Sex: F

1) How many litres of milk does your family consume in a day? 1.5 L

2) How much milk does each family member consume daily?
- ☑ 1-2 glasses
- ☐ more than 2 glasses

3) Why do you think consumption of milk is necessary?
- ☑ Healthy for your body
- ☐ Supplies the required amount of calcium
- ☐ Contains required vitamins

4) What type of milk do you use?
- ☑ Loose
- ☐ Packaged

13

If Using Loose Milk

5) Price of loose milk Rs./ltr. 66/-

6) Purchase point

☑ Home delivery ☐ Shop ☐ Dairy booth

7) Reason for using loose milk

- ☐ price
- ☑ taste
- ☑ unadulterated
- ☐ home delivery
- ☐ credit facility
- ☑ freshness
- ☐ any other reason _____

8) Reason for not using packaged milk

- ☐ price
- ☑ not fresh
- ☐ adulterated
- ☐ synthetic
- ☐ low quality
- ☐ not good for children
- ☐ any other reason _____

9) Do you think the water content in your milk is more than specified?

☐ Yes ☑ No ☐ Don't know

If Using Packaged Milk

5) Price of packaged milk Rs./ltr. _____

6) Purchase point

☐ Home delivery ☐ Shop ☐ dairy booth

7) Type of packaging purchased

☐ Plastic pouch ☐ Tetra pack ☐ Bottled

8) Do you observe the expiry date on the package?

☐ Yes ☐ No

9) Reason for using packaged milk

- ☐ price
- ☐ taste
- ☐ unadulterated
- ☐ home delivery
- ☐ quality
- ☐ any other reason _____

For Both

10) Does price affect your decision of the type of milk you buy?
☐ Yes ☑ No ☐ May be

11) Are you satisfied with the quality of milk supplied?
☑ Yes ☐ No ☐ Somewhat

12) Do you think price affects the quality of milk?
☐ Yes ☐ No ☐ May be

13) Do you think packaging affects the quality of milk?
☑ Yes ☐ No ☐ May be

14) Do you drink flavoured milk sold in the market?
☐ Mostly ☑ Sometimes ☐ Never

15) What do you think your milk is adulterated with?
☐ Water ☐ Milk powder ☐ Urea ☐ Detergent
☐ Unaware ☐ any other none

16) Are you aware of the ill effects of consuming adulterated milk?
☑ Yes ☐ No

17) How often has consuming adulterated milk affected your family's health?
☑ Not even once ☐ A few times ☐ Many times

18) According to you, which type of packaging of milk can be easily adulterated?
☐ Loose ☑ Plastic pouch ☐ Bottled ☐ Tetra Pack

19) Would you consider buying a particular type of packaged milk if it is safer than the others?
☑ Yes ☐ No ☐ May be

20) Do you know what to do if you feel that the milk you are consuming is adulterated?
☐ Yes ☑ No ☐ Don't know

15

h) Scanned copy of filled questions for expert

MSB Educational Institute

Interview Questions for Nutritionist

This interview is part of a research project and is designed to seek expert opinion to acquire knowledge to create awareness among people about the nutritional values of milk and about alternatives to regular milk.

We also aim at learning some techniques to identify adulterated milk easily.

We, the students of MSB Educational Institute would be glad to have your contribution about the same.

Thank you.

Date: 16 Sept, 2016

Name: Ms Arwa Sabuwala Designation: Nutrionist at Parsi Dairy Farm -Mumbai

1) Why is it necessary to include milk in our daily diet?

Milk is a whole food. The first food introduced to an infant is the mother's milk as it contains all macro nutrients like proteins, carbs and fats, as well as micro nutrients like vitamins B, D, calcium and follic acid. Milk is a power food. It is important for bones and contains zinc. Its essential for all ages

2) What are the alternatives to regular milk?

The alternatives are lactose-free milk (processed milk) for people who have lactose intolerance. Soya milk from soya beans. Almond milk is not considered a substitute as it contains a lot of fat.

3) What are the common adulterants found in milk?

Common adulterants are: Water, Starch [to increase thickness], Detergents, oil, sugar, salt, formalin [preservative] Urea is not an adulterant but it is the urine of the animal which gets mixed in milk by mistake.

4) How does consuming adulterated milk affect human health?

Adulterated milk looses its nutrients and hence, causes vomiting problems, digestion problems and diarrhoea.

5) According to you, which type of packaging of milk can be easily adulterated?

Loose milk and pouch milk are the easiest to be adulterated whereas tetra pack is the most difficult one to be adulterated.

6) What do you know about synthetic milk?

It is basically artificial milk made from oil, detergent, and sugar. It is not as good as pure milk which we get from cows or buffaloes. Its just a mimic of the pure milk. It can be identified by its look, smell and taste.

7) Are there any techniques to identify adulterated milk?

Its look - cow's milk is yellowish whereas buffalo milk is pure white. Therefore, it is easier to identify buffalo milk. Detergent- shake milk hardly, little foam forming is normal but excess foam marks the presence of detergent. Pouring milk from a steel vessel- if the milk does not leave marks it also shows the presence of excess water.

8) What should people do if they find that their daily supply of milk is adulterated?

- Complain to the company
- Lodge a complaint on "www.fssai.gov.in/feedback.aspx" [FSSAI is a government body that regulates and maintains eatable items]
- Change the milk you use.

9) As part of this research project we are planning to distribute pamphlets to create awareness among people about milk adulteration. What do you think about the same?

It is a very good idea as people are not aware of what's in their milk, so it is important to create awareness as people take it very lightly when it comes to adulterated milk.

10) Would you like to add any information in the pamphlet?

- Read label because milk has a short shelf life which only lasts for 2-3 days. Hence, it should be consumed within 1-2 days.
- How to store milk in the best way.

~~~~~~~~~~~~~~~~~
~~~~~~~~~~~~~~~~~

i) Scanned copy of lactometer readings recorded

TABLE FOR RECORDING TEST RESULTS

Date: 8/9/16

LACTOMETER READING FOR DAY 1

Tested by Name: Munira Tinwala

↓ Decrease in lactometer reading indicates addition of water

↑ Increase in lactometer reading indicates removal of fat or addition of skimmed milk

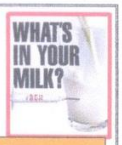
Type of packaged milk	OBSERVATION and INTERPRETATION after testing		
	Less than Normal (< 1.028)	Normal (1.028 to 1.033)	More than Normal (> 1.033)
1. LOOSE MILK			
Sample1			1·038
Sample2	1·021		
Sample3		1·030	
Sample4	1·023		
Sample5		1·032	
2. PLASTIC POUCH MILK			
Sample1		1·032	
Sample2	1·020		
Sample3	1·024		
Sample4		1·033	
Sample5		1·030	
3. FLAVOURED MILK			
Sample1		1·033	
Sample2			1·037
Sample3	1·021		
Sample4			1·038
Sample5	1·022		
4. TETRA PACK MILK			
Sample1		1·030	
Sample2		1·030	
Sample3		1·031	
Sample4		1·030	
Sample5		1·030	

j) **Scanned copy of loose milk readings recorded**

TABLE FOR RECORDING TEST RESULTS

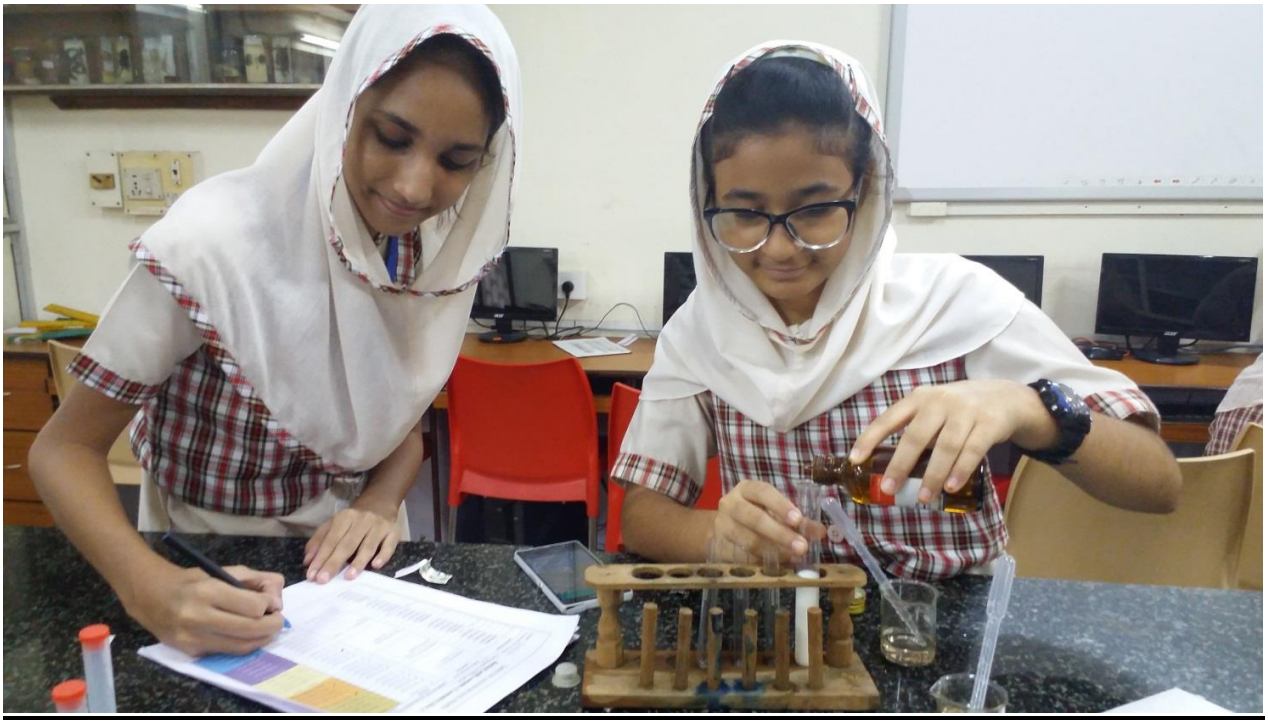
Date: 8/9/16 *LOOSE MILK SAMPLE (5 SAMPLES) DAY 1*
Tested by Name: Na'ama Shaja purwala

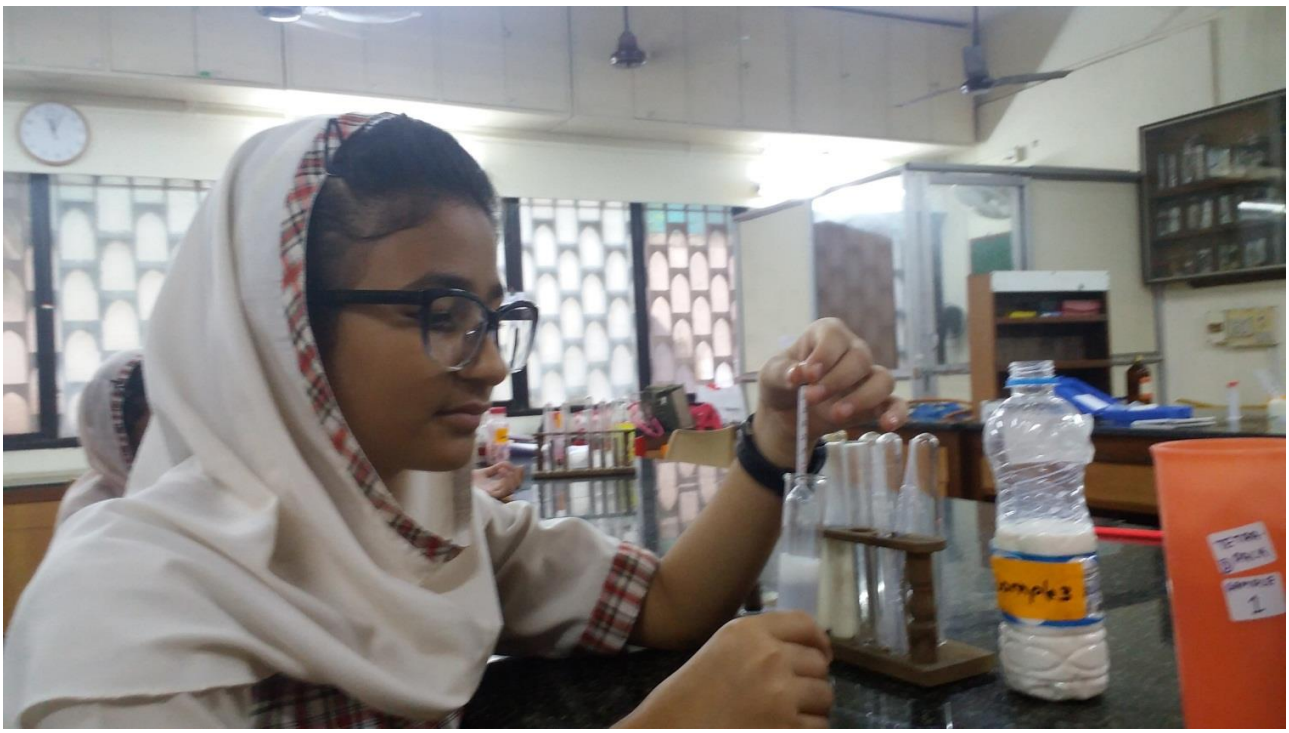
ADULTERANT	Colour change to be observed	OBSERVATION and INTERPRETATION after testing	
		Natural	Adulterated
1. Hydrogen peroxide Sample1	Appearance of dusty yellow colour.	☑ No Change	☐ Dusty yellow
Sample2		☑ No Change	☐ Dusty yellow
Sample3		☑ No Change	☐ Dusty yellow
Sample4		☑ No Change	☐ Dusty yellow
Sample5		☑ No Change	☐ Dusty yellow
2. Boric acid Sample1	Appearance of Deep orange colour on the turmeric paper.	☑ No Change	☐ Deep orange colour
Sample2		☑ No Change	☐ Deep orange colour
Sample3		☑ No Change	☐ Deep orange colour
Sample4		☑ No Change	☐ Deep orange colour
Sample5		☑ No Change	☐ Deep orange colour
3. Urea Sample1	The solution turns Yellow in colour	☐ No Change	☑ Yellow colour
Sample2		☑ No Change	☐ Yellow colour
Sample3		☐ No Change	☑ Yellow colour
Sample4		☐ No Change	☑ Yellow colour
Sample5		☐ No Change	☑ Yellow colour
4. Detergent /soap Sample1	appearance of Violet colour	☐ No Change	☑ Violet colour
Sample2		☐ No Change	☑ Violet colour
Sample3		☑ No Change	☐ Violet colour
Sample4		☑ No Change	☐ Violet colour
Sample5		☑ No Change	☐ Violet colour
5. Formalin Sample1	Violet or Blue ring appears at the intersection of the two layers.	☑ No Change	☐ Blue colour
Sample2		☑ No Change	☐ Blue colour
Sample3		☐ No Change	☑ Blue colour
Sample4		☑ No Change	☐ Blue colour
Sample5		☑ No Change	☐ Blue colour



6. Skimmed milk Sample1	Appearance of orange colour. or Appearance of yellow colour.	☑ Yellow colour	☐ Orange colour
Sample2		☑ Yellow colour	☐ Orange colour
Sample3		☑ Yellow colour	☐ Orange colour
Sample4		☑ Yellow colour	☐ Orange colour
Sample5		☑ Yellow colour	☐ Orange colour
7. Starch Sample1	Appearance of Blue colour.	☑ No Change	☐ Blue colour
Sample2		☑ No Change	☐ Blue colour
Sample3		☑ No Change	☐ Blue colour
Sample4		☑ No Change	☐ Blue colour
Sample5		☑ No Change	☐ Blue colour
8. Salt Sample1	appearance of yellow colour, or Appearance of Chocolate or Reddish brown colour.	☑ Chocolate colour	☐ Yellow colour
Sample2		☑ Chocolate colour	☐ Yellow colour
Sample3		☐ Chocolate colour	☑ Yellow colour
Sample4		☑ Chocolate colour	☐ Yellow colour
Sample5		☐ Chocolate colour	☑ Yellow colour
9. Neutralizer Sample1	Appearance of Pinkish red colour.	☑ No Change	☐ Pinkish red colour
Sample2		☑ No Change	☐ Pinkish red colour
Sample3		☑ No Change	☐ Pinkish red colour
Sample4		☑ No Change	☐ Pinkish red colour
Sample5		☑ No Change	☐ Pinkish red colour

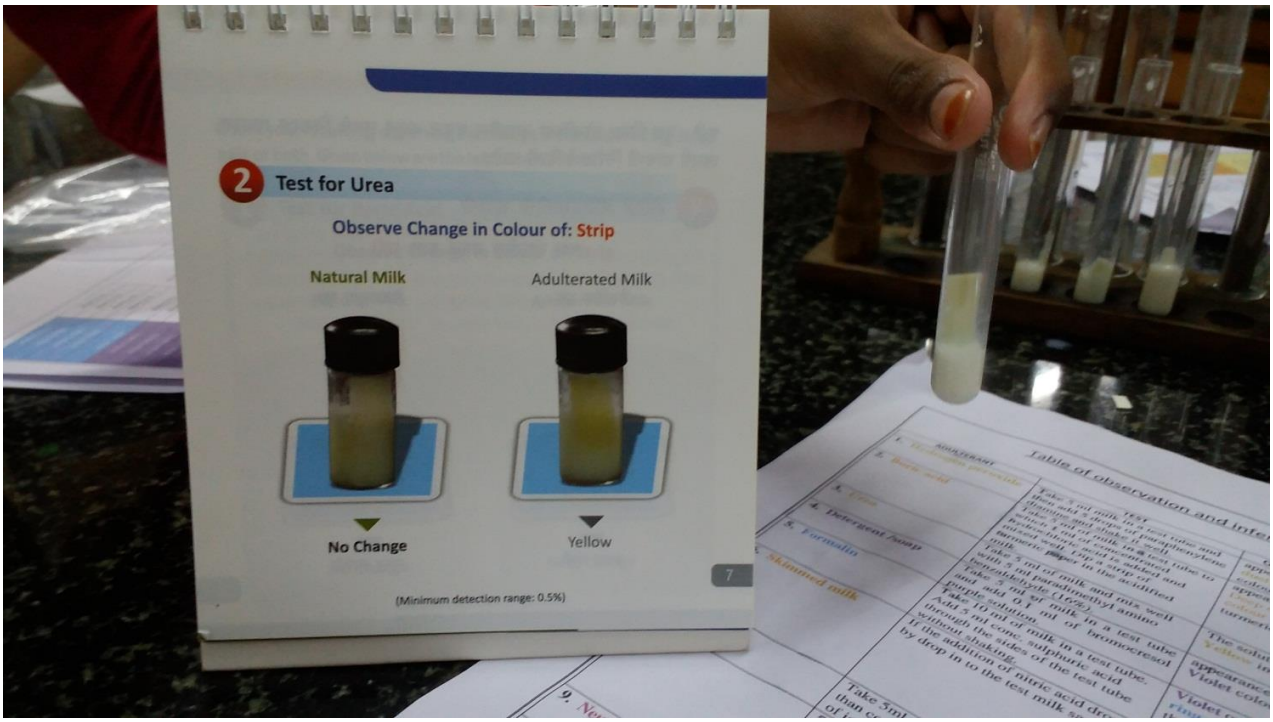
k) Photographs of students performing experiments

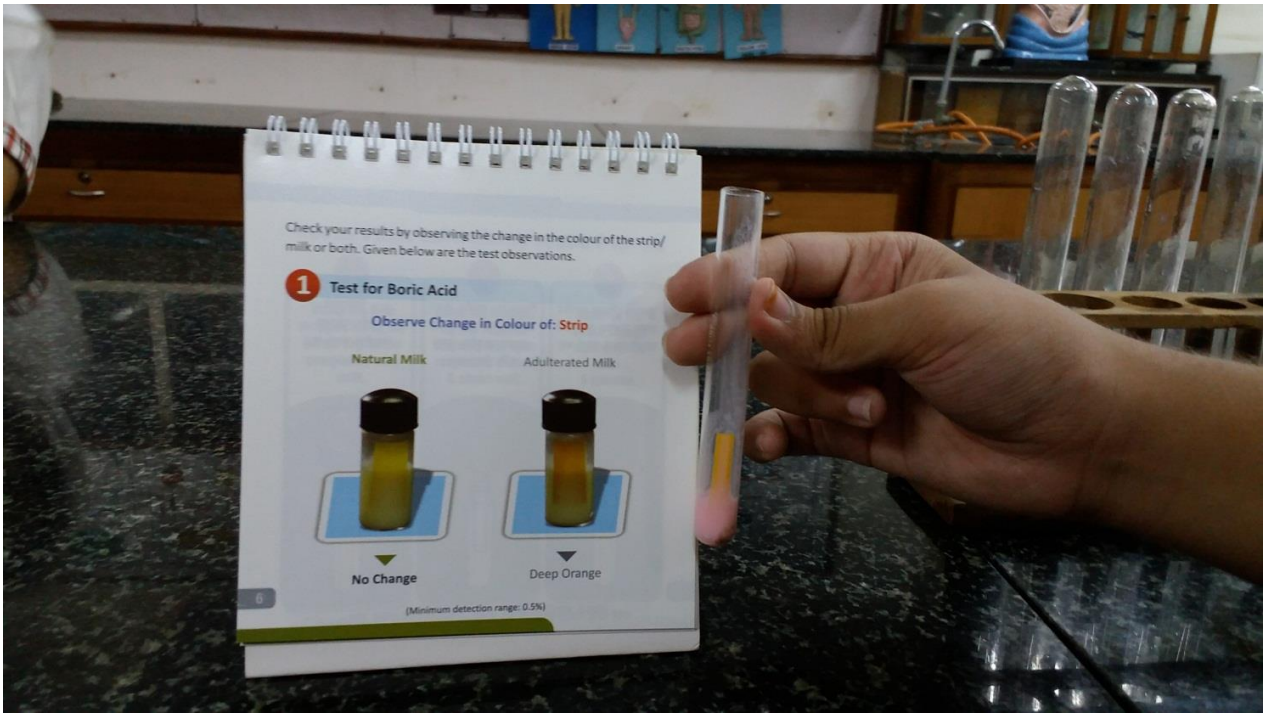




↑ **Testing using Lactometer**

↓ **Tests for Formalin in milk samples**


2 Test for Urea
Observe Change in Colour of: Strip
Natural Milk
Adulterated Milk
No Change
Yellow
(Minimum detection range: 0.5%)
7


Check your results by observing the change in the colour of the strip/ milk or both. Given below are the test observations.
1 Test for Boric Acid
Observe Change in Colour of: Strip
Natural Milk
Adulterated Milk
No Change
Deep Orange
(Minimum detection range: 0.5%)
6

l) Photographs of students taking interview.

Students visited Parsi dairy farm to interview Ms. Arwa Sabuwala a nutritionist

↑ **Students interviewing Ms. Arwa Sabuwala**

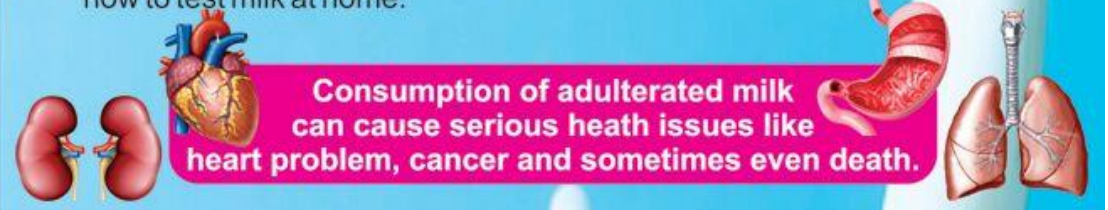
Students getting the questionnaire filled ⟶

m) Copy of Pamphlet used for creating awareness.

ATTENTION! ATTENTION! ATTENTION!

WHAT'S IN YOUR MILK ?

We the students of **MSB Educational Institute**, through our research project on milk adulteration have identified that people are not aware of how to test milk at home.



Consumption of adulterated milk can cause serious heath issues like heart problem, cancer and sometimes even death.

Following are some tests which can be done at home to check adulteration in milk :

Water : The presence of water can be detected by putting a drop of milk on a polished slanting surface. The drop of pure milk flows slowly leaving a white trail behind it, whereas milk adulterated with water will flow immediately without leaving a mark.

Starch : Add a few drops of tincture Iodine or Iodine solution. Formation of blue colour indicates the presence of starch.

Detergent : Shake 5 - 10 ml of milk sample with an equal amount of water. Lather indicates the presence of detergent.

Synthetic Milk : Synthetic milk has a bitter taste, gives a soapy feeling on rubbing between fingers and turns yellowish on heating.

Many milk testing kits are available in the market which can be easily purchased and the tests can be conducted at home.

!! Remember !!

* Check the expiry date on the milk pack.
* Contact the company if you find the milk adulterated.
* Send complaints on the fssai website www.fssai.gov.in / feedback.aspx

n) Photographs of Students distributing Pamphlets

8. ACKNOWLEDGEMENT

We, Alefiyah Bootwala, Naqiyah Pittalwala, Na'ama Shajapurwala, Rashida Mandasaurwala and Munira Tinwala take this opportunity to thank our principal Mrs. F. Dahodwala for giving us this opportunity to conduct this research on milk adulteration.

A hearty thanks to Ms. Arwa Sabuwala for giving us precious inputs, which helped us immensely. We also thank all the consumers who were part of our survey and willingly helped us fill the questionnaire.

We are very grateful to Ms. Nafisa Jetpurwala, who helped us to make our report formal and verbal. Pointing out our mistakes regularly helped us to improve our study a lot.

Special thanks to our mentors Ms. Rashida Poonawala and Ms. Tasneem Badshah who made our journey easy from deciding the topic, carrying out the lab tests to getting the conclusion. We also want to thank our main coordinator Ms. Farida Poonawala without whose assistance it would have been impossible to complete our project.

Once again, a hearty thanks to all those who helped us make this research possible. If we have forgotten to mention anyone who contributed to our study, a great thanks to them too.

9. REFERENCES

- http://www.fssai.gov.in/Portals/0/Pdf/Adulteration(26.02.14).pdf
- http://www.streetdirectory.com/food_editorials/beverages/beverages/tests_to_detect_adulteration_of_milk.html
- http://www.downtoearth.org.in/news/most-indians-drinking-adulterated-milk-finds-fssai-survey--35646
- http://indianexpress.com/article/cities/mumbai/nlrrf-borivli-mumbai-residents-group-out-to-stop-milk-adulteration/
- http://testomilk.com/
- https://explorable.com/writing-methodology
- http://www.socscidiss.bham.ac.uk/methodologies.html