

# **A Comparative Survey on the Quality of Drinking Water and its Associated Hazards in the Vicinity of the Dumping Site and the Areas Away from Them.**



---

**Group  
Members:**

Fatima Azfar, Waiza Zainab, Umer Naveed, Muhammad  
Raza Mehdi, Anas Awais

## **ACKNOWLEDGEMENT**

Foremost we would like to express our sincere gratitude to our advisor Ma'am Uzma Safdar for her support and guidance during our research period. She supported our idea and guided us with her patience, motivation and immense knowledge. I would also like to thank lab attendants at Punjab University science laboratory, Mr. Ibtisam Butt, lecturer at Punjab University and correspondents at Water and Sewer Authority (WASA) for providing assistance in research material. We are grateful to all the shopkeepers and residents around Mehmood Booti dumping site for guiding us with their valuable responses.

## **DEDICATION**

We would like to dedicate our work to all the people around the world who survive drinking polluted water.

## **ABSTRACT**

Disposal sites pose serious threat to the environment and nearby residents. Certain hazardous components from disposal sites are added into the local water supply and deteriorate water quality which is major cause of many gastro-intestinal disease. A research was carried out to check the conditions of water in the Mehmood Booti Landfill site in Lahore city. Water samples were collected from within 1km radius to check the water quality through certain parameter like pH, Hardness, Turbidity, conductivity and Total dissolved solids. A survey was done from the people living nearby to check the effects the water quality in their area had on their health. The laboratory tests and survey showed that water quality in this area is not up to standards and can be regarded as unsuitable for drinking.

## Table of Contents

Abstract .....	4
Introduction .....	6
An Overview of the Study Area .....	9
Methods and Materials .....	11
Results and Analysis .....	16
Verifying the Hypothesis and Conclusion .....	22
References .....	22

## **INTRODUCTION**

From the beginning of life human produced waste like any other creature on this planet but as human grew in number and the endeavor of fulfilling the growing need of products started to fulfill, especially after industrial revolution, their waste also increased which nature was unable to recycle quickly the non-biodegradable and hazardous chemical waste coming out of industries and waste like plastic from households started collecting on land. From that time to this date human started collecting the waste onto a piece of land away from the cities under the open sky. This easy solution of just building a landfill site was never enough and as cities expanded people had to live closer and closer to these landfill sites and it became part of their live as the all sorts of organic as well as unhygienic hospital waste and local industry in these dumps contribute in the formation of greenhouse gases and as water leaks through these dumps all sorts of chemicals become part of underground aquifers and enters into human body through drinking water.

This instigates me to investigate the damage done by this dump to people who are unknowingly victimized as they are forced to live near these sites and face water borne diseases including diarrhoea, paratyphoid, typhoid, cholera, hepatitis A, enteric fever, dermatitis, and many more are permanent health risks to the nearby residents people (Butt & Iqbal, 2007). It's a matter of grave concern as it endangers people's lives.

Population wise, Pakistan, at present is one of the largest country in the world with the population of 193.2 million [1]. Blessed with surface and ground water resources ensuring water supply coverage of about 91 percent of population and sanitation coverage of about 59 percent of population [2] . Unfortunately, only about 66 percent of total population in Pakistan has access to safe drinking water [3]. The quality of groundwater is subject to deterioration due to the reasons cited above. With reference to Lahore ground water is suspected to be polluted in certain areas like Mehmood Booti. In this case it is hypothesized that

---

*“Mehmood Booti dumping site is endangering the water quality in the areas surrounding it which pose health risks to people living nearby”*

---

- [1] World Bank, United States Census Bureau
- [2] WHO and UNICEF
- [3] PMDG report.



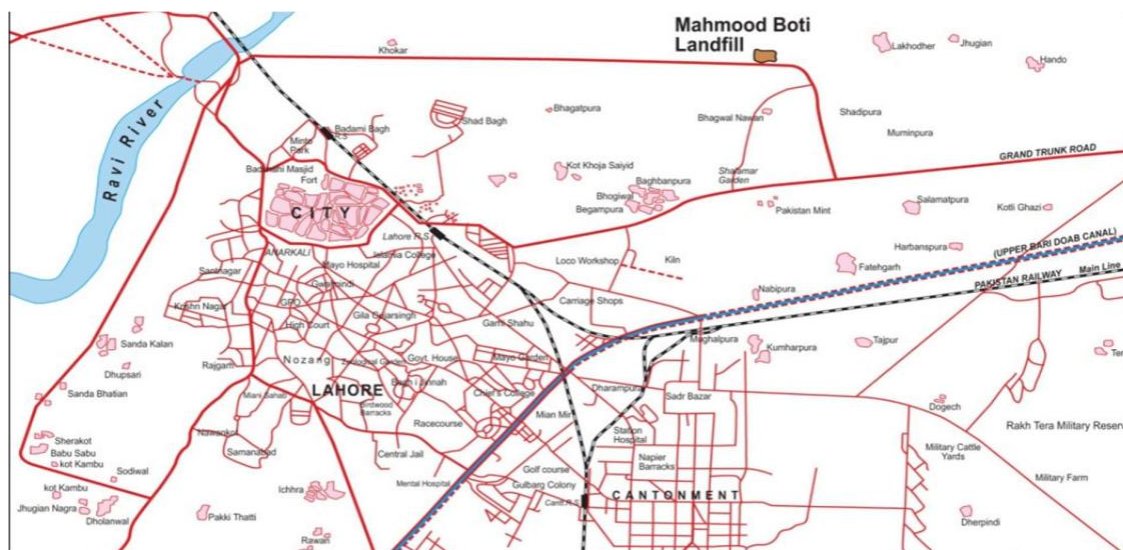
[4]

In recent years many studies have been carried out on the assessment of ground water quality near landfill sites using different approaches and methodologies to find out the level of ground water pollution, bacterial contamination and concentration of heavy metals etc. A number of scholars (Akinbile & Yusoff 2011, Kumar et al. 2011, Karanchanawong et al. 2010, Longe & Balogon 2010) have examined the possible water contamination around municipal landfills. In this study an attempt is made to study these contamination comparatively and learn from the people about its effect on them.



## **AN OVERVIEW OF THE STUDY AREA**

The site Mehmood Booti is oldest dumping site in Lahore still still non-engineered where open dumping is carried out. The site is situated alongside Ring road in the provincial capital Lahore. This is the north-eastern part of the city located between  $31^{\circ} 43'$  north latitude and  $74^{\circ} 39'$  east longitudes. [5] It is the alluvial plain of river Ravi. The population of Lahore is little over 9 million with the growth rate of 2.84% by this time all squeezed into city's boundaries of 1772km square [6]. Mehmood Booti Landfill site became operational since 1995 and it covers 630 kanals of area. It receives 1200 to 1500 tons of municipal solid waste per day, 30 to 40 % of the city's total daily solid waste. [6]



[8]

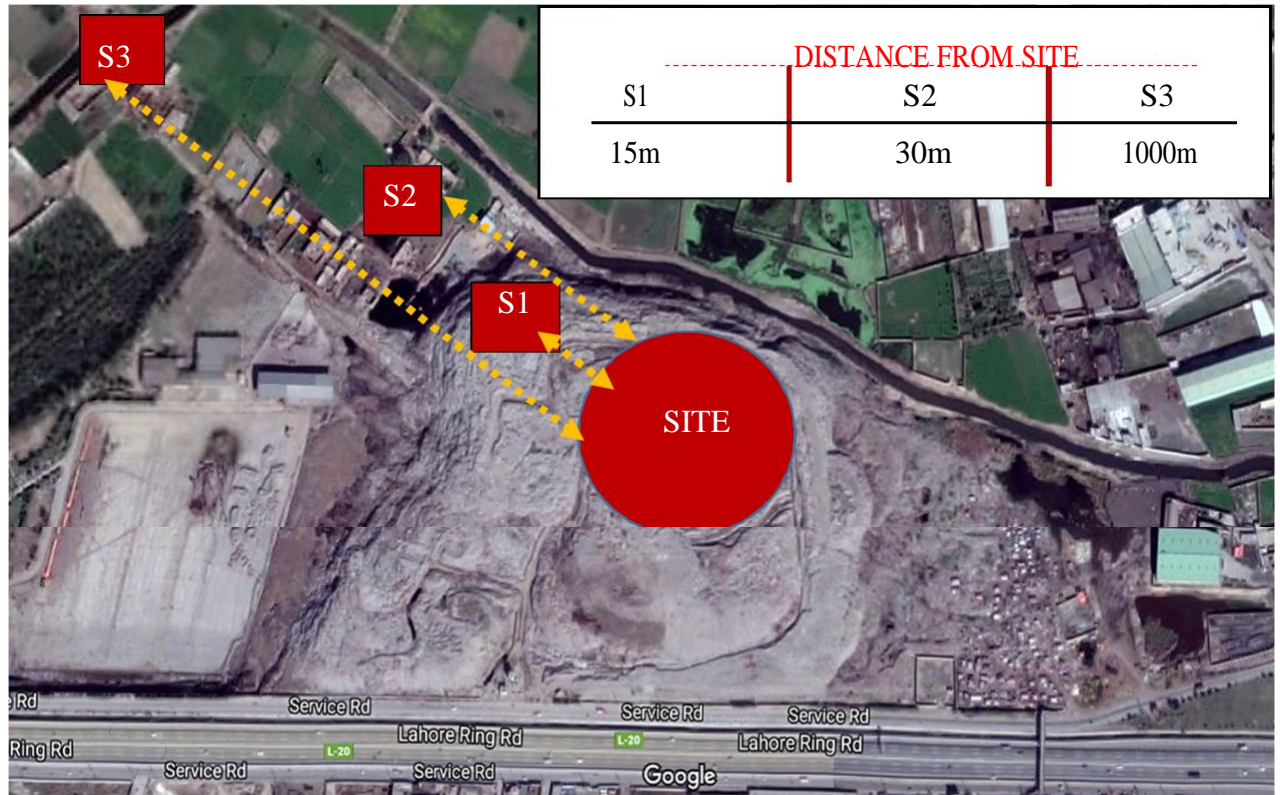
[5] Google maps

[6] World population review

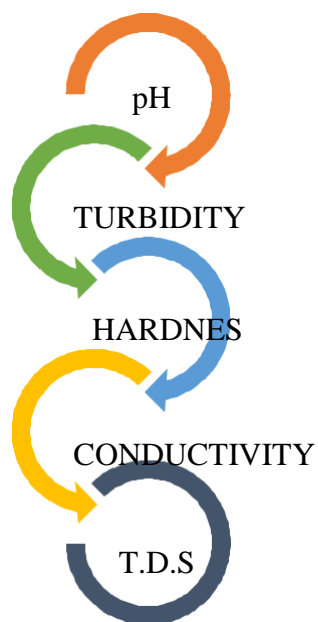
[7], [8] Asian journal of social sciences and humanities.

## **METHODS AND MATERIALS**

To reduce the involvement of any other factor in deterioration of water quality the sample were taken within 1km radius from site. Samples were taken from the nearby houses and shops in 1litre bottles, details of sample sites can be seen in the figure below.



Source of all the samples were either manual pumps or tube wells. Samples were brought home and within 24 hours they were taken to Punjab University Science Lab where tests were performed under proper assistance of teacher and a lab expert. Parameter checked in the tests are shown on the next page.



A questionnaire was also created to ask people about their experience of the water quality in their area. The main target was to know about how often people get ill in these areas. Earlier it was thought to be done by taking data from nearby hospital but due non availability of any record there, we had to rely on the questionnaire. People who took part in this survey were shopkeepers, all aged above 18, near the site who had their homes around. A sample of the questionnaire is attached on the next page.

RESIDENT'S VIEW ON WATER QUALITY NEAR MAHMOOD BOOTI  
DUMPING SITE

Q-1 WHAT IS YOUR SOURCE OF DRINKING WATER?

- a. WASA
- b. PERSONEL BORE.

Q-2 DOES THE WATER YOU DRINK HAVE ANY ODOUR?

- a. YES
- b. NO.

Q-3 ARE THEIR ANY VISIBLE SUSPENDED PARTICLES IN THE WATER YOU DRINK

- a. YES
- b. NO

Q-4 DO YOU BOIL WATER BEFORE DRINKING?

- a. YES
- b. NO

Q-5 DO YOUR FAMILY MEMBERS GET STOMACH RELATED DISEASE?

- a. YES
- b. NO

Q-6 HOW OFTEN DO THEY GET STOMACH RELATED DISEASE?

- a. RARELY
- b. SOMETIMES
- c. FREQUENTLY

Q-7 DO YOU TAKE MEDICAL ADVICE FOR THIS PURPOSE?

- a. YES
- b. NO

Q-8 ARE YOU SATISFIED BY THE WATER QUALITY IN THIS AREA?

- a. YES
- b. NO

Q-9 WOULD YOU CONSIDER MIGRATING FROM THIS AREA DUE TO WATER HERE?

- a. YES
- b. NO

## **RESULTS AND ANALYSIS**

Sample	pH	Total Hardness (mg/l)	Turbidity (N.T.U.)	Conductivity ( $\mu$ S/cm)	Total dissolved solids(mg/l)
WHO	6.5-8.5	500	5.00	----	<1000
S1	7.43	547.66	5.74	1543	790
S2	7.82	194.80	4.74	372	190
S3	7.27	218.60	8.69	453	230

### pH

Here the pH value is a good indicator of whether water is hard or soft. The pH values of all collected water samples ranged 7.27-8.16 and were found to be within limits set by WHO.

### HARDNESS

Total hardness was found to be within the prescribed limits by WHO except at S1 where it was 547.66 mg/l. This is due to the close proximity of the sample site to the landfill, thus making the water unfit for certain domestic uses and drinking.

### TURBIDITY

Turbidity can decrease aesthetic quality of water and impart colour in it. Values for turbidity were found to be exceeding the WHO limits at two sample sites i.e. 5.74 NTU at S1 and 8.69 NTU at S3. The exceeded limits for turbidity at S1 exhibit the presence of pollutants in the ground water which might be due to the leachate percolation

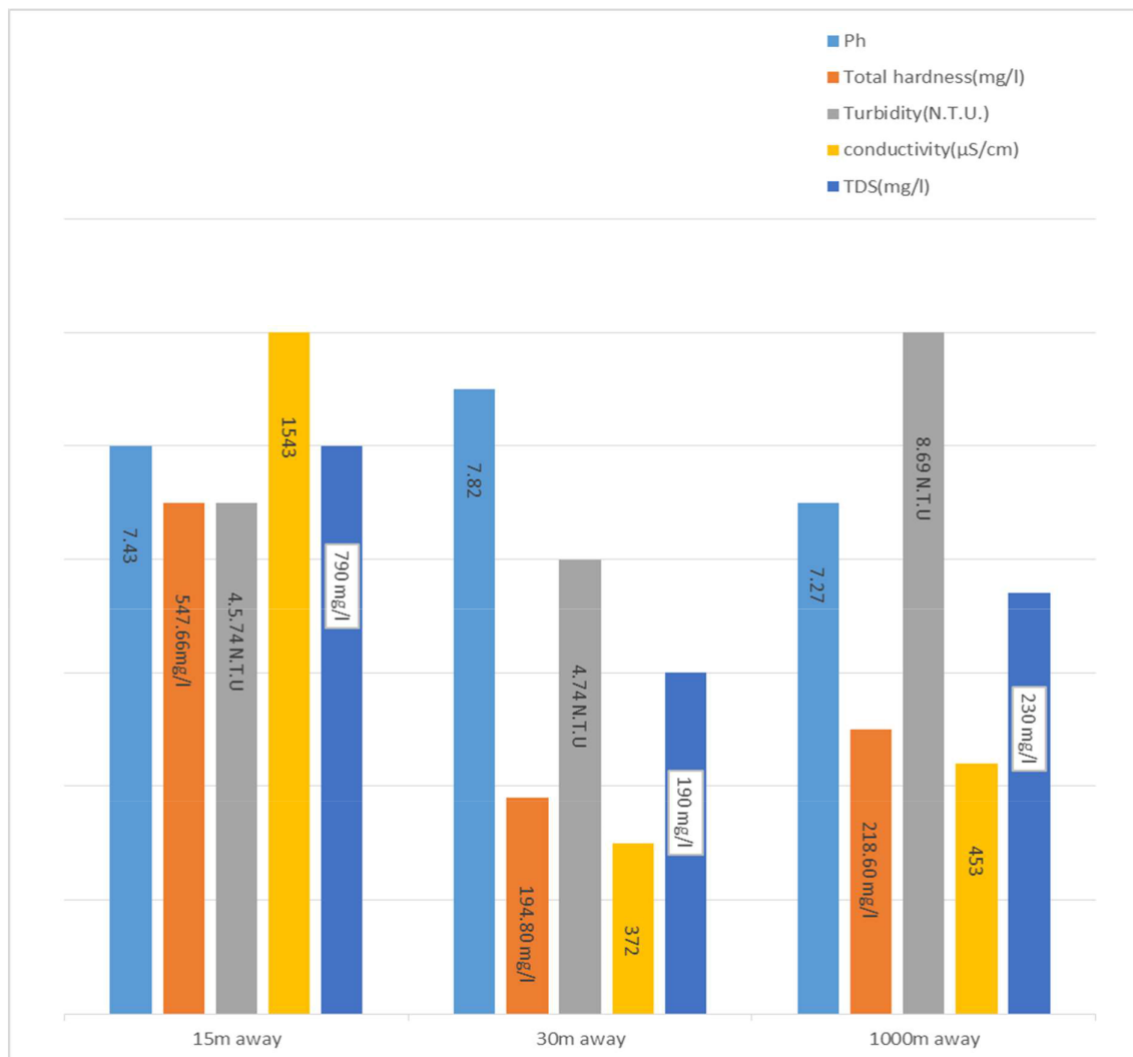
### CODUCTIVITY

Conductivity is a valuable indicator of the amount of the materials dissolved in water. The conductivity in the study area ranged 372 to 1543 ( $\mu$ S/cm). As it can be analysed from table and the graph below that values for conductivity were found to be high at S1. These high values obtained at S1, sample area closest to landfill site, indicate the effect of landfill on water quality in form of leachate seepage and inorganic pollution.

### T.D.S

Test results shows that value of T.D.S ranged from 190 to 790 mg/l thus within permissible limits of WHO. However the concentration was found to be quite higher at S1 with 790 mg/l as compared to W2 and W3. The over whelming values for TDS have also increased the conductivity values particularly at S1.





The graph shows in comparison the variations in different values of individual parameters. See that most values are higher in S1 the closest sample site to the dumping area

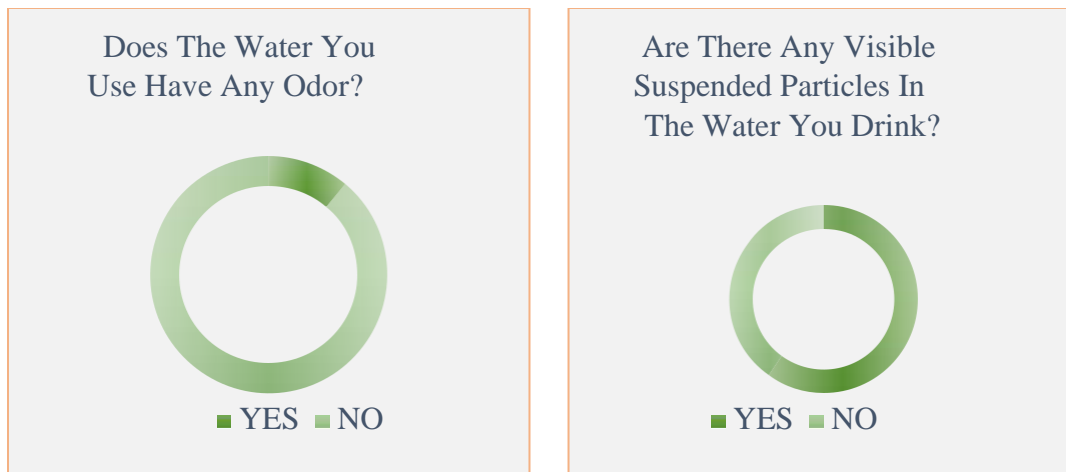
Similarly we evaluated the results of the survey conducted during the research period, after analysing the answers we somehow reached closer to the hypothesis. The results are shown in the graph below.



■ WASA ■ PERSONEL BORING SYSTEM

The results of Q-1 showed us that most of the residents use water provided by WASA except a very few houses who have installed their own boring system. Since many use WASA supplied water, there are greater chances for it to be get polluted due to open and close to surface pipelines.

Question number 2-3 were put to know the visible effects of landfill site pollution on the water, this further supported the tests like T.D.S, Turbidity and Conductivity. It also helped to know the chances of water being source of disease to people.

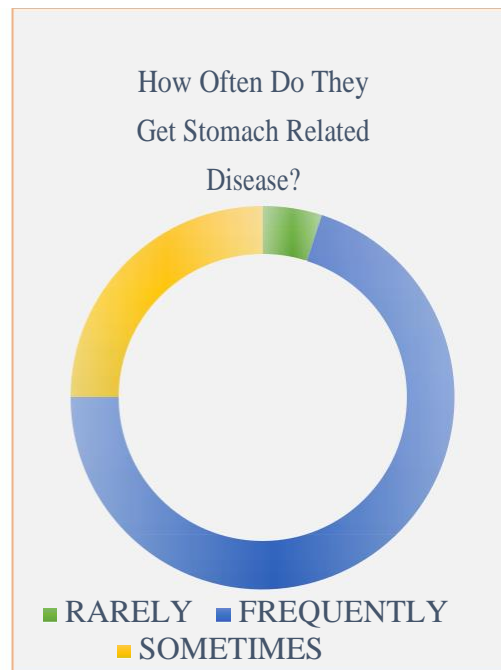
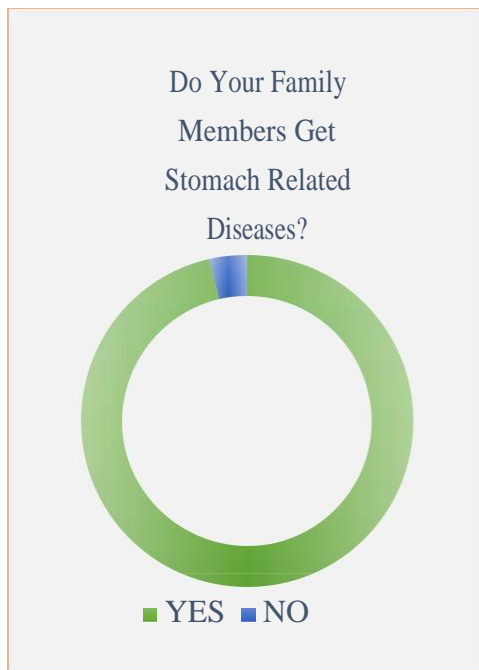


More people complained about the suspended particles in the water while a very few had said to have recognized any odor.

Q-4 justifies the effects of pollutants in drinking water as majority of people did not boiled water before drinking thus greater number of people are affected by any sort of pollution in the water by the dump in the site.



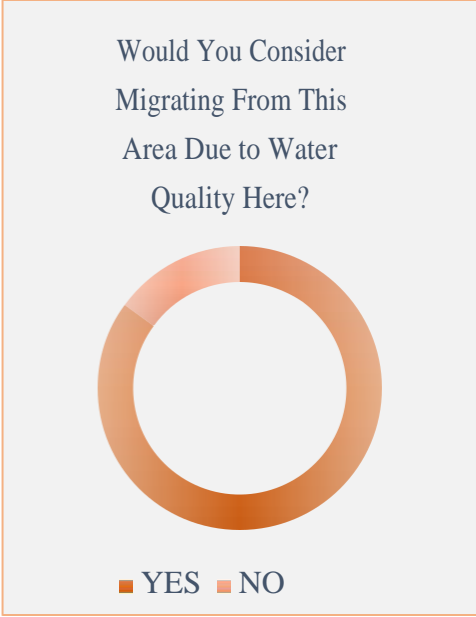
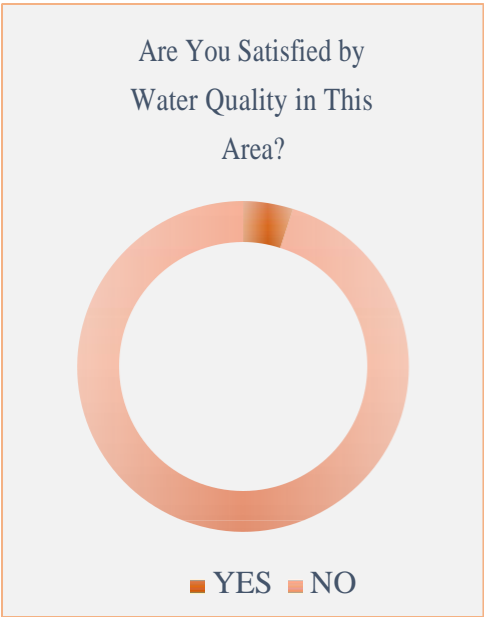
Question 5-7 helped us in knowing that greater number of people are affected from the hazardous material from the landfill site entering into the local water supplies.



More than 85% of people faced stomach related disease and most of them had to suffer from them frequently. Another alarming thing we came to know from the survey was that many people do not take medical advice when they get any sort of stomach related disease and prefer following conventional ways to cope with them, this is shown below



Question 8-9 facilitated to indicate the outcome of high level pollution in the area and greater number of people wanted to migrate from the place indicating that they still are aware that the poorly managed landfill site is reducing their living standard and were not satisfied by the water quality which proves that water is polluted near the site.



## **VERIFYING THE HYPOTHESIS AND CONCLUSION**

It is seen that there is high concentration of T.D.S, conductivity, hardness and turbidity in some of the samples especially in those obtained from S1 and S3. With decreasing values of hardness, conductivity and T.D.S in the results, we saw that water quality in the site closest to dumping site is most damaged. Survey results also supported the hypothesis that water quality is damaged in the areas in vicinity of the dumping site and effecting people's health as most people have told that they get stomach related disease frequently. Survey disclosed that people are not satisfied with the water quality and consider to migrate from the area which demonstrates that people are aware that dumping site is polluting their water supply.

To control the addition of leachate into the water immediate upgradation of the site is required according to the Solid Waste Management Guidelines. Broken pipelines in the area should be fixed straightaway as they can be point for the entry of pollutants and bacteria spread in the constituency due to presence of all sorts of waste at nearby dumping site. It should be realized that every step should be taken, like installing a disinfection plant, to provide them a clean supply of their most basic need, water. Resident's satisfaction in this case should be at highest priority as this will keep them from finding other places to live thus reducing financial and physiological pressure on them. Proper awareness among of operational/field staff and residents should be done to make them realize the effect of drinking polluted water on their live.

## REFERENCES

- World Health Organization, *Drinking Water*, 2022, [Online]. Available: <https://www.who.int/news-room/fact-sheets/detail/drinking-water> [Accessed Nov. 28, 2022]
- Nature News, *Access to basic drinking water services, safe water storage, and household water treatment practice in rural communities of northwest Ethiopia*, 2022, [Online]. Available: <https://www.nature.com/articles/s41598-022-25001-y> [Accessed Nov. 28, 2022]
- Kathmandu University medical journal (KUMJ), *Water pollution and health*, [Online]. Available: <https://pubmed.ncbi.nlm.nih.gov/18603885/> [Accessed Nov. 28, 2022]
- Science Direct Topics, “Drinking Water Quality - an overview | ScienceDirect Topics”, *Drinking Water Quality – an overview*, 2022, [Online]. Available: <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/drinking-water-quality> [Accessed Nov. 28, 2022]
- Medical News Today, *How does water pollution affect human health?*, [Online]. Available: <https://www.medicalnewstoday.com/articles/water-pollution-and-human-health> [Accessed Nov. 28, 2022]
- SCDHEC, *Drinking Water Quality*, 2022, [Online]. Available: <https://scdhec.gov/environment/your-home/drinking-water-concerns/drinking-water-quality> [Accessed Nov. 28, 2022]
- Water Pollution, *Dangers of Water Pollution*, 2022, [Online]. Available: <https://www.water-pollution.org.uk/dangers-of-water-pollution/> [Accessed Nov. 28, 2022]
- Your Article Library, *Water Pollution: Effects and Health Hazards of Water Pollution*, 2014, [Online]. Available: <https://www.yourarticlelibrary.com/essay/water-pollution-effects-and-health-hazards-of-water-pollution/28280> [Accessed Nov. 28, 2022]