Water Contamination due to Textile Waste Dumping and its Impact on Health: A Case Study of Faisalabad.

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CERTIFICATE

This is to certify that this thesis entitled: *"Water Contamination Due to Textile Waste Dumping and its Impact on Health: A Case Study of Faisalabad"* submitted by Mr. Saad Bin Khalid is accepted in its present form by the Department of Development Studies, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in Master of Philosophy in Development Studies.

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Dedication

I dedicate my work to my loving and affectionate parents, supporting brothers and sisters, and friends who encouraged me a lot throughout my research work.

DECLARATION

I hereby declare that this thesis, neither nor a part thereof, has been copied out from any source. It is further declared that I have carried out this research by myself and have completed this thesis on the basis of my personal efforts under the guidance and help of my respected supervisor **Dr. Muhammad Jehangir Khan**, Assistant Professor, Development Studies Departments, Pakistan Institute of Development Economics, Islamabad (PIDE), as fulfillment of the requirements for the award of degree of M.Phil. in Development Studies.

Where the contribution of other are mentioned, every effort is made to represent this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions. No portion of this work presented in this research has been submitted in support of any application for any other degree or qualification in PIDE or any other university.

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Contents

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ABSTRACT

The unplanned throw away and mishandling of solid waste has developed a serious threat to the environment of Pakistan and especially of the industrial cities including Faisalabad. A number of spots and locations are existing and spotted in Faisalabad where solid waste is thrown without taking any safeguard in order to protect the soil, atmosphere, the surrounding

locality, crops and the residents from their evil effects. The open dumping points in different cities have created a fatal threat to the required quality of the environment. To interrogate into the scenario different sites being used for the dumping purpose have been subjected to the Research. Primary data survey is taken to complete this study, and semi structured interviews were done upon the officials of Faisalabad Waste Management Company, textile industries, households, and Doctors relating to the study area. Saturation point is used for sample size. Industries are located in Khurarrianwala. The settled parameters of the precautionary steps for the waste dumping have not been implemented by the relevant bodies for the purpose at these spots. The growing magnitude of the industries and the urban areas has added further deterioration in the gravity of the situation. The object of the study is to examine the dumping points and the surroundings to have an analysis about the impacts on groundwater and the human health of the locality. The interviews of the local residents of the vicinities and the medical practitioners were conducted to evaluate the effects on the quality of life. The hygiene of the locality, the common and specific disorders in the human health of the neighboring areas of the dumping sites are also compared with other people which live in normal nature. It was detected during study that the municipal solid waste systems have no sufficient planning and the management of the waste is very poor. Secondly according to literature review it is noted that many heavy metals are detected in Muhammadwala and Makuwana ground water like Lead, Cadmium, Sodium, Calcium carbonates and bicarbonates, hardness of water. The leachates are injurious to the underground water of the locality. The resources and the funds provided to redress the problems, to which the areas are facing, are very meager as compared to the intensity of the situation. The economic growth is being affected in the presence of this problem.

Chapter 1

INTRODUCTION

One of the most critical problems of developing countries is improper management of vast amount of wastes generated by various anthropogenic activities. More challenging is the unsafe disposal of these wastes into the ambient environment. Water bodies especially freshwater reservoirs are the most affected. This has often rendered these natural resources unsuitable for both primary and/or secondary usage (Fakayode, S. O, 2005).

The environment is a combination of all the external conditions and influences which affects the life development of any living organism including the human being and its behavior and the society. Allah Almighty has created our dwelling EARTH with a marvelous biodiversity. The nature has blessed our earth munificently with a vast variety of resources which are helpful to sustain and flourish the life of every living organism and especially the human being. The Creator of the Universe built a delicate and novel relationship in between three major occupants of our Globe and which are the natural resources of earth, human beings, other living organisms.

Nobody could misuse these protected gifts both in both quality and quantity (Rehana, 2007). According to (Kemp, 1998). Environmental pollution is basically "the contamination of the physical and biological components of the earth and its atmospheric system to such level that normal environmental condition was harmfully affected". In other words, environmental pollution comes into action, if any substance is released due to any process or action which causes any type of harm to human life or other living creatures supported by environment. Industrial effluent contamination of natural water bodies has emerged as a major challenge in developing and densely populated countries like Nigeria. Estuaries and inland water bodies, which are the major sources of drinking water in Nigeria, are often contaminated by the activities of the adjoining populations and industrial establishments (Sangodoyin, A. Y, 1995). River systems are the primary means for disposal of waste, especially the effluents, from industries that are near them. These effluent from industries have a great deal of influence on the pollution of the water body, these effluents can

alter the physical, chemical and biological nature of the receiving water body (Sangodoyin, A. Y, 1991).

Increased industrial activities have led to pollution stress on surface waters both from industrial, agricultural and domestic sources (S. O., &Osibanjo, 1981). Wastes entering these water bodies are both in solid and liquid forms. These are mostly derived from Industrial, agricultural and domestic activities. As a result, water bodies which are major receptacles of treated and untreated or partially treated industrial wastes have become highly polluted. The resultant effects of this on public health and the environment are usually great in magnitude (Osibanjo et al., 2011).

Industries are the major sources of pollution in all environments. Based on the type of industry, various levels of pollutants can be discharged into the environment directly or indirectly through public sewer lines. Wastewater from industries includes employees' sanitary waste, process wastes from manufacturing, waste water and relatively uncontaminated water from heating and cooling operations. High levels of pollutants in river water systems causes an increase in biological oxygen demand (BOD), chemical oxygen demand (COD), total dissolved solids (TDS), total suspended solids (TSS), toxic metals such as Cadmium, Copper, Nickel and Lead and fecal coliform and hence make such water unsuitable for drinking, irrigation and aquatic life. Industrial wastewaters range from high biochemical oxygen demand (BOD) from biodegradable wastes such as those from human sewage, pulp and paper industries, slaughter houses, tanneries and chemical industry. Others include those from plating shops and textiles, which may be toxic and require on-site physiochemical pre-treatment before discharge into municipal sewage system (V et al., 2005; Phiri et al., 2005; Otokunefor et al., 2005).

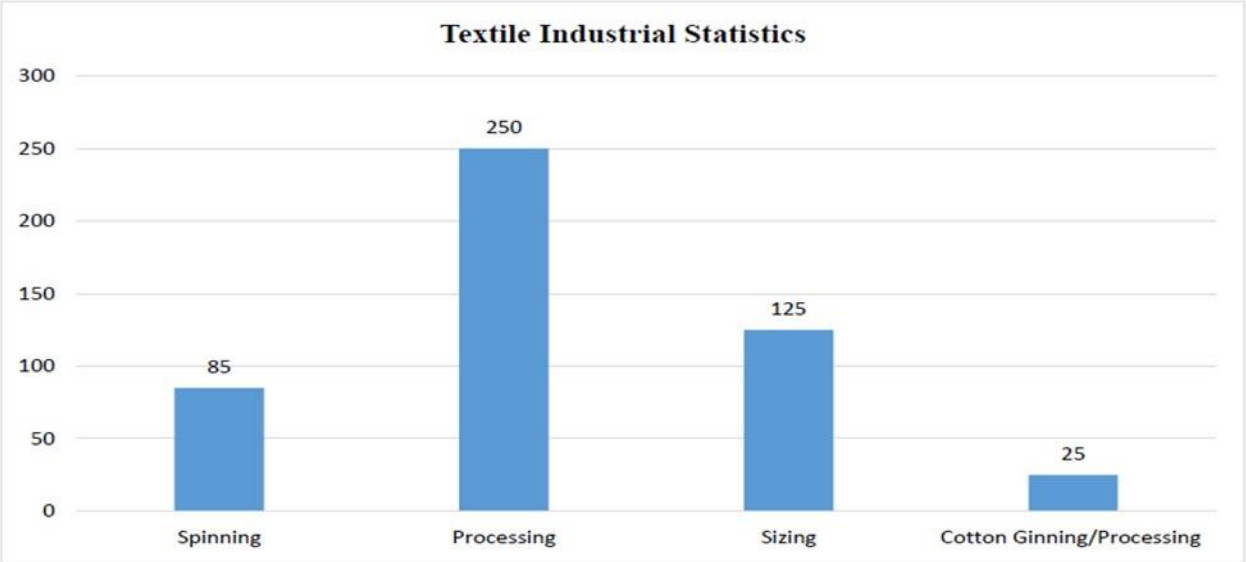
With competing demands on limited water resources, industrial pollution remains one of the major problems facing Nigerian cities. As societies throughout the world become more aware of the issues involved in water pollution, there has been considerable public debate about environmental effects of effluents discharged into aquatic environments (Calamari and D, 1985). The industrial discharge, therefore contribute a larger portion of the flow of the river during the dry season, with the result that the water quality of the river is further deteriorated. Uses, for which the river is employed involving body contact, expose serious hazards to users due to the bacterial situation. Many bodies of water in Nigeria experience seasonal fluctuations, leading to a higher

concentration of pollutants during the dry season when effluents are least diluted (Kanu et al., 2006).

The water has made more than 70% of the earth and it is an integral part of all types of life. The oceans on earth are the main storage spots of water, as they contain more than 97% of total water. The presence of water in the air is found in the form of clouds and vapors. Simultaneously, small in proportion, near to 1.6% of water exists underground. The glaciers and ice-caps do constitute some portion of water on earth. Water may rightly be declared an elixir of life. The ecosystem of earth is maintained largely due to the presence of water on it.

The swift urbanization has increased the use of ground water for drinking purpose, domestic and industrial processing purposes. But the fast expansion of industry and the improper management of waste is damaging the quality of underground water. This situation is raising an alarm to human health. It may also restrict the economic development. It is a distressing situation that due to improper and unmanaged disposal of industrial wastage. The underground water is losing its quality in main cities of Pakistan especially Faisalabad. The continuous, excessive and unnecessary use of ground water has dropped the water level to a harmful and dangerous line. By the passage of time, Science grew and defined the atmosphere, as a combination of classical and complex natural gaseous systems which are vital and important to give support and continue the living creature's life on our planet. The rapid industrialization, expanding urbanization and the new mechanized transport systems are adding the disturbing elements into the environment of Earth. The chains of factories, mills, machines, vehicles and the industrial smoke are the causes of respiratory diseases and the human discomfort. It has badly affected the health of human beings, plants and animals. It has also damaged the soil and the other structures related to Earth. It has already been specifically studied and observed that the developing countries have very improper management of huge wastes generated by many industries. The waste consists of many things which cannot be brought into use in future. It must be disposed of. The waste generated so from the industries has many forms like solid, liquid or in gas. (Omofonmwan &Eseigbe, 2009). The trend towards industrialization and urbanization has rapidly caused the increase in population of cities, which increases the consumption of not only the services but also the goods, and as a result the solid waste is being multiplied frequently.

Faisalabad city is known as the Manchester of Pakistan due to the textile industries installed here over. According to (tribune 2013), textile sector of Pakistan contributing 9.5 percent to the GDP of Pakistan and absorbs 30% of employment. Faisalabad extends approximately $20.5 billion to the total GDP of Pakistan, FCCI (Faisalabad Chamber of Commerce and industry). Faisalabad is main hub of textile industry. More than half of total textile industries of Pakistan are present in Faisalabad. According to (Punjab Board of Investment and Trade 2016) more than 50% shipments of textiles mills of Pakistan are completed by Faisalabad.



Source: FCCI, 2017

According to Faisalabad Chamber of Commerce and Industries there are more than 340 different textile industries units are working in Faisalabad. Textile industry is a symbol of urbanization and it is the good source of increasing GDP of country. These are the specs for which Faisalabad is renowned as Manchester of Pakistan. Textile sector makes varied products like household linens, clothing and bed sheet, curtains, carpets and many other things. Interaction with textile sector is very necessary because wearing clothing, blankets for sleeping and obviously towels for drying are the products of Faisalabad

The textile industry creates and emits waste in bulk which directly or indirectly pollutes the environment. Industry is a best rout towards the development of any country but on the other side it has a bad or worse effect on the natural environment, in case its waste is not properly managed. There are large number of chemical procedures being applid in textile industry of Faisalabad and

each course has its own influence on the environment. Different steps involved in textile industry starts from the raw fiber, and followed by spinning, weaving, bleaching, dying, and washing etc. Thereafter at the end the dumping of waste products is managed. Any industry during its working creates one or more types of wastes causing environmental pollution in the form of smoke, contaminated water, solid waste, residuals, chemicals etc. Solid waste contains solid trash, used motor oil, household and industrial chemicals and their packing containers and cans, building materials and other waste which contains heavy metals. Solid waste does not mean that waste which includes solid form waste like rock or brick. According to (Steven A 2009) open dumping is removal of solid waste openly on land which contains chemicals and heavy metals and other hazardous elements.

In developing countries like Pakistan, open dumping and dumping sites are common because of lack of enough budget for waste treatment and lack of skilled labor and inefficient technology. Open dumping of waste is common process of residuals disposal in Pakistan. Its attitude toward groundwater resources and soil is was very bad. The contamination or pollution of groundwater and soil is because of presence of heavy metal and salts can cause negative effect on animals, human health and soil fertility and productivity (Smith et al., 1996).

It is a fact observed that the expansion in industry has multiplied the consumers but along with it, the solid waste of the textile industry in Faisalabad has also polluted the face of the earth and quality of groundwater, the atmosphere and the life of every type.

The wastes and especially the solid waste is a threat to local area people and to its environment. In big cities of developing or under-developed countries, the waste management is very poor, and it involves the lack of resources, institutional and infrastructure facilities (Visvanath & Glawe, 2006).

No doubt that the industrial revolution has brought a new touch to life but on the other hand it has been producing large amount of solid wastes. Time has reached to address the damaging effects on health of humans and issues of environment because of production and wasting of solid wastes and its improper carrying and dumping. Industrial solid waste has caused not only the land pollution but also degraded the quality of underground water and life.

By the help of literature review and primary data survey research has been planned to be made in comprehensive manner to investigate the negative effects of the improper solid waste management on environment, underground water and especially the human life. The dumping of industrial solid

waste in Faisalabad and the impacts of it upon the human health of the locality around the dumping area and deterioration of underground water as of its result has been focused, from its qualitative standards, in Research under consideration.

The industrial wastes and the improper disposals of those is also a source of water pollution. Leachate from the solid waste dumping sites have very bad effect on the chemical properties of water and geotechnical properties of the soil. Leachate of solid waste easily alter the soil and water properties (Ebrahim Panahpour, 2011).

The probability has been transformed to certainty that the unmanaged dumping sites are a source of contamination of ground water. The same contaminated water is being used by the residents of Faisalabad. In the areas around the dumping sites, the water borne diseases are found commonly in the population, and that is due to the heavy metal mixing as the Lead, Cadmium and Nickel etc. During research different diseases like Typhoid, Amoebiasis, Giardiasis, Ascariasis, and Hookworm were observed more in number in the residents of the locality around the dumping area. Some persons suffering from kidney damages were also observed.

Certain other hazards, briefed below, were also noticed in the areas under examination.

- Skin infection and allergy.
- Infecting wounds and burns.
- Bad odors in the locality.
- Kidney infection, typhoid fever
- Stones produced by metals in uterus and kidneys
- Muscular pain, and heart palpitation problems
- Less greenery in the near dumping site

The above facts are true, but it has given birth to a major problem and that is the severe bad impact on ground water and as a whole including the health of human beings, animals and plants. Now a days, green environment is a hot topic of the world at large. Each country on the earth is making the efforts to clean its environment and to reduce the pollution. Large number of policies are being

made and implemented on their lands with respect to pollution and the industries. Unfortunately, in our country, Pakistan, only the policies are made but not implemented properly in the true senses and due to this negligence and ignorance many side effects have been arisen and born. Green environment or sustainable environment is one of the SDGs (sustainable development goal) which is to be implemented on the whole world and especially Pakistan. Textile industries of Faisalabad are generally and mainly located near the population areas and those industries are severely emitting the smoke in the air, draining chemicals in water and the sub-soil and dumping the residues and waste material in land and it further is contaminating the land water etc. These pollutants not only disturb the environment but also have bad impact on human health and irrigation system for agriculture. Dumping means discard junk, waste or undesirable material normally in an unsafe and uncaring or hasty way. In this scenario the dumping of waste by the textile sector of Faisalabad is unhealthy and is giving a bad impact overall of the environment of the country.

Usually the stake holders of the industry do not obey the policies and rules framed by the government and do not properly dispose of the residues and especially the solid waste in accordance with the prescribed or required procedure. Poor waste management is the result of improper and bad government policies, instability in politics and their will, lack of suitable use of economic resources and human resources, and weakness in local waste management institutions leads toward poor and improper waste management especially in larger cities of developing countries. (Visvanathan & Glawe, 2006).

The dumping process in vogue on our land is worse for any living creature, the human body and the irrigation. Textile sector disposes-off its waste to the environment in form of chemicals, smoke and the solid wastes and their contaminants drip into groundwater or be carried by rainwater to rivers and lakes. Due to this vicious cycle the pollutants disturb aquatic life, human health, and pollute ground water and drinking water and burst diseases.

Open Dumping of waste and effluents of textile sector pollute drinking and ground water, the open dumping of wastes of textile industry creates adequate environmental pollution and when rain takes place, pollutants leaches into the ground and contaminate the ground water (Usman M et.al., 2017). Water pollution or contamination happens when body of water is badly exaggerated due to addition of large concentration of materials, metals or chemicals or anything which contain contaminants to the water. Sewerage water, waste generated by industry are the main sources of water

contamination. Waterborne diseases caused by drinking contaminated water which cause serious damage to human body. Waterborne diseases are typhoid, hookworm, kidney infection, cancer, stone building etc.

Kareem M. et.al., (2016) analyzed that there are many heavy metals which are present in ground water of Muhammadwala and Makuwana. Sources of that contamination or heavy metals are due to leachates from the dumping site which is present in that area. They used different physical and chemical tests to check the quality of ground water. And they found that the ground water of study area of Faisalabad is very hard and contaminated. They found that Nickel, cadmium, Lead, sodium, carbonates and bicarbonates are present in ground water of Faisalabad.

After that (Usman M et.al.,2017) also studied the condition of ground water of Muhammadwala. They found that, leachates of solid wastes present in dumping site have directly impact on ground water which contaminate the ground water. They took six samples of ground water in range of 2-4 km of dumping site. Size of that dumping area is about 75 acres. They also applied many chemical tests to check the hardness of water like Ph of water, TDS etc. and the results of the study found the hardness of water to the level of 187-660 mg per liter. And they also found that many heavy metals were present in that water, which are not suitable for human health. Water became harder due to the excess amount of calcium and magnesium, dissolved in it. Water becomes hard if it will contain excess of minerals and heavy metals.

These surveys only told that there were many metals, salts and carbonates present in water. And they checked it by chemical test. But they didn't watch the condition of the residents of the area. They didn't tell what diseases appeared in the human bodies due to the metals and chemicals traced during the study of the area. They didn't tell the methods how dumping could be reduced.

That lacked area of the study has been covered by me during my research work. In this study the researcher took interviews from house dwellers near the dumping sites to find out about the diseases and problems they were facing due to those dumping sites and contaminated water. Second researcher took interviews from textile sector to assess about the process and procedure of the waste disposal which is resumed after finishing of the product. Third researcher took interviews from doctors to check, what is the impact of heavy metals (lead, cadmium, hard water, Ph, sodium, chloride, carbonates and bicarbonates) on human health.

Fourth researcher interviewed the official employees of Faisalabad waste management company to find out how dumping can be reduced or how hazardous elements from waste can be removed before dumping that waste.

With the help of literature review researcher find in this study, that these metals and hardness of water have seriously bad impact on human health and can be overcome of decrease by decreasing waste dumping.

1.2 Statement of Problem

Faisalabad is a city of textile sector. It is a source of development and revenue generation GDP. In the direction of this; Khurrianwala, Makuana, Muhammadwala and Nishatabad in Faisalabad contain significant amount of Industries but have very low-level waste management practices and has very deepening effect on the lives of common people. Waste dumping of textile industry have worse impact on ground water. Waste dumping contaminates ground water, which people drink and faces many health issues. Many chemicals and heavy metals present in dyes used in textile industries leaches from the waste into the soil and mix with ground water which contaminate ground water badly. This research has tried to find out the lacunas in waste management practices, and the reason behind the low level of management practices and due to which ground water is contaminated, and how to counter them?

1.3Research Questions

Following are research questions.

1. What are the waste management practices in the units of textile sector installed in the area of Nishatabad, Muhammadwala, Makkuana and Khurarrianwala in Faisalabad?

Explanation: -

This question requires to find out that what is the process of waste resumption and how the mills and industries manage that waste. Where that waste is burnt or where and how it is dumped or

where the waste residues are disposed of. Each industrial unit has a waste management wing for the management of the waste.

2. How to analyze the vitality and eventuality of waste dumping procedures and there after its effects on environment particularly ground water contaminations and its impact on human health (water borne diseases)?

Explanation: -

Basically, this question wants to explore that how dumping site contaminates the ground water. Here researcher want to see that how chemicals or contaminates leach from waste towards groundwater and how that contaminated ground water has a worse impact on human health.
Basically, researcher want to see the reason behind the increasing ratio of water borne diseases.

3. How its effect can be spotted and countered?

Explanation: -

This important question wants to trace out if there is any negative impact of waste dumping on ground water and that the dumping may be a reason behind the increase in waterborne diseases and that how to reduce the dumping or its impacts.

1.4 Research Objectives

Objective of my study is to examine:

1. The effect of waste dumping of textile industries in Faisalabad on environment, especially on ground water.
2. Effect of contaminated water on human health (waterborne diseases).
3. Counter measures to solve waste dumping issues.

1.5 Significance of Study

This study will help those, who are very interested in capturing the effect of textile waste dumping on ground water by analyzing its relationship with environment and human health. The empirical analysis of the effect of waste dumping and its impact on ground water is helpful for ministry of environment and environment specialists to carry out another dimension in the research related to ground water and especially its linkage with environment and human health. This work would also be very significant for the study of the steps liable for decreasing the amount of waste generated from industrial sector.

Further it will aware the concerned ministries to carry on some serious steps in the areas of Khurrianwala, Muhammadwala, Makuwana and Nishatabad effected due to waste dumping, because the reduction in waste dumping will ultimately improve the quality of ground water and reduction in the cost being incurred on health issues.

(Chapter 1)

1.5Explanation of the key terms/concept

Waste Management, Waste dumping, Bad Environment, contaminated ground water

1.5.1 Waste Management

According to UNEP (2005)

In order to meet the requirements of clean landfill, a disposal or dumping site should have to follow these three basic conditions which are as such: -

- Disposed waste must be properly crushed and filtered.
- The solid waste must be covered properly, so that no one could get harm from it from the surroundings.
- There must be high level preventive measures against the waste dumping in addition to the awareness of its negative impacts, like bad odor and the effects, contamination of ground water

and its effects on living bodies, land and agriculture etc. Waste management authority will have the primary role to supervise and have a check upon it.

1.5.2 Waste Dumping

Waste dumping is a process in which textile waste is disposed of or it is burnt openly in the dumping site in a way, that it easily contaminates the natural resources and the environment of the surrounding. Open dumping of the waste also contains the solid waste materials that have worse effects on human health and environment in addition to the agriculture and the land condition.

1.5.3 Bad Environment

Waste dumping has a bad and negative impact on the environment. It creates a bad smell and manipulates the aesthetic view of the environment.

1.5.4 Contamination of ground water

Waste dumping contains some toxic chemicals in the trash which can easily be absorbed into the soil and pollute it. This hurts the plants, animals and infects the animal and human health. Once contaminated, the soil becomes so infected that it will not be possible to restore its originality.

Chapter 2

LITERATURE REVIEW

Water pollution due to poor management

Ahmed & Ismail, (2018) worked on water pollution and its sources, effects and the management. A case study of Delhi. This study was based on a sample survey of Delhi city in India. Authors collected the data by using mixture of closed and open-ended questions. The respondents were university students in Delhi. Sample represented a cross-section data of students of different age groups, sex, educational level and income level of some students if they were employed. Respondents were from 129 localities in Delhi. In this study Questions ware related to water pollution. 419 sample size was selected for this analysis. This study had been carried out by the help of descriptive statistics, frequency tables, cross tabulation and chi-square test of independence. According to authors, 94% students (respondents) were aware of the water pollution and its causes and environment threats to Delhi. This study brought into light the results, that dumping of the industry waste was one of the most important reason of water pollution. To the second rank, untreated sewerage water was a serious ingredient of water pollution. The third factor adding to the gravity of the issue was found the discharge of the industrial units. The water pollution was found liable to cause Diarrhea, Typhoid, Cholera, Dengue, Jaundice, Chikungunya, Malaria etc. to the residents of the locality of study in Delhi.

Jaspal and Haider (2014) studied and worked on the management of chemicals, their concerns and challenges to Pakistan. According to authors, quick development, evolution and urbanization of the population, and poor housing schemes have cut down the distance between the population and chemical industries in Pakistan, and for the reason, if any accident might arise in chemical factory, it would definitely cause a harm to the houses which are situated close to the site. Some of major chemical accidents occurred were 1) in Bhopal, India in 1984 and in which around 27 tons of Methyl isocyanate (MIC), a fatal gas, was discharged and spread in the environment and it resulted the death of a million of people. 2) Buncefield tragedy, the UK (2005) and whereon 2 billion euros were loosed. Vulnerable challenger for Pakistan's chemical industry is the same.

1. Dangerous waste disposal: Chemical industry has a discharge of huge amount of waste materials which are not properly dumped or disposed of by the responsible figures. This practice set bad impacts upon the life, like the poisonous chemical waste released by tanneries in Sialkot had been causing the alarming diseases, like cancer etc. Estimated 20% peoples living in the areas of Jhar, Noro Dojal Nullahs, Hattar and head-to-head areas with chemical industries were found suffering from kidney, lungs, stomach, bones and skin diseases, and just only due to the bad water management.

2. Safety and Health Issues: Workers are not informed properly about the safety measures and precautions to be taken while working in the chemical industrial units and they usually do not adopt the requisite steps for the health and safety purpose. Especially in dye industries, workers be given the proper awareness and knowledge to take the thorough and all safety precautions required and provided for their job in order to meet any alarm or the unusual situation for their health and safety.

3. Lack of data: Most of the industrial workers do not have the proper knowledge about the reaction of the chemicals used in industry or their working place. Further they do not know that chemical being used is good or bad for their life or health and that how its side effects can be reduced or countered.

4. The non-inclusion and non-participation of the Academic and Research Institutes

5. Lack of the interest and Contribution from the community and the civil society.

6. Law Acts and their low implementation: There are some 50 existing Law Acts and Rules to deal the chemical industries, factories, the working places and the labour working therein. But those are not effectively implemented according to the true situations, due to the malpractices and the undue fear or favour.

Khalid, et al., (2017) worked on environmental impact of industrial effluents and contribution of managing bodies in context with Karachi. The objective of the author was to check the ecological effects of industrial wastes mixing in water of Karachi and the role of local management bodies of Karachi with regard to the concern. Data was collected from both secondary and primary sources. Primary data was collected by personal observation and the use of unstructured

interviews of different white-collar people of the society of Karachi including the officials and executive authorities like the relevant chief engineers and managing directors of the Bodies. Secondary data was gained and acquired from the research papers, journals, internet and report reviews. Conclusion of the study showed that industrial effluents not only polluted the water due to the waste drainage, but also left huge negative impact on soil and then vegetation. In Karachi industrial waste water and local water both are flowing together from drains to Malir and Lyari River and finally reach to and fall in the sea directly. That water is contaminated with the contents of heavy metals like Cr. Zn, Hg and other heavy metals, and unfortunately that proved fatal for the aquatic marine life. Before reaching the sea, the said contaminated water is being used for the irrigation purpose of crops and plants in Korangi and near area which led to cause a direct negative impact on human health including the reproductive problems, cancer etc. There are existing a number of legal Acts in regard to the pollution, the safety precautions and drainage management, but as referred above, there is a lack of supervision and proper monitoring of the issues in the light of the said laws and Rules.

Jabeen, et al., (2015) worked on challenges of water Pollution and the risk to human health and the flaws in the water laws and policies formulated in Pakistan. The improper expansion of the net of the industrial sector has built up a lot of pressure on the existing water resources. Fast growing industries has further created water pollution problems. According to author, around 2000 million gallons of mess in quantity is being discharged in water tracks daily in Pakistan. In our country a number of 1228, including textile industries, chemical industries, food processing, paper industry, plastic industry, paint, pesticides, leather units etc. etc., out of the bulk of 6634 registered industries were found spreading a plentiful pollution. They are found directly polluting the water body and the reservoirs. According to author only 1% of the wastewater is being treated and recycled by industries before it is removed away. Data-study has further showed that there are 4 (four) types of quality threats to the sources of drinking water of Pakistan i.e. bacteriological 68 percent, arsenic 24 percent, nitrate 13 percent and fluoride 5 percent. The trend examination has discovered that out of 357 samples, only 45 water sources were found safe for drinking purpose. The above noted pollutants are responsible to cause malevolent and harmful diseases to the type of cancer, skin problems, gastro intestinal infections etc. It is important to note that a number of laws and policies to ensure the safety and protection of environment and safe water are

existing in force in our country but, according to the above reference, the authorities and the society are giving a deaf ear to the alarming issue. The governmental departments and organs are not trying to address the crying problem for the reasons, might not be genuine.

2 Ground water contamination due to waste dumping:

Usman M et.al., (2017) worked on a case study of groundwater contamination due to the open dumping of municipal solid waste in Faisalabad, Pakistan. The residence and Locale of authors belong to Faisalabad. And the unit of data collection area was Muhammad Wala in Faisalabad. Author selected six points from which water samples were collected and they are located near at the specific distances from Muhammad Wala. Samples were observed by seven parameters that involved pH, TDS, Turbidity, Hardness, Fecal Coliform and Total Coliform to inspect the affected ground water quality from dumping. According to author waste quantity was increased with the increase in population and Faisalabad is the 3rd most populated city of Pakistan. Almost 75 acre area is under the use of dumping in the area of Muhammad Wala. Approximately 900 tons waste is carried to this specific dumping site daily and is thrown there in the open atmosphere without taking any appropriate precaution in order to save the life and land. The said waste is found containing organic and inorganic dangerous chemicals in addition to the heavy metal elements. These hazardous elements when came in contact with the ground water under the influence of gravity pull or they leach through the ground, they badly contaminated the ground water. Dumping site under study (of Faisalabad) is found unplanned because there are existing thousands of houses nearby that site and every house introduced a new problem due to the contaminated ground water. Author collected six different ground water samples from taps near Muhammad Wala and tested those at the seven parameters, meant for the source of natural water. Results showed that many pollutants were having their addition in the ground water due to leachate flow. Groundwater quality was deadly awful in the samples of near to the dumping site as compared to the samples taken from the spots far away of that site. Similarly, heavy metals were present in the former water samples which is a serious threat to human health.

Srigirisetty S et.al.,(2017) analyzed open dumping of municipal solid waste and its impact on groundwater and soil. Study area of this research is dumping yard near Thandemvalsa Village

located about 12 km far away from Srikakulam town which is the area of India. Researcher basically focused on the impact of leachate from the solid waste dumping in the area of Thandemyalsa village of India. This study was based on qualitative research and researchers used cross tabulation method. Researchers took six different samples of soil and water from village in range of 2km away from dumping site. Many Physical and chemical parameters were inspected in water samples consisting of pH value, electrical conductivity, total dissolved solids, total hardness of water, calcium, magnesium, potassium, iron, chlorides, turbidity and the Nitrates. Similarly, soil samples were also tested at the same parameter as those of water samples. Researchers founded that 60% waste was generated from local residential buildings. Street sweepings and drain cleaning was 10% and commercial establishments was 9%, the market waste was 5% and restaurants was 5%. After applying physical and chemical testes it was analyzed that soil and water both contained high amount of chlorides, nitrates. Ph value was not normal of both water and soil samples, hardness of water was 232-810 mg per liter. So due to the presence of these heavy metals, soil was unable to produce the plants and its fertility was decreasing. Ground water contained excessive nitrates which lead to infant problems in addition to the mother and child. Hardness of the water caused vomiting, typhoid fever, cancer, liver and kidney failure and infections. So, researchers concluded that safe solid waste management of open dumping leads to safe human health.

Ardani et. al., (2015) conducted a study to check the impact of landfill leachate on the quality of ground water in Iran. All the samples were obtained from the wells around the landfill area and different chemical, biological, and physical parameters were applied. All the tests were completed according to the standard methods for the investigation of wastewater and the normal water. The results exposed that the highest level of pH 7.76 mg/l, nitrate34.12 mg/l, phosphate 8.84 mg/l, total hardness 2095 mg/l, electrical conductivity 14850 s/cm, total dissolved solids 5841 mg/l, Ca+2 2.5 mg/l, Mg+2 30.11 mg/l, Na+ 112 mg/l, K+ 28.8 mg/l, , and biological oxygen demand 4.5 mg/l. The results of microbiological tests were reported negative. Finally, they recommended that Albourz landfill be upgraded to a standard that would guarantee adequate protection of both the surface and the groundwater resources in the locality.

Awaz, B.M (2015) conducted a study to examine the leachate pollutions and its effect on the ground water in Iraq. The weighted additive leachate pollution index (LPI) was used to examine

the leachate pollution and researcher took leachate samples from post-treatment basin, pre-treatment basin and pond which are affected by leaches of contamination from solid waste were analyzed for physio and chemical features pH value of water, TSS, EC, DS COD, BOD, Cl, PO4 -3 , NO3, SO4-2 and NO2 and to check the presence of heavy metals like Lead, Copper, Manganese, Nickel and Cadmium. The outcomes exposed the presence of COD, BOD, PO4 -3, SO4-2 and NO3 in samples were much above from the normal limits of World Health Organization standards concerning for drinking water quality. Results of this study showed that impact of leachate of contaminants from waste of landfills and effluent of surface drainage during rainy season was found negative on the groundwater. Results showed that high LPI value 6.651 of water was recorded for leachate before treatment indicating the role of leachate treatment and after treatment that value was reduced which mean leachates have positive impact on groundwater. Difference between the levels of contaminants of water before treatment and after treatment samples displayed that treatment of leachate was very useful for reducing levels of contaminants. By decrease in contaminant risk of leachate, contamination of the ground water will be decreased. Author also recommended that leachate treatment can be in form of chemical dosing, ventilation and leachate collection. And land fill managements hauled gave attention towards waste.

Claret F et.al., (2011) worked on metal speciation in landfill leachates with a focus on the influence of organic matter. This work was done by the examination of heavy metal contents in leachates into groundwater collected from eight different areas of France. Authors worked on seven non-hazardous waste junkyards and one hazardous waste area. Authors took eight samples from France. All that dumping areas was the compound of leachates, which were less than ten years old and in very worst condition. Geochemical representativeness of the leachate sample technique was used to select landfills as sample. And some samples of water were taken by pound which was near to landfills. Some parameters like (electrical conductivity, dissolved oxygen, pH and temperature were checked at site with, respectively thermometers. And presence of different types of chemicals and heavy metals was checked in laboratory by sample of water. After investigation, heavy metals found existed in many samples which are Pb, Zn, Ni and to a lesser percentage of Cu and Co. Results of this study showed that pollutants present in water were divalent metals which are (Zinc, Cadmium, Nickel, Copper and lead), which have a habit to form complexes with organic matter in water and soil which was very worse for surrounding areas and human health.

Asuma O and Aweto K.E 2013 worked at leachate classification and valuation of groundwater and surface water qualities near municipal solid waste dump site in Effurun which is part of Delta State, Nigeria. Locale of researcher was Effurun dump site. This study is based of primary survey of researchers. They collected groundwater sample from two hand dug wells and one sample was taken from borehole that are located near dumpsite. Authors collected leachate samples which were collected from channels dug in the dumpsites. After that, samples of surface water were collected from water bodies which are close to dumpsite. All samples were differently named. The physical and chemical parameters were applied and examined by authors were pH, (TDS) total dissolved solids, Sulphates, chlorides, nitrates, phosphates, ammonium, (BOD) biological oxygen demand and (COD) chemical oxygen demand (COD), magnesium sodium, potassium and calcium. Heavy metals include lead, iron, zinc, chromium, copper and manganese. These parameters were tested by laboratory. Results of this study was, sample of waterbodies and leachates taken near from the dumping site were much contaminated as compared to samples obtained from the places away of that sites. Impact of leachates increased when quantity of rain increased. Second it was also analyzed that water samples taken from wells were much better as compared to ground water and surface water bodies. Metals were present in every source of water, but concentration of metals, Ph, hardness, BOD and COD were different in every sample.

Kareem M et.al.,(2016) analyzed spatial analysis of ground water contamination in close vicinity to solid waste sites in Faisalabad using GIS techniques. In the study of this case Geographic Information System (GIS) tool was used by authors to complete this study. Author checked the quality of groundwater of Faisalabad, as Faisalabad was 2nd largest industrial city of Pakistan and 1st textile industrial city and 3rd most populated city of Pakistan. Its waste ratio was also huge and contamination too. According to author ground water of Faisalabad was very contaminated due to dumping sites. The locales of Faisalabad use that contaminated water that creates many waterborne diseases due to presence of heavy metals (cadmium, lead, and nickel) in it. Study was based on primary data. Total 130 sites were selected in 23 colonies. The simple and random sampling was applied to collect the water samples from around the solid waste site. To investigate water contamination these parameters were used Lead, Nickel, Sodium Absorption Ration, PH value, turbidity, cadmium was examined in lab. When nugget sill was less than 0.25 spatial

dependency was strong, moderate between 0.25-0.75 and values greater than 0.75 was weak dependency. The known results of the study showed that groundwater of Faisalabad, rate of spatial dependency classes of nugget sill showed lead. cadmium, electrical conductivity and PH have strong dependency, nickel and Sodium Adsorption Ratio was moderate dependent and turbidity low. Authors concluded that all the dumping sites were a big threat to ground water. Ground water around the waste dumping sites was worse to be used for human health. The concentration of Physio-chemical parameters SAR, RSC, EC and PH and the heavy metals like Nickel, Cadmium, and lead increased and crossed the WHO standard.

Singh and Jhamnani(2009) worked on groundwater contamination due to bhalaswa landfill Site in New Delhi. Solid wastes were disposed of in solid material form, from commercial markets, municipal and non-municipal, industrial sector and agricultural events. Landfilling or waste dumping area was favorite method of municipal solid waste disposal due to lack of technology, funds, inefficient work and skilled labors. As water penetrates through the landfill or dumping areas, contaminants, pollutants were leached from the solid waste towards groundwater. Leachate is a process when humidity or water enters the garbage in a landfill and dump area, absorbed contaminants and chemicals in the liquid and leachers go from the soil to and mixed with ground water. The results of this study showed that, heavy metals were found present in the landfill areas but there was no natural source of heavy metals in the study area but high amount of heavy metals (Mn, Ni, Cu,Zn and Pb) were observed in ground water, which have direct negative impact on human health. Six samples of ground water were taken by researchers from near dumping area and those samples contained heavy concentration of heavy metals.

Ali, et al., (2014) studied weakening soil quality and decline in vegetation wealth were grave outcomes of open waste dumping which have brought about developing open dumping. The focal point of this inspection was to survey the obligation of open waste dumping in soil contaminating and its bad impact on plant's assorted variety in one of the prestigious green urban areas of Pakistan. Surface soil tests were gathered from both, open waste dumping zones assigned by Capital Development Authority (CDA) and sub-areas of H10-belt of Islamabad city. 12 soil samples were taken by authors from H-10 H-9 and H-8 and from the back of International Islamic university Islamabad. The various variety of vegetation was tested at testing locales. Several tests were done on sample soils such as pH, Total Dissolved Solid and Electrical Conductivity by digital

meter. Different substantial metals were obsessed like Lead, Copper, Nickel, Chromium, Zinc and cadmium at the dumping site. By transferring the soil from dumping area to fertile land, it decreases the productivity of 44 varieties of plants at contaminated land.

3. Textile dyes contain contaminants

Chequer et.al.,(2013) dyes are those chemicals which provide color to clothes and often used in textile industry, cosmetics paper industry and food. This chemical was composed or made by combination of atoms known as chromophores. It was assessed that more than 10,000 unique colors and shades are utilized modernly and more than 7 x 105 tons of manufactured dies were yearly created around the world. Up to 200,000 tons of these colors are lost to effluents every year, because of the wastefulness of the coloring procedure. These dies were high steady in light, temperature, water, cleansers, synthetic substances, cleanser and different parameters, for example, fade and sweat. The textile industry used some amount of water in manufacturing processes. Water was mainly used in the dyeing and finishing operation of dies. The wastewater from textile plants were the most contaminating of all the industrial sectors. Textile industry wastewater after dying process were variating in many parameters, as, biochemical oxygen demand, chemical oxygen demand, pH, color. Colored, recalcitrant organic, surfactant. Toxicant, salts and chlorinated compounds were the key pollutants in textile wastes. Toxic dyes were decreased the light penetration and photosynthetic activity which cause oxygen deficiency in water, pollute drinking water and had a worse impact on irrigation. The toxic effects of the azo dyes may result from the direct action of the agent itself or of the aryl amine derivatives generated during reductive biotransformation of the azo bond. Azo dyes were the most efficient dye used in textile sector. When it was wasted after whole procedure in water and someone drink that water, it enters in the body by digestion, it will have absorbed to aromatic amines by the azoreductases (enzyme that catalyze the reaction). It produced N-hydroxylamines in human body, which cause DNA damage. Most difficult job confronted by the wastewater treatment plants of textile industry was removal of the color of these compounds. Dyes were structed so hard and resist high temperature, so it can be removed very difficultly, for example, half-life of dye, Reactive Blue 19 is about 46 years at pH 7 and 25°C. The impact on environment by other pollutants in textile wastewater, and the occurrence of little amount of dyes in the water which were not too much

visible and toxic extremely affects the visual quality and transparency of water bodies such as rivers and lakes. It also harms the aquatic life.

Kumar A (2016) analyzed the environmental pollution by textile industries in India case study. Textile industry in India were divided into many sectors like cotton, woolen, silk and jute. Most of textile sectors were in Kanpur, Ahmedabad, Surat, Indore, Kolkata, Chennai, Nagpur, Coimbatore and Madurai. India produced cotton annually about 102.1 crore Kg. India has 2324 textile industries which included composite and process sector. in India. Textile industry used different dyes, chemicals and sizing materials. After completing these processes, many waste waters were discharged outside. One of the major sources of pollutants was waste water discharged from textile industries. The processing of textile sectors used much amount of chemicals and water for wet processing. After which industries released crude sewages in the Amanishah Nalla. Which contained toxic chemicals, and that contaminated water absorbed by the soil which polluting soil, contaminate underground water and irrigation. Textile sector effluent contained aniline, dyes, acids, caustic soda, metal ions, bleaching powder etc. That polluted water was discharged into Amanishah Nalla canal which flows through Sanganer. And farmers used that water for irrigation which polluted vegetation and was found bad for irrigation and human health. Many people suffer from health hazards due to this act like eczema, contact dermatitis, asthma etc. authors also noticed that this water not only have bad impact on human health but also pollute environment by spreading smell pollute lake and water. Poor smelling soil was sampled by alkaline (pH 8.8) and trace metal ions. Unused dyes present in effluent contained many different colors which block the light to penetrate in soil and reduce the self-purification ability. Waste water contained extreme amount of lead, Copper, Cadmium, chromium and calcium carbonates which decreased the irrigation of soil.

Shaikh (2009) worked on the environment issues related with textile sector in Pakistan. According to author great amount of and biochemical processes take place in the textile industry and each procedure have different effect on environment. Influence started with the usage of pesticides through cultivation cotton and ended on the usage of large amount of chemicals in textile process for the production final product. Chemicals used in the textile sector cause environmental and health problems during the manufacture procedure second with releases of gasses and third by these chemicals seem due to their attendance in the final good. Water pollution produced by the

release of raw waste and toxic chemicals used during processing was the major cause of health issue and environment pollution. These elements or chemicals can harm consumer if left in the fabric. Wastewater made by the industry was high in COD, BOD, pH, temperature, turbidity, color and poisonous substances. The straight release of this wastewater in rivers polluted the water and affect the vegetation and wildlife. Sewage were usually hot, smelling, alkaline and colored by chemicals used in process. Some of dyes and pigments were deadly or lower the dissolved oxygen content of receiving waters was very dangerous for aquatic life and it also harm water quality which may harm the human health. According to author there were four ways of emission of colorant in environment

1) Through daily process overflowing or outflows.
2) Through discarding of extra material and process remain substances.
3) Through unintentional or accidental release.
4) Removal of solid waste in form of packages.

Some dyes, cationic retarders, dye fixing agents, and heavy metal salts were very tough to destroyed, therefore they have negative impact on the environment. The dangerous impact of substantial metals on creature and oceanic life is reliant on their physical-compound frame. 1) Acetic acid used in dyes on polyester 2) cationic dyes on acrylic fibers, 3) acid dyes on silk, nylon and wool uses a high BOD and can absorb 50- 90% oxygen. Textile industry solid wastes were fabrics, yarns, fibers, packaging waste, dye and chemical containers, waxes, paper, cartons, and sludges etc. These dangerous solid wastes were containing toxic material and may harm workers of that industry. Machines used in industry specially in dry processes violate the law and cause hearing problems. People lived near to that industry suffered from noise pollution problem.

Kant (2012) worked on environmental hazard created by textile dyes. According to author, textile industry dyes have very bad impact on environment. Author worked on some poor villages of India (KotBakhtu, KotBhara, Ramgarh Bhunder, KotFatta, Chathewala, Mallwala, Sharegah, Kaile Bander, ChakRuldu Singh Wala, Jeewan Singh Wala, Pathrala, ManakKhana, and different towns along the banks of the Lisada deplete close Bhatinda). According to author, around 80 percent of the dyestuffs remain on the texture, while the rest go down the deplete. And these dyes not only damage the aesthetic view of the environment but also have a bad impact on health of human beings and animals. Common color stuffs require wide amount of water for coloring.

Relatively equivalent to or twofold that of the fiber's very own weight. Water wasted from textile industry contained Sulphur, nitrates, soaps, acetic acid some heavy metals (arsenic, copper, lead, nickel, mercury and cobalt and some supporting chemicals which were highly toxic. These chemicals and salt did not only pollute the water but also damage the health of human beings. Some villages near to Bhatinda, where canal water was not available, farmer used wastewater of textile industry due to which plaque on teeth, joint pain and grey hair of villagers were common. Due to pollutant in water, it smells very bad. Government spend million of rupees to get rid of it.

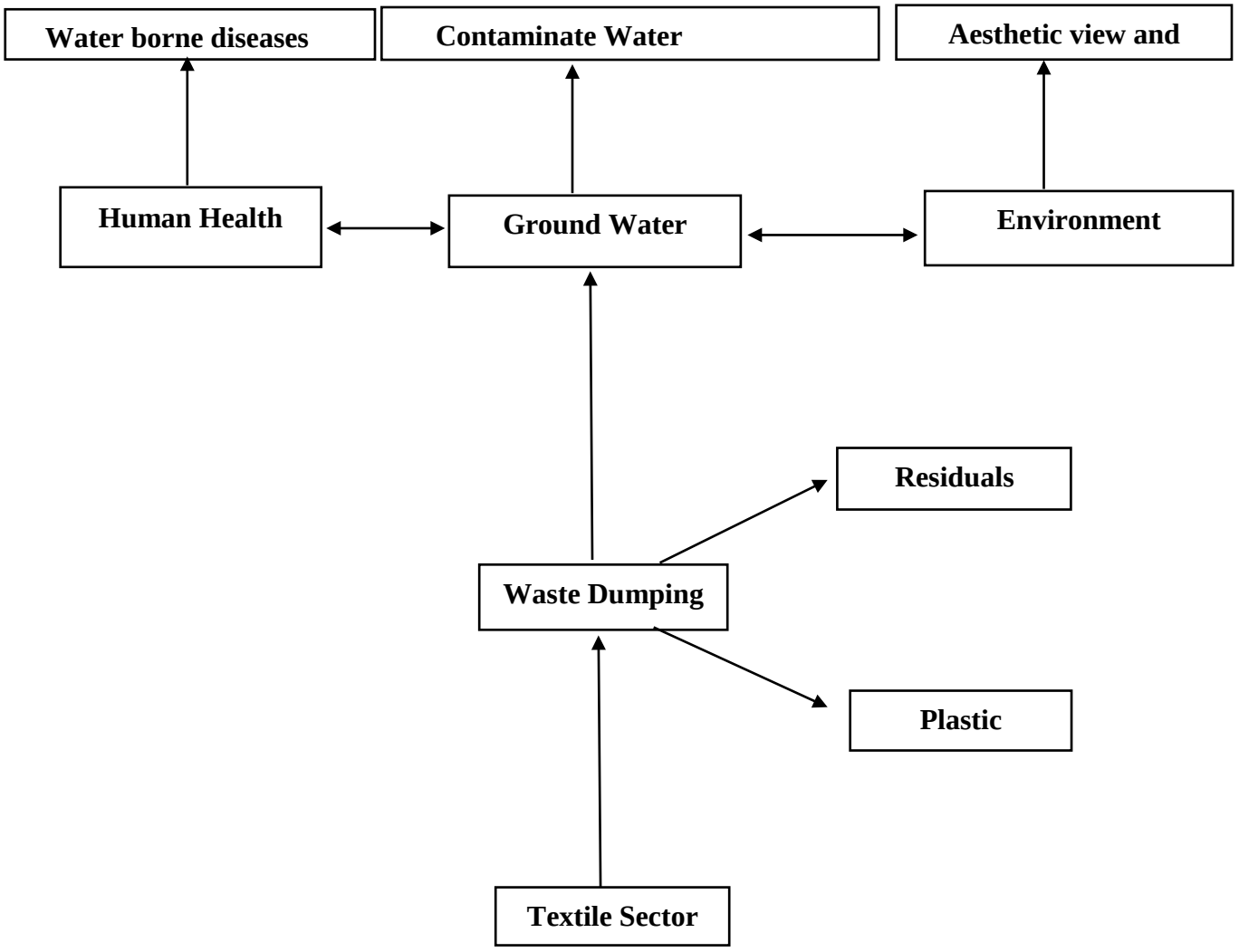
4. Impacts of using contaminated water.

Wu & Sun, (2016) studied the estimation of groundwater quality and also better understand the grade of groundwater contamination and potential risks to residents due to usage of that contaminated water in alluvial plain (China) where agricultural and industrial actions were much in ratio. The objective of the study to analysis water contaminated due to industries waste water and its negative impact on human health. The data uses in the study in secondary form. Different 90 samples were collected from shallow pumping wells located at different locale near study area during 2013 for completing this study. According to author sampled shallow groundwater was seriously contaminated by TH, NO3 -, NO2 -, TDS, SO4 2-, and F-. Presence of these contaminants and pollutants indicated, the industrial waste and agricultural waste have direct impact on groundwater quality. Physio-chemical parameters used in this study was minimum, maximum, median, mean, and standard derivation. According to result of author, pH range of water from 7.72 to 8.31 with average of 8.13, which showed that groundwater of the study area was slightly alkaline. Researcher analyzed by using mean, groundwater was containing Ca2, Na, Mg2, and K, that contaminated water was used for drinking purpose and agricultural purpose. The recommendation of this study was industrial waste water impact on health so government and industries should remove hazardous wastes form waste before through it out. Mixing of contaminated water in pure water of sea contaminated natural sources. Some solid waste which contained heavy metals in the industrial waste water have very negative effects on the human health.

Khan, et al.,(2013) examined in his study the health risks associated with heavy metals in the drinking water of Swat, Northern area of Pakistan. The objective of the study was to check the

health risk due to heavy metals from industrial waste in the drinking water. The data used in the study was primary data. The data were collected from Madyan, Fatehour, khwazakhela and Mingora and other different places like Pump, Tube well etc. The econometrics technique was use that is ANOVA. The results of the study was that heavy metal are very harmful for the health. These metals come from industries. The metal creates problem in the drinking water and then convert very immoral impacts on the health. Conclusion of the study is that heavy metals like (Manganese, Nickel, lead, Cadmium, Copper) in the drinking water are included both from surface and ground water resources and the traces of those metals have created big and serious problems in human health. The value of $P<0.05$ in the samples is very significant which means that they would last impact on the living health. To control the mixing of industrial waste in the water would mean the provision and availability of clean water and that the use of the clean water for drinking purposes and others is a requirement of life.

4.1 Conceptual Framework



A Conceptual Frame work consists of data, concepts, analysis and output. Data contains the numerical figures either obtained qualitatively or quantitatively. Analysis include the overall results of data and output is the result after analyzing data. In the above conceptual framework independent variable is waste dumping sites which carries large number of municipal and nonmunicipal wastes. Non-municipal wastes are those waste which are generated by industries. Faisalabad textile industrial sector wastage are the plastic, chemical containers, used dyes, removed motor oil in containers, solid waste in form of dyes and bleaches which carry heavy amount of heavy metals, residuals of industrial sector, many waste batteries, and contaminated fibers which are disposed of after finishing the dyes of clothes. In rainy days, hazardous elements and dyes present in waste leaches from the soil with the help of rain water and mixed with ground water, which is almost 70 to 120 foot below from the surface of ground. After mixture of chemicals under-ground pure water is converted into contaminated water which contains heavy metals and as a result that soft water is changed into hard water by addition of chemicals (Kareem M et al., 2016) and (Usman M et al., 2017). By usage of that contaminated water, human health and environment receive bad effects. Human health is badly affected by drinking that contaminated water and environment is affected due to bad odor and unpleasant view. And that contaminated water also decreases the production of plants and crops. Waste dumping comes from textile sector which ultimately negatively effects the ground water. Ground water after being contaminated from dumping sites leads to health hazards and problems i.e. Cancer, Skin diseases and stomach problems, and dumping also have worse impact on aesthetic view of the atmosphere and create a bad smell.

Chapter 3

RESEARCH METHODOLOGY

The fundamental target of this section is to give a short presentation of the data and research strategy for this qualitative investigation with respect to the water contamination due to textile waste dumping and its impact on health of the residents of selected areas of city Faisalabad, Pakistan. This investigation took into consideration a more profound comprehension of households, industries, and employees of Faisalabad Waste Management Company (FWMC) and doctors. and give a way to build up the hypothesis from the information to comprehend what are the socioeconomic components which impacted the ladies to work in public transport sector.

The appropriateness of grounded hypothesis and an effective approach for this investigation are examined in-depth in this part. This section gives the detail of the research process. It provides the information concerning the technique that was utilized in embraced this study just as a support for the acceptance of this method. The Chapter likewise portrays the different phases of the study, which incorporates the participant's selection, the process of obtaining data from the respondents and the method of data analysis and ethical concerns are also primary components of this chapter.

Methodology is not same as the method and does not only set out to provide results, literally it is the acumen of the scientific method. A systematic approach has to use to conduct any analytical study and to assure the exactness, noteworthiness, and importance of the study. In order to apply the right methodology and setup the suitable and most appropriate technique from the heart of the study is universally accepted.

Research methodology segment will deliver the material about data collection methods, research design, sampling strategy and unit of data collection that will be used in accomplishment of this study. This section also delivers data about location where study will take place.

3.1 Research Strategy

When researcher seeks to identify and try to understand the relationship among variables a quantitative methodology is good (Creswell, 2003) but on the other hand when the objective(s) of a study is to analyze a phenomenon by relying on the perception of a person's experience in a

given situation then a qualitative approach is appropriate (Stake, 2010). The nature of the research questions and the subject being examined determined that which research methodology or strategy will be used (Denzin & Lincoln, 2005).

Qualitative research examines data directly from field work through interviews and questionnaires. Qualitative research is important because it engages us with things that matter and in way they matter. It has massive potential to face some major challenges. We can explore a wide collection of social worlds (including texture) through qualitative research (Mason, 2002). In this study I used interviews for data collection. And used semi-structured interviews which is a type of interview. So I went to Makuwana, Khurrianwala, Muhammadwala, and Nishatabad for survey and took semi structured interviews from local households, doctors, textile mills and Faisalabad Waste Management Company.

To accomplish this study, I used qualitative research approach. Qualitative research approach is a type of social act that is used to see the way, how people understand and see their practices and experiences to recognize the reality of society. It is done by different ways like interviews, diaries, classroom observations and open-ended questionnaire, analysis, and to interpret the data content analysis of visual and textual and history (Zohrabi 2013).

This present research study sought to construct a theory in answer to the following research questions:

1. What are the waste management practices in textile sector of Nishatabad, Muhammadwala, Makkuana and Khurrianwala in Faisalabad?
2. How to analyze the vitality and eventuality of waste dumping procedures and there after effects on environment particularly ground water contaminations and its impact on human health (water borne diseases)?
3. How its effect can be spotted and countered?

As the objective of present study is to examine the effect of waste dumping of textile industries in Faisalabad on environment, especially on ground water, effect of contaminated water on human health (waterborne diseases) and counter measures to solve waste dumping issues, a qualitative methodology is the most appropriate choice.

A qualitative research approach was chosen as the methodology because this approach reinforces an understanding and interpretation of meaning as well as intentions underlying human interaction. Data was collected using in-depth interviews. The next paragraphs outline a detailed justification for selecting the specific approaches and methods.

A qualitative research approach was chosen as the methodology because this approach emphasizes on an understanding and explanation of meaning as well as acceptations elemental human synergy. Questionnaire survey was conducted for data collection. In the upcoming paragraphs a detailed justification is being provided for choosing the qualitative research methodology.

3.1.1: Justification for Using Qualitative Research Methodology:

Qualitative research methodology is a multifaceted research strategy involving an interpretative and clearheaded methodology to subject matter (Denzin and Lincoln, 2005). The multifaceted quality of qualitative research facilitates the analysts to establish a holistic image of the aspect in question. Following are the basis that determine the qualitative research (Denzin and Lincoln, 2005).

- Qualitative research looks at the relationships within a system.
- Qualitative research demands time consuming analysis; it requires ongoing analysis of the data.
- Qualitative research is holistic; it looks at the larger picture and begins with a search for understanding of the whole.
- Qualitative research focus on understanding a given social setting, not necessarily on making predictions about that setting.
- Qualitative research design incorporates informed consent decisions and is responsive to ethical concerns.

- Qualitative research design requires the researcher to become the research instrument. It also incorporates room for description of the researcher's own biases and ideological preferences.

In the qualitative type of research, the goals are descriptive and exploratory instead of explanatory (Ferreirra, Mouton, Puth, Schurink&Schurink, 1998). The descriptive type of the qualitative methodology of research enables the investigators to give a description of the participant's experiences, which will either assuage or assist the vague supposition on which the research is established and it also allows the readers to know the context linked to the experience, the unmistakable quality of the problem and the effect of the issue (Meyer, 2001).

3.2 Research Design

Research design supports us to fulfil the aims of study. This assessing based on descriptive research approach and type of research design mostly concentrate on the questions of what, rather, than and why. It also delivers complete description of contributor's experience. This study is descriptive research because researcher describes the impact of poor waste dumping of textile sector on ground water and human health.

3.3 Data collection methods/ technique

As this study is based on qualitative data which is mostly nominal, non-numerical and descriptive in nature. In order to achieve my targets of this study, I gathered data from primary source. Primary data is that data which is collected and composed from firsthand experience which means it has not been published and is more reliable and truer. Validity of primary date is better than secondary data. Primary data is not to be altered by humans (Kabir S 2016). Primary data is not based on newspaper, magazine and other printed sources but it is based on experiments, surveys, questionnaire and interviews.

To complete this study primary information is taken by semi-structured interviews. Semi-structured interviews deliver the instructions and provide a reliable data. According to (Bernard 1988), semi structured interview is the best method to get data or information when you have only, one chance to interview someone and you have to perform several interviewers out into the field to collect data. This type of interview delivers a clear image of instructions for interviewer and help to get reliable qualitative data. Semi structured interview is a qualitative research method that

combines a pre-prepared set of open-ended questions which help interviewer to explore particular themes about his/her study. But some questions can be changed or added by researcher according to behavior of respondent. An interview guide is selected for semi structure interview which help researcher to complete interviews. That interview guide must know about the locale and have information about your study.

3.4 Sampling

To accomplish this study, researcher used simple random sampling method for gathering data from textile mills and households of Nishatabad, Khurrianwala, Makuwana and Muhammadwala. According to Frerichs, R.R(2008) simple random sampling is population survey-based sampling. This type of sample is used when researcher choose randomly from population. Simple random sampling is used to avoid biasness and other unwanted effects. There are almost 1500 houses near Makuwana dumping site and almost 2000 houses near Muhammadwala dumping site. So, for collecting data from houses near dumping site I used simple random sampling. I took interviews randomly from households which live near to dumping sites. For random sampling I made a list of houses of Mukuwana and Muhammadwala and then chose randomly from that list for collection of data which is called random number table. There are 37 textile units in Khurrianwala and 19 textile mills in Nishatabad. Similarly, I chose random mills and units for interview.

For local doctors of Makuwana and Muhammadwala, researcher used convenience sampling of the relevant area mentioned above with ethical consideration. Convenience sampling is type of nonprobability sampling that depends on data collection directly from population members of study area which are easily available to researcher. Saunders M *et.al.,* (2012). Convenience sampling is type of non-probability sampling where sample is chosen because of their easy availability and approximately to the researcher work. I use convenience sampling for doctors because I choose doctors which are easily available and recruit for this study.

While for Faisalabad Waste Management Department researcher used purposive sampling. Purposive sampling method is type of non-random sampling in which selection of sample is built on expert person about population (Prof. S.M. Chouhdary 2014). It is very helpful when there are limited number of people present which are ready to help as primary data sources according to research design and objectives. I used this sampling method because I want to know the

information about dumping, it's area and how to reduces its effect. From Faisalabad waste management, I took semi structured interviews from official employees which are limited.

Units of Data Collection

Following are units of data collection of this study: -

1. Official Textile units of Faisalabad:

   Every textile industry in Faisalabad like Nishat Mill, Sitara Spinning Mill, Sitara Chemical and Sitara Textile have waste management department which controls the waste of industry sector. Data from waste management department of textile industries which helped this study.
2. Household:

   Researcher collected primary data from relevant sectors of Faisalabad facing severe shortage of water crisis particularly sector Millat town, Ameen town.
3. Local Doctors of Makuwana, Nishatabad and Khurrianwala and Muhammadwala: They are aware of diseases produced by heavy metals present in waste of textile industries.

4. Faisalabad Waste Management Company:

FWMC helped me to tell where textile sector dumps their waste. Researcher took interviews from official people

Sample size

For sample size researcher used saturation point for all units of data collections.

Saturation point or saturation of data is known as the stopping of collecting date in qualitative research approach. In saturation point one sample size does not fit. (Fusch and Ness (2015). Saturation focuses on the results and research question of new codes or themes which were made

after completing interviews. And this is named as inductive thematic saturation point (Saunders B 2017). In easy way theoretical saturation point or saturation of data is researcher got a point where same data occurrence repeatedly which make researcher empirically confident that his/her data is saturated. Saturation point is that point where no supplementary data is created or required whereby the researcher can categorize them. Researcher sees that same answer, data or cases came over and over again then he or she is assured that it is saturated. (Saunders B 2017).

In this study researcher used the same method. He didn't specify the sample size. He took saturation point where he got the same answers from respondent. Researcher collected data from UDC's in saturation form and many respondents provide researcher information according to my actual research questions. Where researcher get repetition of same answers of cases, then there my collection of data stopped.

Data Transformation:

After the successful collection of data editing, verification and transformation of data was done.

Data was transformed from interviews to transcripts to achieve the objectives of the study.

Field Experience:

During the data collection on field researcher was countered with a lot of difficulties and problems such as transport and to convince the respondents to allow the researcher to enter their houses and accuracy of the answers to be asked during interviews. Due to the awareness of the importance of research among the locals it was very difficult to get the all required information for this study. Most of the times people feel hesitation and not willing to answer the questions because they feel researcher was an employee of government and trying to get the information for the tax purpose. To counter these problems respondents were taken into confidence and trust by the researcher after discussing and explaining the true purpose of the study. Researcher made the commitment with the respondents that all the data would be used only for the purpose of research and that the strict confidentiality would be kept and observed by the researcher.

Thematic Analysis

Thematic analysis is a method for classifying, forming, and offering vision into accurate patterns of meaning themes of dataset. Concentrating on meaning of (across a dataset) means, thematic analysis help researchers to watch and make sense of collected or shared meaning and practices (Braun V and Clarke V 2012). Basically, thematic analysis help researchers to collect their data in theme form. Thematic analysis is a step which patronize the data set in a right way, so that the researcher can inspect his data for completing his study. Furthermore, thematic analysis delivers an explanation and describes the themes, which are much relevant to the earlier study which has been described in review of literature (Braun and Clarke 2006).

Transcription

Transcription is the process in which researcher can alter spoken and behavior language of participant's body into textual form (Mayring, 2014). Transcription is a process or method which helps to convert oral interviews into textual form. Researcher took interviews and recorded the results but by the help of transcription, researcher wrote down that recording in text form. This method is applied only in qualitative research approach.

Familiarization

After transcription, qualitative data passes through next step known as familiarization. When qualitative data is converted from recording into textual form, researcher observes and concentrates to that textual data and pick all similar answers from the text data of same research question.
In other words, familiarization helps researcher to absorb the data by listening or reading data from transcripts and then researcher will become aware of main ideas of data and key terms and then recurrent themes and make another note of it (Srivastava A and Thomson B 2009).

Identification and Characterizing Theme

Braun and Clarke (2006) theme in qualitative research shows a picture of data from which researcher captures a significant and important part of collected data which is suitable and according to research questions. Identification and characterization of themes are the next step

after familiarization. As researcher choose similar ideas from textual data, next procedure is to make a theme of that ideas which is identified by researcher. In this step researcher makes a theme of its collected data and writes it in its study. Theme of data is said to be the main abstract of the overall textual result obtained by interviews.

Ethical consideration

During interviews the privacy of household's data is considered, and all the collected information is kept strictly confidential and is used only for the research purpose.

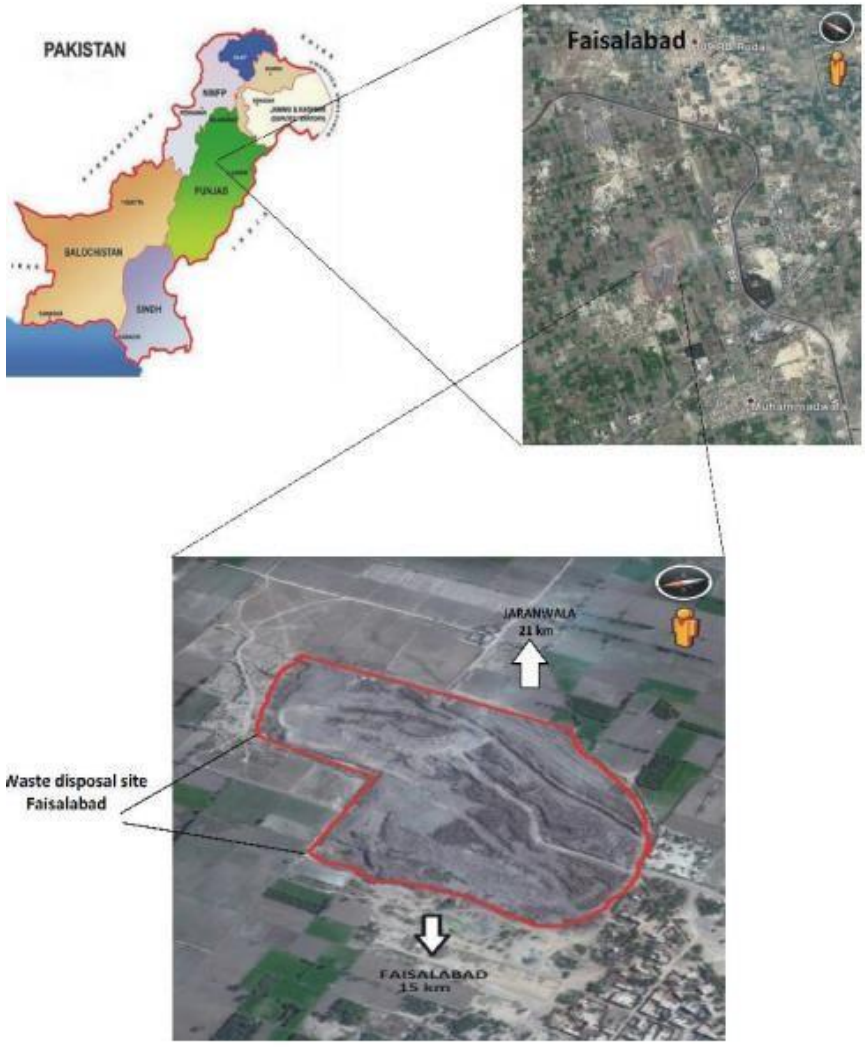
Locale

The area of Faisalabad is situated in between the Chenab and Ravi rivers and which is known as Rachna Doab. The Chenab River flows about 30 kilometers, whereas the Ravi River travels for about 40 kilometers in the District. The lower Chenab canal is the major channel of irrigation to 80% of cultivated lands in the area. Geographical location of Faisalabad is at 31.42 latitude and 73.08 longitude. The area is situated at the elevation of 186 meters above the sea level. It is the second biggest city of Province of Punjab and third most-populous city of Pakistan. As to history, it is the first planned city developed during the British Regime with view to replicate the design 0f

the Union Jack having eight roads emerging from a large Clock Tower. The area covered by the Faisalabad district is some 5856 square kilometers. Faisalabad has grown to become a major industrial and distribution city because of its central location in the region and connecting roads, rails, and air transportation. It is being referred as the Manchester of Pakistan.

Faisalabad Chamber of Commerce and Industry is the monitoring body of the industrial activities in the district and it reports its findings to the Federation of Pakistan Chamber of Commerce and Industry and the provincial government.

Sub Locales



My basic subject locale is Faisalabad, but I also took the sub locales namely Nishatabad, Muhammadwala, Makuwana and Khurrianwala for mu study. I took this area because Nishat Mill is present in the center of Nishatabad. Similarly Sitara Spinning and Sitara chemical industries are existing in the area of Khurrianwala. The waste dumping sites are present in the limits of Makuwana and Muhammadwala. In these areas, there are many problems relating to water like water born disease, Diarrhoea, skin diseases specially in female residents and the bad and repelling environment. Wastage of textile mills have polluted the groundwater, air and land. My specific focus is on the quality of groundwater of that area and secondly on the water relating diseases in those areas of study.

Chapter 4

RESULTS AND DISCUSSIONS

Faisalabad Waste Management Company

Researcher finds that, government has allotted approximately 75 acres area for waste dumping in Muhammadwala which is located near Central Jail, Jaranwala road Faisalabad. Approximately 2000 houses are present in surrounding of that dumping site. According to FWMC, in 1990 this area was allotted for waste dumping because at that time the specified land was totally unfertile and a few numbers of residential houses were existing in the locality. An employee of FWMC said that *I am employee of FWMC for 20 years. Dumping site of Muhammadwala was about 10 ft below from the surface of road by from past 10 years waste cross the surface of roads and amount of waste is increasing day by day.* Level of dumping zone was much down from the surrounding area but by the passage of time the area was filled by waste and when it is raised from the surrounding lands it is flattened with bulldozers. At present the second layer of waste is going on which is quite above the surrounding area. With the increase in the heap of the waste, the underground water is becoming more and more polluted.

As per the information provided roughly 500 FWMC vehicles are on the roads in order to transport the municipal waste only for its disposal to the dumping site and each vehicle carries the waste thrice a day. *Another higher ranked employee of FWMC told me that Faisalabad is generating about 1400-1900 tons waste daily but the carrying capacity is 900 tons only, from which 1000 tons of waste is disposed in dumping site and remains openly. One of the locality is Makuwana, consisting of almost 1500 houses and which is situated near to Muhammadwala and located on Jaranwala road Faisalabad, and which is also becoming a dumping site*. It is told that the carrying capacity to the dumping sites is very less as compare to generation of wastage.

Out of 1900 tons, 900 tons of waste is generated by the alone industrial sector of Faisalabad (Solid Waste Management 2018). According to official employees of FWMC there are two main sources of wastes.

1. Non-Municipal waste

2. Municipal waste

Non-Municipal Waste

Non-municipal waste is that waste which is generated and disposed of by industries, agriculture sector, oil mining, land mining and gas production.

Municipal Waste

The waste which is discharged by residences, city buildings and business places is knowns as municipal waste. It is also called as home waste. But the leading waste generation unit is industrial unit of Faisalabad. According to Faisalabad Chamber of Commerce (FCCI, 2017) there are approximately 340 textile units working in Faisalabad including both small and large industries. The researcher found that these industries have a leading role in generation of waste nearabout 900 tons daily. Mean, half of the quantity of waste generated in Faisalabad, only by the industrial units. Pakistan is a developing country and in developing countries, the process to dispose of the waste is open dumping and it is due to the provision of low financial grants and the nonappearance of expertise.

According an employee of FWMC, *non-municipal waste carries with it many hazardous things which cause a serious damage the environment. 80% of Municipal waste materials are decomposable and contains no dangerous chemicals and heavy metals. But non-municipal waste contains heavy amount of chemicals, oils, used dyes, remaining color pigments and dyes, used motor oils, discharged batteries, chemical containers, heavy metal suspended solids and many metallic salts. As Faisalabad is a city of textile sector so these industries generate huge amount of waste which is not good for environment.*

Second the researcher came to know from waste management company that dumping can be overcome by many methods which must be followed by industries and the government should implement those rules upon the industries.

Reduce Waste

I took interviews from engineers which are employees of Faisalabad Waste Management Company. An engineer told that *waste dumping is very old method to clean the city. Waste is carried out from city and through it out in landfill which is selected for dumping but in Faisalabad dumping site is near to population. Waste generated by textile industries contain many hazardous contaminants which deploy the environment and human health. But it can be decreased if textile sectors reduce their wastes.*

There are many methods to reduce the waste as to filter the waste which would remove the hazardous matters or contaminants from waste. An employee told me that *I am serving FWMC from 15 years, we always recommend industries to filter their waste so contaminants don't disturb eco system but many industries ignore it. Some industries also install plants which reduced waste and they play a good role in our society.*

Industries can reduce their waste by demanding less amount of raw materials. They should buy the required amount only to which they are in need of. Second, industries should have to reduce the packing materials. According to FWMC, industries should redevelop the packaging material and try to manage recyclable packaging content, such as air packs or corn-based packing peanuts. Third, by using different techniques like filtration, electrolysis, RO (reverse osmosis) and centrifugation, the industries can easily remove many hazardous elements from wastes. But sadly, there is lack of funds and grants so industries cannot install these facilities.

FWMC authorities also told that in Nishatabad, there is a textile unit named Nishat mill. The town was named so due to Nishat mill. The said mill has a machine which is helping to generate energy by burning the waste. "A process to treat waste material by burning the organic materials present in waste material is known as incineration" This process of incineration for waste treatment termed as "thermal treatment" which converts waste into ash, gas and heat. Now Nishat Mill can utilize their waste for producing energy by converting it into thermal power. The mill has also reduced the usage of 40% coal for burning. They burn waste with coal. These methods are very useful for decreasing waste.

Discussions

FWMC tells how textile units disposed their waste and how dumping can be countered. So, it covered research question 1 and 3.

Faisalabad is a textile industry city which have many textile units of spinning, printing, manufacturing, dyes and chemical production. So, this city generates a heavy load of waste about 1900tons daily. FWMC (Faisalabad Waste Management Company) is a department which have to manage waste of Faisalabad. They told that, government allotted two main dumping sites in Faisalabad which are Muhammadwala and Makuwana. But their carrying capacity is 1000tons waste daily, but Faisalabad generates 1900tons, in which 60% waste non-municipal waste which came from industries. According to Faisalabad Waste Management Company, there are many houses near dumping sites which are affected by landfills. Waste contains many types of dyes and chemicals, plastic containers, many types of plastic, some old batteries, used machine oil, and many rough clothes, which dump openly in landfill. Dumping can be decreased by decreasing amount of waste or waste generated by industries should be filtered. Filtering of waste means to remove harmful elements and contaminants before disposed it.

UDC 1: Textile industries

Researcher also took data from Textile industrial sector of Faisalabad. As Faisalabad is the Manchester of Pakistan. According to (Faisalabad Chamber of Commerce and Industry) Faisalabad contributes 20% GDP of Punjab province, an approximately annual GDP of $20.5 billion is contributed by Faisalabad. Faisalabad is known as the hub or base of the textile industry in Pakistan, 70% of total textile mills of Pakistan are existing only in Faisalabad. Different textile unites are running in Faisalabad like spinning, processing, dying, sizing, cotton ginning and processing. As Faisalabad is industrial city and 3rd most populated city of Pakistan, and it is also becoming the polluted city of Pakistan. According to survey, Faisalabad become the 2nd top most polluted city of Pakistan. According to the report of survey of (Punjab Medical University), 68% ground water of Faisalabad is contaminated.

Basically, researcher wants to collect data from the employees of textile sector which are involved in waste process, and researcher took semi-structured interviews from them and fined that all

industries have different method of disposing of their waste but at the end all waste of every industries is dumped openly in land of Muhammadwala and Makuwana. *An employee of a textile industry told that many raw materials were brought which were packed in plastic covers and plastic containers which are useless after using it.*

Many industries informed that their plastic bags and extra raw, spoil cotton and other packing materials were burned but remaining dyes and oils containing heavy metals were unable to be burnt. So, they disposed it openly in dumping site. Mostly synthetic dyes are used in Pakistan textile industries which has bad effect on all forms of life. According to a *chemist, textile dyes contain Sulphur, naphthol, nitrates, acetic acid chromium compounds, heavy metals which are copper, lead, cadmium and nickel are used in printing and processing of clothes. 5-9% of every chemical is wasted after finishing process. These chemicals, dyes, metals and bleach are packed in plastic containers in raw form. After using it, some chemicals, useless oil and unusable liquid were again packed in plastic containers and disposed-off in dumping site.*

Secondly all the industries never filter their waste due to which they contaminate the dumping site and surrounding of dumping site. There are almost 40 textile industries in Khurrianwala, in which majority are of chemicals and processing units. They have a major role of wasting large number of chemicals and heavy metals. Every industry has 10-15 private vehicles which are used only for shifting waste from industries to dumping site.

Researcher also took interviews from drivers of those vehicles and who are the employees of textile units. They agreed that daily large amount of waste is disposed openly in dumping sites without any precautions and filtration. A driver said that *I am working in this unit from 7 years. My work is to drive truck from unit to dumping site which is located at Muhammadwala and Makuwana. My work is to dispose waste and dump it. In a week I transfer waste 2 to 3 times which is my job. Waste contains some containers, many forms of plastics, sometime old batteries, oils and some rough or wrong printed clothes.*

Discussion

From textile units of Faisalabad author knowns that, textile units never take care about the environment. 5-6% dyes and chemicals used in printing of clothes were disposed openly without any tension. Employees of textile industries told that they disposed their waste daily when

production is done continuously otherwise after 2 days, we disposed our waste. Textile waste contains different types of dyes, chemicals, bleach, motor oil, clothes and many types of plastic.

According to chemical engineers, dyes used in Pakistan contains carbonates, bicarbonates, calcium, food color, Nickel, Lead, Cadmium, Chromium, oil etc. which can easily contaminate water.

In whole Faisalabad only 2-3 industries can filter their waste and used a method called incineration. This process changes the waste into thermal energy which is used by industries. But other industries are deploying environment.

UDC 4 Local doctors

In Addition to FWMC, textile mills and household, the medical officers (doctors) of the study area were also the respondents and the data so far obtained is to be discussed as follows.

As researcher, study area is Muhammadwala and Makwuana where dumping site is located so after interviewing the households, researcher collected data form local doctors of Muhammadwala and Makuwana. According to the survey of (Kareem M,*et. al.,* 2016) in Muhammadwala, heavy metals present around the solid waste dumping sites are Lead, Nickel, Cadmium, Sodium, Potassium and magnesium. By watching that survey researcher took interviews from doctors about the ratio of patients which are facing water borne diseases. Focus of researcher was only on those doctors who are carrying practice and jobs in study area, and most of those doctors are having their jobs in both Allied hospital and District Head Quarters hospital Faisalabad and the local clinics running in the areas of Muhammadwala and Makuwana. Medical officers who were interviewed for collecting data told that patients of waterborne diseases are increasing day by day. A general physician doctor running private clinic at Jaranwala road near Makuwana, told that *many patients came here for their checkup, and most of the people are facing waterborne diseases. Most people of Makuwana and Muhammadwala have liver problems, blood pressure, hepatitis A, forms of stones in kidneys and uterus, stomach swelling and diarrhea.* Their conclusion was that patients of water borne diseases were not common 10 years ago but now a days they are diagnosed in routine.
Another doctor told that major problems which patients are facing due to contaminated water are, liver diseases, blood pressure, stomach pain, diarrhoea, muscular pain, vomiting, hepatitis A, hair

fall, allergies, skin infections, fever and stomach swelling, human health goes down. *People near to dumping sites are facing more diseases as compare to other peoples who are using filtered and mineral water or live away from these land-fills.*

Sources of Sulphur, Cadmium, magnesium, sodium, acetic acid, detergents and bleach are due to discharging of waste dyes. Sources of lead is old batteries, motor oils, paints, ink and dyes. Best source of Cadmium is color pigments which are heavily uses in Faisalabad industries.

Sodium in water may cause nausea, vomiting, muscular twisting, and high blood pressure. Environmental Protection Agency mentions that in drinking-water, sodium should not exceed from 20 mg/L. High potassium causes heart palpitation shortness and cause problem in breath and Chest pain. The excess of calcium in water make it hard which causes stomach problem. Magnesium make muscular pain and cardiac problem.

A doctor told me that *ground water of Muhammadwala and Makuwana is very hard which is not suitable for health.* According to him *Hardness of water is expressed by milligrams of calcium carbonate equals in per liter. Hard water is formed when water passes through or water is mixed with anything which is made by calcium and magnesium carbonates, bicarbonates and sulfates.* Hardness of water is checked by milligrams of calcium carbonate mixed in water per liter. According to World Health Organization (WHO) water containing calcium carbonate below 60 mg per liter is considered as soft water. 60–120 mg per liter is called moderately hard water and 120–180 mg per liter water is hard and more than 180 mg per liter, water is very hard. But the hardness of water near dumping site of study area is 190 mg to 220 mg per liter. *Hardness of water causes vomiting, stomach swelling, stomach pain and typhoid. And high amount of chlorides and carbonates make crystals in human body which change into stones in kidney and liver.*

Depending on pH and alkalinity, hardness in water above from 200 mg per liter in water can result in scale deposition, particularly on heating. Carbonates and bicarbonates effect the intestine problem, chloride and sodium make sodium chloride which is formula of salt. It increases the blood pressure of human being. It is also noted that liver problem patients are increasing in study area. Blood pressure and stomach problem are common in every house. Hair fall and skin diseases are common. Doctors recommend using boiled water, or use filtered water and doctors also suggested that government should make RO plants for drinking water.

Another amazing thing I got to know from a doctor that *I am running my private clinic in Muhammadwala and many patients came here with different diseases. Waterborne diseases are very common in this area. But mostly age of patients is from 12 to 30 years. Waterborne diseases are common in youth as compare to old ones.*

Discussions

My third unit of data collection is doctors of Makuwana and Muhammadwala. Basically, this unit covers research objective no 2. Doctors told that how water is contaminated and how it is bad for human health. After approaching local doctors, it is spotted that in rainy days, rain water absorbed contaminants from waste present in landfill and leaches through the soil and mixed which natural groundwater. Due to mixture or contaminants, groundwater loses its quality. So, people near dumping sites used that water for drinking purpose due to o which they face many different types of waterborne diseases. According to doctors, ratio of patients of waterborne diseases near dumping sites are greater as compare to other areas or areas which are living away from dumping sites. Mostly diseases people are facing in majority are diarrhea, typhoid, liver problem, uterus and bladder infections, production of stones in kidney due to carbonates and bicarbonates, Hepatitis A, stomach pain and stomach swelling.

Another amazing thing is that people age of 12 to 30 years faced more diseases as compare to old ones. Doctor also told that, groundwater of Muhammadwala and Makuwana is much harder as compare to other areas.

UDC2 Households

After getting data from FWMC, Doctors and Textile industries, next target of researcher was houses near dumping site of Muhammadwala and Makuwana. According to UC of Jaranwala road, there are more than 2000 houses near dumping sites. And almost every house has a water bore. Those houses didn't use government water supply because ground water is available at 80-120 feet down from the soil surface and its cost is very low. So almost all of the houses use ground water. Secondly that area is not as developed as the city area of Faisalabad. There are only two water filtration plants in that area but the plants are not purifying the eater properly. Third the area of

study is not wealthy. Poor people do live in that area. So, they can't even afford to buy drinking water from filtration plants. After taking interviews from households of study area, about 30 to 35% houses are using the water, supplied by the flowing canal of Faisalabad. The filtration plants of the area charge about 10 rupees per can. But that water again is not pure, rather polluted. Similarly Canal water is again not pure. Nearly 10 % households use the filtration plant water. Price of pure filtered water costs 2.5 to 3 rupees per litter.

Now the basic objective of researcher was to find out that if people of local houses are using ground water then what problems they are facing from the use of that water? First researcher got that 60% houses use ground water for drinking purpose and all houses use that water in bathrooms meaning thereby that they do not use the government water supply.
Second the focus was on the diseases relating to the use of contaminated water. Some 30 to 35% residents are living there from the last 20-30 years. And they told that before 10 to 15 years, the ground water was totally soft, and no salt was present in the ground water. But from the last 8 years the water is becoming little salty and the salty taste is increasing day by day.

A male respondent told me that I am living here from 27 years and my age is 47. We can't afford the filtered water for drinking purpose. So, we use ground water for drinking. As I am living here from 27 years, we never feel any type of salt or contaminated water, but from past 10 years this water is very salty. The people who are living in those houses from last 30 years, they haven't faced any type of waterborne diseases. But their family members, to the age of approximately 18-30 years are facing different diseases caused by contaminated drinking water.

Another male respondent of Muhammadwala answered that *I am living here from 21 years. Me and my family using ground water for drinking purpose. My wife has stones in her kidney. And doctor told that it is due to poor water quality. Now we used boiled water but that boiled ground water still taste very salty and it usually creates stomach problems in our family.*

Common water borne diseases in the dwellers of study area noted by researcher are including Liver problems, stones in uterus and kidneys, typhoid, simple fever, diarrhoea, high blood pressure, hair fall, skin allergy, problem in breathing and muscular pains.

Another male respondent told me that *I am living Makuwana from 32 years. Here we face many issues for drinking water. We are not able to buy purified water. We use ground water for drinking*

purpose. My father never faced any disease due to water, because according to him groundwater of Faisalabad was not too much polluted. But my children frequently suffers from waterborne diseases.

Another male respondent told that my age is 62 years. I am living in Muhammadwala with my family from 30 years. My son works in a textile mill as a labor. First when we drink underground water it tastes so good. But now it tastes too much salty and cause many issues about health. But still I never face any type of waterborne disease but my son and son's wife and my granddaughter became victim of typhoid, diarrhea and stomach swelling due to contaminated water usage.

So, it is cleared that young people face more health problems of waterborne diseases as compare to old ones. And ground water has been polluted as the contaminants out of the waste included in the ground water and resultantly disturbed the water quality causing the health threats.

Discussion

According to local peoples of Makuwana and Muhammawala, there are only two water filtration plants which are very costly. Those area is not too much rich, they cannot afford filtered water so, they use groundwater for drinking purpose. This portion or UDc cover my 2nd research objective. I got to know after interviews that, people living near dumping sites faces many different waterborne diseases. They face these types of diseases due to usage of contaminated water for drinking purpose. Major diseases faced by local people are hepatitis A, stomach pain and swelling, muscular pain, throat itching, diarrhea kidney infection.

According to them, groundwater of this area is very salty as compare to other areas. It is also noticed that, age of 12-30 years people are more victim of waterborne diseases as compare to old peoples. Some old people of local area told me that, before 35 years, water of this area was very sweet and good in quality. But from 20 years, this water in like a poison for human beings.

Chapter 5

CONCLUSION AND RECOMMENDATIONS

Faisalabad is the largest industrial and a busy city of Pakistan. Faisalabad is also known as Manchester of Pakistan because it has largest number of textile industries and units in all over Pakistan. As Faisalabad is industrial city so it is also 2nd most polluted city of Pakistan. As it is the industrial city, it means it also generate a large amount of waste is dump or disposed daily.

Semi structed interviews are taken by researcher for collecting data form his UDC's. Approximately 1900 tons daily waste is generated by Faisalabad in which 900 tons waste is only generated by industrial sector. There are more than 340 textile units working in Faisalabad, which are involved in the processing, finishing, dying and printing of cloth. Meaning thereby that a large number of paints, dyes, ink, motor oil and batteries are used in every textile industrial units which are transported by different means of carriage. The waste carries with it heavy metals present in different dyes, chemical containers the contents of which have been been used, motor oil which has been replaced by new one, old batteries which are discarded, plastic containers and many other solid wastes. All industries and textile units dispose their wastes openly without any filtration or without removing hazardous elements from the waste.

Faisalabad Waste management Company was allotted with 75 acres of land in 1990 at Muhammadwala and 2025 acres land in Makuwana which are being used as dumping sites. That land was chosen without any precaution and measurement. According to UC of that area there are more than 2000 houses and large number of populations is living in that area. Pakistan is a developing country and it is suffering shortage of funds and grants, lack of technology and skilled people, so it is quite difficult to purchase new types of technology. The waste is being dumped openly in the land. Further our governments are not much efficient, so their policies and briefings are also very poor. They selected that land without any surveys and without any checks and parameters. Now that waste which contains heavy metals and chemicals are leaching through the earth by the help of rain water and mixed with ground water which is 90 foot below from surface of ground in that area and that metals and chemicals contaminate ground water. Water is the basic requirement of life. That contaminated water is necessary for drinking, food preparation,

agriculture purposes, washing and tacking bath. The most abundant natural resource on earth is the groundwater. This study is planned to measure the impact of ground water by waste dumping of Muhammadwala and Makuwana, which are areas of Faisalabad. The water quality of Faisalabad is very injurious for human health. Primary data survey is taken placed and semi structured interviews were conducted by researcher. By the help of literature review it is noted that Lead, Cadmium, sodium, carbonates, Nickel, bleach, detergents, chloride, and bicarbonates were present in underground water of Muhammadwala and Makuwana. By the results of researcher, it is found that local people of study area are facing high Blood, Kidney stones, liver infection, respiratory problem, hair fall, skin allergy, Hepatitis A, Heart palpitation, uterus infection, and some cases of heart problem due to heavy metals. These diseases are relating with the usage of contaminated water.

According to doctor heart problem and heart palpitation problems are due to Lead, more carbonates causes constipation, produces stone in uterus and in kidney, Nickel and potassium cause stomach problems and diarrhea. Sodium and chloride increase the blood pressure of human body and excess amount of salt in water may damage pregnant ladies. Typhoid fever, stomach pain, swelling of intestines is due to hardness of water. And hardness of water is checked by mixture of bicarbonates and carbonates in water. According to survey, ground water of Muhammadwala and Makuwana contains carbonated and bicarbonates at the level of 220 to 240 mg per liter. Which means that water is too hard. And hard water normally causes stomach pain, diarrhea, intestinal swelling, vomiting, nausea, blood pressure and makes stones in kidney and uterus. It is also founded that ratio of patients facing High blood pressure, kidney infection, stone in kidney, typhoid fever, stomach problems are more as compared to the people which live away from the dumping site.

The discharge of industrial waste through improper dumping method in Faisalabad invariably has resulted to the presence of high concentrations of pollutant in the ground water. sustainable development goals also force on the environmental protection and health issues. But in Faisalabad waste deploy both, environment and human health. So, this for the development of city, waste should be filtered properly or incineration process should be used by mills as Nishat mill using it. In the literature review the ground water of the study area contained high concertation of contaminants, which may be toxic to different organisms and agriculture also. The improper dumping has considerable negative effects on the water quality of the receiving water bodies and as such, they are rendered not good for human use. It is therefore recommended that the careless

disposal of industrial wastes without pretreatment should be discouraged and stopped. Imposition of direct charges on industrial waste by the regulating agency, as well as continuous monitoring and surveillance is imperative in order to ensure the protection of water resources from further degradation.

RECOMMENDATIONS

1. The population of Muhammadwala and Makuwana, area of Faisalabad has been affected by the contaminated groundwater. Therefore, it is necessary to improve waste management and also install filtration plants and Reverse Osmosis plants.
2. It is known and recognized that, industrial waste is discharged and being dumped openly over the land which has contaminated the ground water. It is recommended that waste should be filtered before it is disposed of and be properly dumped.
3. There is need to build proper solid waste and wastewater management system for the entire District, Faisalabad.
4. Media should have to play its positive role to start awareness programs because people are not aware of groundwater pollution, its effects on health and land and further the disadvantages of dumping.
5. Government must take steps to finish this social problem and to decrease the pollution from city.
6. Every industry should have to reduce their own waste by using different technological available methods like incineration. Nishat mill is using this method which has helped the mill to reduce the usage of coal and also helped to reduce the quantity of waste by burning it with coal. Estimated 40% of coal is being saved through this process. Waste is burnt with coal.
7. People living near dumping site should have to use the boiled and filtered water.

Implications

Research implications basically shows that, impact of the research or study may help someone in future research or also help for policy decisions for government and NGO's or the related field of the future study. So, implications of my study, are following

1. Faisalabad Waste Management Company.
2. Solid Waste Management.
3. NGO's working for environment and reducing waste.
4. All medical institutes which are working on water quality.
5. Awareness of population about quality of water and its disadvantages.
6. Future researchers.
7. For government to make best policies and finish waste problem.
8. Textile industrial sector to adopt those processes which reduces waste as discussed above.

Limitation of this study.

1. It is very time-consuming process but I have limited time.
2. As time is limited, so I cannot cover broad area for my research. My research area is very small. this type of study should be done on a large scale.
3. Another limitation of my study is funding problem.

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Interview questions

Faisalabad Waste Management Company

1) How do you manage the disposal of waste?
2) How many types of waste are generated in Faisalabad?
3) Which type of waste is more hazardous for environment?
4) How does dumped waste pollute the under-ground water?
5) Is it possible to save the Quality of the under-ground water by the betterment of the waste and how?
6) What is the disposal process of the textile industries?
7) Are there some precautions which government inform to textile units to take care before disposal of waste in landfills?

Textile industries

1) What type of dyes are used for dying and printing in Faisalabad?
2) Dyes used in textile industries in Faisalabad are made up of which chemicals?
3) How much amount of chemicals and dyes are waste after finishing?
4) After finishing step, what is your process of disposal extra tings of waste?
5) Have government gave you some precautions for disposal of waste?
6) Before disposal waste, do you remove hazardous elements from waste?
7) How any amount of waste is produced by unit after every process?
8) Is government ever subsidize you for removing contaminants from waste?

Local doctors

1) Since when you are running your clinic in Muhammawala or Makuwana?
2) Which type of patient's ratio are more in this area?
3) How underground-ground water is polluted by waste dumping?
4) How chemicals used in dyes are harmful for human health?
5) Which types of the waterborne diseases are common in research area?

6) Which age group of the patients is victimized more due to the usage of contaminated under-ground water?
7) Any precautions for people to save them from waterborne landfills?
8) Is there any difference in ratio of patients suffering waterborne diseases living near dumping sites and people living away from the landfills?

Local people

1) Since when you are living in Muhammadwala and Makuwana?
2) Which water you use for drinking purpose?
3) Is your water used for drinking purpose good in quality or not?
4) If yes, which water you use? And if no, why you use that water?
5) Have you or your family member ever faced waterborne diseases?
6) Since when under-ground water became hard or brackish in taste?
7) If you or your family member ever suffered waterborne diseases? What was its nature and what was its effects?
8) What is the situation of dumping site?
9) Has government ever done some procedure for control dumping?