

# The Impact of Water Pollution on Economic Development of Pakistan

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## Abstract

The current article contributes to providing knowledge to the public of Pakistan regarding the adverse effects that water pollution is having on the human health and welfare in Pakistan and moreover, the negative consequences that Pakistani economy faces due to the deteriorating condition of water resources in the country. The industrial and municipal waste directly drained in the natural water bodies, and this is becoming the leading cause of water pollution in the country. The contamination of water that occurs in Pakistan in different ways and the health, living standard and overall economy of the nation is suffering due to such extent of water pollution in rural and urban areas of the country. The study also addresses the farmers' community to bring awareness in them regarding the inappropriate use of pesticides and fertilizers that are causing waterborne diseases in Pakistani population. It is critical for Pakistan's government to make effective policies to protect the environmental condition of Pakistan and take immediate measures to deal with the issues of water pollution.



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## Introduction

It is crucial for every country to meet the environmental standards to be economically stable and to bear a healthy nation. Likewise Pakistan also needs to be compliant in terms of environmental standards if it wants to progress economically and do trading with worldwide country, particularly when European Union along with all other major countries have set a strict regulation regarding environmental standards and are showing reluctance to import products particularly crops and edibles from countries that are having environmental problems (Ashfaq, 2016). As Pakistan is one of the countries having environmental problems particularly in the aquatic area, therefore it will have to address the issue more vigorously to solve the environmental issues in terms of air and noise pollution but particularly water pollution (Khalid, 2017). If we take an example of the alarming consequences of rapidly growing water pollution in Pakistan then it is to be noted that a big chunk of Pakistani industrial sectors includes agriculture and fishing, and both need unpolluted water and both account for over 2/5th of employment and 1/4th of output in Pakistan (The world fact-book, 2012). It can be understood that how bad the water pollution can impact the economy in this scenario. Considering this, it seems ironic that however, the country depends on this entity for growth, but the citizens are constantly threatening the future and development of the country by causing immense water pollution in several ways. Water pollution is rapidly increasing due to the excessive use of chemical fertilizers, the bulk of industrial wastage that is dumped into lakes and water bodies on daily bases, the dumping of untreated sewage into the sea, and the pipelines that are highly contaminated and still transport water throughout the country (Azizullah, 2011). Contamination of drinking water is further making a disastrous impact on the economy and wellbeing of the nation by causing the waterborne diseases in people all over the country. Most of the health problems that are being reported on a daily bases are directly or indirectly occurring due to polluted water. 45% of deaths in infants and 60% in the overall population are due to diarrhea and waterborne diseases, respectively (Arif and Naheed, 2012).

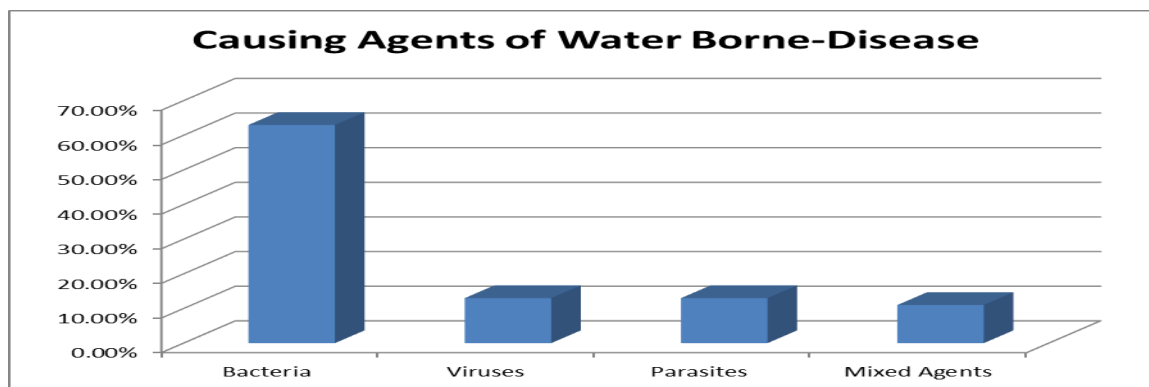
## Main Causes of Water Pollution in Pakistan

It is mostly the human being itself who is rapidly polluting the water through harmful activities. One of the most harmful act that human being does to cause the water pollution is the disposal of municipal, industrial and domestic waste in a highly unethical way which is to dump all these harmful wastes in water bodies such as rivers, lakes, streams, etc. (Kahlowan and Majeed, 2003). According to estimation, around 2 million tons of waste, sewage, and other harmful effluents are discharged into water bodies of the earth on a daily bases. Countries that have been developed a better infrastructure for their countries to get rid of the waste material have overcome the problem of pollution to some extent but the countries with less systematic infrastructure and who are yet in the phase of development are in worst condition in terms of water pollution as they dump more than 90% of their raw sewage and around 70% of industrial wastes into the water sources and the percentage is increasing day by day (Azizullah, 2011). Sial et al. (2006) stated in a study regarding the role of industries in water pollution in Pakistan that more than half of the registered industries in Pakistan are noted to be immensely polluting without any action against them. This can be used as evidence to conclude that Pakistani industries are the main source of causing water pollution by dumping their effluents with a very high amount of toxic and organic materials in water bodies. The industries that are mainly involved in causing the water pollution belong to the sectors of pharmaceuticals, textile, ceramics, food, petrochemicals, steel, sugar mills, oil mills, leather tannings and fertilizer factories (Sial et al., 2006). These sectors have a number of

factories who produce hundreds and thousands of gallons of wastewater that contains pollutants in huge quantities including nitrates, anions, cations and toxic metals such as arsenic, lead, iron, mercury, cadmium, chromium, copper, zinc, nickel, cobalt, lead and magnesium (Ullah et al., 2009). Majority of the Pakistani industries depicted in the surrounding of major cities. They directly dump the waste effluent into the drains, streams, rivers, ponds, lakes, ditches, clearings and agricultural land that is most near to their convenient without considering the consequences (Ullah et al., 2009). For example, River Kabul of Khyber Pakhtoon-khwa receives around 80,000 m<sup>3</sup> of industrial waste effluents per day. Even the capital city Islamabad is not safe because it does not have any infrastructure or appropriate management to deal with the disposal of effluents in its industrial estates. Consequently, the wastes drain straight into Sawan River. Moreover, according to estimation, only 1% of wasted water by Pakistani industries is treated before getting discharged (Azizullah, 2011). This result into a large amount of wastewater with a huge quantity of toxic substances to be mixed into clean water bodies and no one takes the environmental destruction into account before causing these wastes to ruin the water resources of Pakistan. According to estimation, different industries cause  $40 \times 10^9$  L of wasted effluent to discharge into water bodies on daily bases in Pakistan, and the figure is increasing rapidly (Ashfaq, 2016). The pollutants of this much waste do not stay confined to the water surface, but they percolate to the soil, which results in the immense contamination of aquifers that based on groundwater. Furthermore, it's not industrial waste that contributes to the water pollution and contamination, but municipal and domestic comes out as a serious threat as well towards water and water resources of Pakistan. Just like industrial wastes, municipal and domestic wastes also contain human wastes and household effluent that are being directly discharged into natural drains or water bodies or open agricultural lands. There are some cases where the system of sewerage collection exists, but they also discharge the harmful wastes to nearest water bodies and this sewerage collecting systems cater below 50% in urban cities, and just around 10% of these collecting sewages effectively treat the waste (WWF, 2007). The big cities of Pakistan, including Karachi, Faisalabad, Lahore, Rawalpindi, Peshawar, Sialkot, and Hyderabad, holds a major share in causing the increase in the wastewater of the country. Treatment plants that are the major solution for the problem of wastewater exist in very few cities of the country and moreover, many of these plants built without the completion of sewerage networks that should be associated to these plants. As a result, these plants are under loaded most of the times because a large number of municipal effluents cannot reach these plants due to the incomplete network of sewerage. Many plants are abandoned as well, and barely a minor percentage of wastewater can be effectively treated. It is roughly estimated that merely 8% of the wastewater from urban areas are treated in municipal plants while the rest is drained into the water sources. It is estimated that only ~8% of the urban wastewater is treated in municipal treatment plants, and the rest untreated waste water is drained into the natural water sources (WB-SCEA, 2006). Nalah is a usual terminology that local people use for gully, ditch or ravine and the stormwater drainages collect the untreated sewage and wastage from cities flowing into the streams, irrigation canals, and rivers. A rough estimate indicates that 2000 million gallons of sewage water get discharge into the surface water bodies in Pakistan on a daily bases (Azizullah, 2011). Besides industrial, municipal, and domestic water waste, another major source that causes water pollution is a wide usage of agrochemicals in the process of agriculture in Pakistan. There are other countries as well, where water contamination has been reported due to agricultural chemicals. China and USA are also among those countries (Azizullah, 2011). But conditions regarding the water pollution resulting from agrochemicals are very bad in Pakistan.

Agriculture chemicals such as pesticides and fertilizers that are applied to the agricultural lands get mixed with irrigation water which percolates through the soil and in the end reach the natural resources of water. This problem gets aggravated further when heavy runoff and flooding occurs in agricultural land in monsoon seasons. The number of pesticides is also detected in ground and as well as surface water, particularly in areas where extensive agricultural practices take place. The varieties of fertilizers that are applied to the crops are not completely utilized by the crops and the remaining quantity that is very large leach into the natural resources of water that consequently results in heavy concentrations of nitrites, nitrates, ammonia, phosphates, and sulfate in water (Ismat, 2012).

These resulting nutrients increase the speed of growth for algae in surface water, which cause eutrophication. Eutrophication, directly and indirectly, threatens the environment. Many species of the algae generate toxins in natural resources of water that are very harmful to humans and for animals as well. Moreover, some of the fertilizers contain very heavy metals as the by-product, and the widespread use of these fertilizers accumulate of the toxic metals in water and soil (Li and Wu, 2008). However, it can be said that although the agricultural chemical contributes in the contamination of water but not to the extent in which industrial, domestic and municipal wastes harm the natural resources of water in Pakistan (MOE-PAK, 2005a). All the different sources that cause water pollution, including industrial and municipal wastes and agrochemical practices, not release the toxic chemicals in the water only but they cause extensive contamination of bacteriological elements as well which eventually leads to frequent happenings of water-borne diseases. They also cause a notable increase in parameters such as BOD (biological oxygen demand), COD (chemical oxygen demand), TDS (total dissolved solids), TSS (total suspended solids) and salinity and therefore deteriorate the quality of water, making it unfit for many purposes especially for drinking purpose (Azizullah, 2011). The percentages of the agents that cause major water-borne diseases can be seen in the given table.

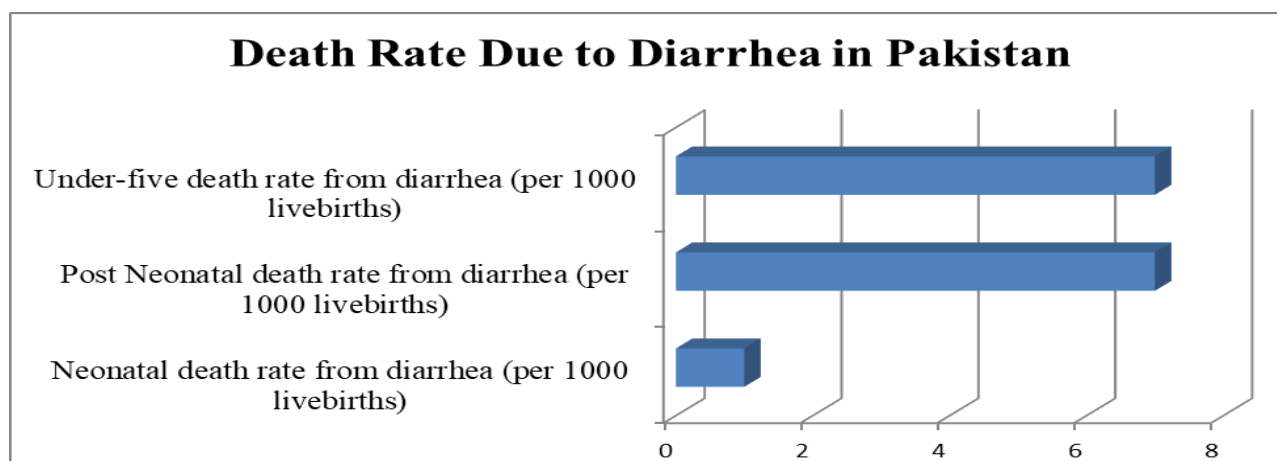


Source: Technology Times Pakistan

### Water Pollution and Human Health

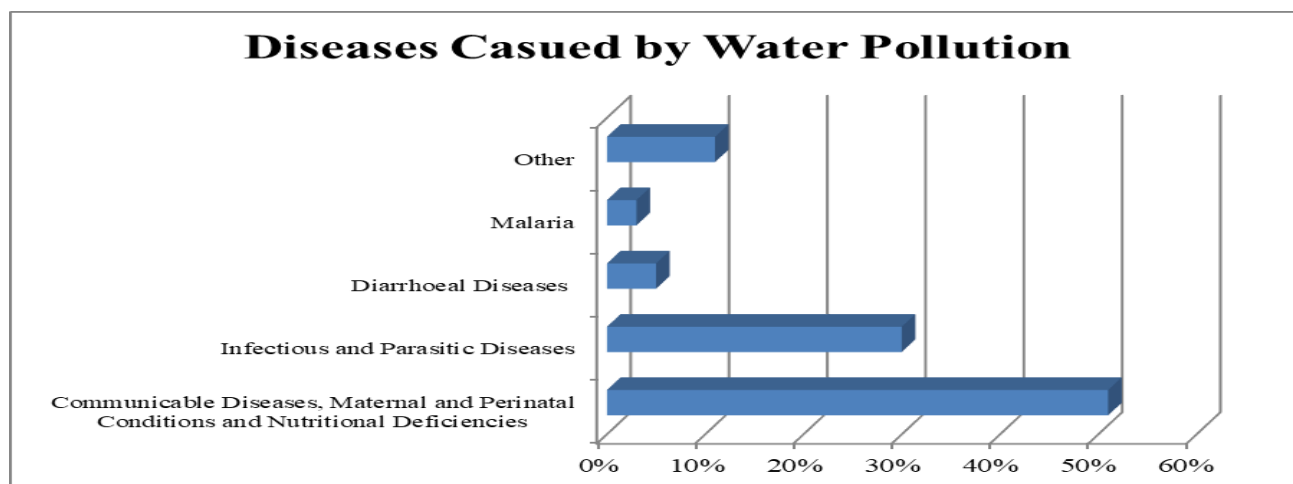
Pakistan is blessed that it has valuable surface and ground resources. However, unfortunately, with time, water is becoming an acute reserve for the sustained health safety of Pakistani people (Murtaza et al., 2015). Contaminated water is one of the major reasons that are causing health problems in young adult individuals. Around 2.3 billion individuals around the world are facing the diseases related to contaminated water (UNESCO, 2003). Over 2.2 million people die in developing countries every year by drinking unclean and

contaminated water. Diseases and infections related to polluted water account for 60% mortality in infant around the world (Montgomery and Elimelech, 2007). Haydar et al. (2009) say in a study that in Pakistan, around 40% deaths and 30% illness are associated with hazardous water. By drinking contaminated water, every 5th Pakistani suffers from threatening disease. It is estimated that over 3 million Pakistanis go through waterborne illnesses, and 0.1 of them don't survive annually. Problems of contamination in drinking water of Pakistan that happens mostly due to industrial wastes and domestic sewage get worst due to lack of practices that lead to water disinfection. Also, the level of monitoring of quality in treatment plants is very poor, which is becoming the major cause of the prevalence of diseases that are purely waterborne diseases (Ullah et al., 2009). It is very difficult to quantify the exact extent of waterborne diseases and illness in Pakistan because the maintenance of such records is nearly at zero levels in Pakistani hospitals (Aziz, 2005). According to the report of UNICEF, 20% to 40% of the patients in Pakistani hospitals are suffering from diseases that occur due to bad and polluted water. These diseases are hepatitis, dysentery, cholera, cryptosporidiosis, typhoid, and giardiasis, which causes 1/3rd of the total deaths that happen in Pakistan. Moreover, every year when monsoon start mainly from June till August and Pakistan receive rains in this season; the situation becomes worse in terms of water-borne diseases such as hepatitis, gastroenteritis, typhoid fever, dysentery, E. coli diarrhea, cholera, malaria, rotavirus diarrhea, and intestinal worms. There is hardly any prevention measures that are effective enough to control the worsening situation in Pakistan (Qasim, 2008). Diarrhea is another very common disease that occurs mainly in children due to contaminated water. It causes 14% of sicknesses in children, mainly those who are below the age of five years, and it accounts for 7% of total diseases in individuals of all ages living in Pakistan. A calculated number of 0.2 to 0.25 million Pakistani children face deaths every year on account of diarrhea and other serious waterborne diseases (Rosemann, 2005). Muhammad et al. (2012) observed in a study that particularly diarrhea is the leading disease associated with contaminated water and cause 2.5 million deaths of children every year in Pakistan. According to a report by WHO a few years back (MCEE, 2015), the death rate of children in Pakistan due to diarrhea was alarming enough to be dealt with immediately, and the situation persists. Below table shows an at a glance death rate of different ages of children due to diarrhea that is caused by drinking polluted water.



Source: WHO and Maternal and Child Epidemiology Estimation Group (MCEE) estimates 2015

Karachi, which is a hub city of Pakistan, faces the problems of unclean water, and people suffer from renal infection. This infection leads to the death of 10,000 people per year. Another great threat to the health of Pakistani people is the presence of pesticides in the drinking water that is available in Pakistan. Very few studies are conducted in Pakistan that addresses the issue of pesticides exposure in water and its hazardous effect on the health of Pakistani people. Studies show the presence of pesticides in great quantity in human blood due to contaminated water and their highly harmful effects on different enzyme levels in the body and biochemical parameters in blood of Pakistani people that are exposed to pesticides (Ejaz et al., 2004 and Khan et al., 2010). Clinical ailments such as headache, dizziness, vomiting, muscular weakness, breathing shortness, skin rashes and burning in urinary tract occur due to the exposure of pesticide that is being continuously reported in Pakistan (Khan et al., 2010). However, most of the studies that are relevant to pesticide impacting public health are conducted on the populations that are exposed to pesticides either as farmers or workers, but the adverse effects can most likely affect common people who are exposed to the harmful pesticides through the water they drink (Azizullah, 2011). Although there is a very rare chance of availability of accurate data of waterborne diseases that are reported in hospitals due to lack of proper record maintenance in hospitals, below chart seeks to reflect the percentage of major diseases that are caused due to polluted water (Munir, 2019).



Journal and book articles should be referred by the author's name and year of publication, e.g. ( Smith and Ward, 2000 ).

### The Value of Avoided illness:

When it comes to the effect of water pollution on the economy of the country in the context of health, then there are many aspects that can be taken into consideration. Medical expenses and losses of productivity are often measured by inquiring about the treatment type that is sought during the episode of illness and by asking that how long the illness lasted and how many days a patient or the family or caregiver of patients were unable to fulfill their usual duties that contribute to the economy of individual families and consequently to the country. Lost time of work is valued at the rate of wage and medical expenses that are imputed on the bases of total social costs of giving the care, not only the costs to patient (Pandey et al., 2003). Economists when to evaluate the value of suffering, pain, and illness avoided and value of the gained leisure time, they mostly do it by questioning. It means that people are inquired that what would they pay to avoid the inconvenience and discomfort of a specific type of illness

that is of a duration. This type of inquiring approach is known as CVM, which abbreviates the Contingent Valuation Method. It is also referred to as the terminology stated preference method. When the measurement is unavailable for the value of suffering, pain, illness and resulting in lost leisure time, then the loss of productivity in case of illness and medical costs are used most of the times to give a lower bound to the value of avoiding illness. This refers to the approach of COI or Cost of illness (COI) to value morbidity (Abedullah, 2006). Medical costs are considered as direct costs of illness, while productivity losses are considered as the indirect cost of illness. In the case of infrequent but serious illness like cholera which is caused by contaminated water. The risk of this infrequent but serious illness is reduced by reducing the chances of water pollution. In this regard, what a person would pay to decrease the risk of having cholera is estimated to value the illness avoided. Thus what should be estimated is what a person would pay to reduce his or her risk of having a stroke. Practically, the approach of COI is used most of the time to value serious illnesses like stroke cholera or a heart attack. However, empirical measurement shows that the payment that people are willing to pay to avoid illness, pain, and discomfort of these situations inclined to be lacking.

### **Value of Reduction in Death Risk**

Economists now understand that people can trade money in regards to safety on a daily bases. Workers agree to do riskier jobs if only they are compensated for the risk they are taking. On the other hand, people invest money to acquire safer vehicles or safety equipment like helmets that can protect them on roads on a regular bases. This willing to payment is termed in short as WTP among economists. WTP of people to reduce the risk of dying is often estimated by studying the differentials of compensating wage in the labor market, or expenses that people bear to decrease the risk of death. These calculating studies are generally referred to as revealed preference studies as they are done on the bases of actual behavior. The second source that estimates the approach where people are directly inquired that what they would be willing to pay too to reduce the risk of their deaths. This approach is also known as CVM as referred to as the context mentioned above of valuing morbidity (Pandey, 2003).

### **The Relation of Pakistani Economy and CVM and COI values:**

Contaminated water is the leading source of water pollution that is adversely affecting the economy of Pakistan along with making a very bad influence of living standards of Pakistani people. According to a rough estimate, Pakistan is suffering the loss of 25% of the production of its potential crop (Abedullah, 2006). As per a study (Brandon and Ramankutty, 1993), the cost of environmental issues that the economy of Pakistan bears is up to 1.8 billion US dollars. This cost was linked with the expenses that people and country spend on health, loss of production mainly the loss that occurs due to the absenteeism of labor and individuals from industries, offices, and schools respectively due to bad health conditions. Ministry of Environment released a report in the month of January in year 2000 reflecting that Pakistan spends around 17 million dollars each year on the problems that are related to pollution particularly the expenses relevant to cleanup activities but in actual 84 million US dollars are needed to completely resolve the environmental problems of Pakistan so 1.8 billion US dollars can be saved each year and can be invested for the growth of economy in some other constructive way. The situation of cost-benefit clearly shows that it is deemed economical to invest in the strategies that are made and executed to control pollution as the control over pollution mainly the water pollution will lead to increase in productivity and will reduce the amount that people pay to reduce the risks of their death and to avoid the illness. This control

over pollution will moreover help to enhance the sustainability of natural resources that currently exist in Pakistan. The extra benefits that can be most likely generated by sustaining the existing resources are not yet included in the mentioned estimates (Abedullah, 2006). The difference of cost and benefit situations can further widen by implicating the rules of WTO which says that members will face more barriers in terms of tariff while exporting their products if the fundamental criteria of environmental benefits are not met by them. It is evidenced that Pakistan is in need to place more emphasis on the protection of environment in order to control the environmental degradation of the country and for safeguard of citizens' health as under the provision of agreement with WTO (World Trade Organization), Pakistan will have to face difficulty while exporting the products from its industries without sufficient environmental protection measures (Azizullah, 2011).

### Recommendations

The following recommendations can help to overcome or at least control to some extent, the issues of deteriorating quality of water in Pakistan.

- Continuous monitoring should be done to check the quality of drinking water around the country in both urban and rural areas.
- Local authorities of the areas need to acquire the required facilities to monitor and then purify the drinking water in their respective areas.
- The intermittent water supply system should be changed to a continuous water supply system so the extensive contamination can be avoided that is caused by the supply of water intermittently.
- Renovation is needed to be done in regards to old, contaminated and rusty water pipelines throughout the distribution network of the country
- Sufficient distances are required to be established between sewage lines and supply lines that provide drinking water so cross-contamination can be avoided.
- Disposal of industrial wastewater should be monitored strictly monitored, and the government should force all the industrial factories to adopt the practice of wastewater treatment.
- Municipal wastewater should also be treated and for the purpose, active treatment plants are needed to be installed along with operative sewage collecting system in large cities
- Strict laws and regulations are needed to be implemented that bear no compromise on the quality of drinking water that is supplied to the Pakistani population in both urban and rural areas.
- Public of Pakistan also need to play their part to diminish the water pollution from the country, therefore, awareness campaigns are required to educate the common people of Pakistan regarding the significance of safe and clean drinking water.
- Proper guidance should be given to common people so they adopt the safety measures while storing water domestically.
- The community of farmer needs serious education that can guide them about handling the pesticides safely and regarding the proper use of fertilizers so the water pollution that is caused by agrochemicals can be reduced.

These measures and expenses towards these practices are very meager when compared to that of the adverse economic effects that Pakistan bears due to the water pollution.



Moreover, the value of human life is more valuable than any other factor; therefore, it is crucial for the Pakistani government to take these measures very shortly.

## References

1. Abedullah, (2006) Sources and Consequences of Environmental Pollution and Institution's Role, in Pakistan, *Journal of Applied Sciences*, 6, 3134-3139
2. Arif, A., and Naheed, R. (2012) Socio-economic determinants of diarrhea morbidity in Pakistan, *Academic Research International*, 2(1), 490
3. Ashfaq, R. A. (2016) Polluted economy, *The Nation*, Jan 16, 2016, available at <https://nation.com.pk/16-Jan-2016/polluted-rconomy>
4. Aziz, J. A. (2005) Management of source and drinking-water quality in Pakistan, *East Mediterranean Health Journal*, 11, (10) 87-98
5. Azizullah, et al., (2011) Water pollution in Pakistan and its impact on public health — A review, *Environment International*, 37 (2011) 479-497
6. Brandon, C. and R. Ramankutty, (1993) *Toward an Environmental Strategy for Asia* World Bank Discussion, The World Bank Asia, Washington DC
7. Ejaz, S. et al. (2004) Endocrine disrupting pesticides: a leading cause of cancer among rural people in Pakistan, *Exp Oncol*, 26, 98-105
8. Fayehun, O. A. (2010) Household environmental health hazards and child survival in sub-Saharan Africa
9. Haydar S, et al. (2009) Evaluation of drinking water quality in urban areas of Pakistan: A case study of southern Lahore, *Pakistan Journal of Engineering and Applied Science*, 5, 16-23.
10. Ismat, S. (2012), Water is Becoming Scarce, *Pakistan Observer*, 28 November 2012
11. Kahlowm M. A, Majeed A. (2003) Water-resources situation in Pakistan: challenges and future strategies. Water resources in the south: present scenario and future prospects Islamabad, Pakistan: *Commission on Science and Technology for Sustainable Development in the South COMSATS*, 2003, 21-39
12. Khalid, S. (2017), Life Straw: A basic necessity of water security, *Weekly Times Technologies*, 10 June 2017
13. Khan, D. A., et al., (2010) Risk assessment of pesticide exposure on the health of Pakistani tobacco farmers, *Journal of Expo Sci Environ Epidemiol*, 20, 196-204
14. Li D. P and Wu Z. J. (2008) Impact of chemical fertilizers application on soil ecological environment, *Ying Yong Sheng Tai Xue Bao*, 19, 1158-65
15. MOE-PAK., State of the Environment Report (2005) (Draft), Government of Pakistan, Islamabad, Pakistan: Ministry of Environment; 2005a
16. Montgomery, M. A. and Elimelech, M. (2007) Water and Sanitation in Developing Countries: Including Health in the Equation, *Environmental Science and Technology*, 41,17-24
17. Muhammad N, et al. (2012) Microbial contamination in well water of temporary arranged camps: A health risk in northern Pakistan, *Water Quality Exposure and Health* 4(4), 209-215.
18. Munir, A. (2016), Water pollution in Pakistan, Available at <https://www.slideshare.net/mobile/Arjumandmunir/water-pollution-in-pakistan>
19. Murtaza, F., et al. (2015) Socio-environmental determinant of exposure to water and sanitation-related hazards in Pakistan, *Journal of Animal and Plant Sciences*, 25, 725-703.

20. Pandey, K.D. et, al., (2003) The human cost of air pollution new estimates for developing countries. World Bank, Washington DC., USA.
21. Qasim M. (2008) Twin cities: Water-borne diseases on the rise, The NEWS, Sunday, July 20, 2008, Pakistan,
22. Rosemann N. (2005) Drinking water crisis in Pakistan and the issue of bottled water, The case of Nestlé's 'Pure Life.' Pakistan: Swiss Coalition of Development Organizations and Action aid; 2005. Retrieved from <http://www.alliancesud.ch/en/policy/water/downloads/nestle-pakistan.pdf>
23. Sial, R. A, et al., (2006) Quality of effluents from Hattar Industrial Estate, *Journal of Zhejiang University of Sciences*, 7, 974–80
24. The World Factbook, (2012), Central Intelligence Agency, available at <https://www.cia.gov/library/publications/the-world-factbook/geos/pk.html>
25. Ullah R. et al., (2009) Assessment of groundwater contamination in an industrial city, Sialkot, Pakistan, *African Journal of Environmental Science and Technology*, 3, 429–46
26. UNESCO (2003), Water for people water for life, The United Nations World Water Development Report 2003. United Nations Educational, Scientific and Cultural Organization (UNESCO) and Berghahn Books
27. WB-SCEA. (2006) Pakistan Strategic Country Environmental Assessment, Main report, Report no. 36946-PCWorld Bank, 1-66
28. Weekly Times Technologies, (2017), Water Security, Weekly Times, June 10, 2017
29. WHO (2015) WHO and Maternal and Child Epidemiology Estimation Group (MCEE) estimates 2015, <<http://apps.who.int/gho/data/node.main.ChildMort?lang=en>>
30. WWF, A special report (2007) Pakistan's waters at risk: Water and health-related issues in Pakistan and key recommendations, Ferozepur Road, Lahore, Pakistan, 1-33

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