

A Study of Influence of Air and Water Pollution on Human Health

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ABSTRACT

Air and Water is a very important source for all living organisms. All the living organisms need air and water so it is life itself. It keeps them alive but polluted water is a very harmful substance. When humans drink polluted water it has serious effects on their health. The polluted water produced by humans does not get properly treated. Some measures have to be taken before such a major problem occurs. Here, education on the dangers of water pollution is extremely important, as it helps people to apply the right attitudes when dealing with the environment. Education activities that get people informed and empowered to help protect water should be encouraged and invested in. Environmental education enhances critical-thinking, problem-solving, and effective decision-making skills. An awareness-raising activity is of great importance for people before they contaminate water sources. These activities can be accomplished through environmental education. Therefore, air and water pollutions control is vital and should be on the top of priority list of the governments. The policy makers and legislators in these countries must update all laws and regulations related to air and water pollutions. Coordination between different departments involving in air and water pollutions must be led by a powerful environmental protection organization. An effective environmental protection organization should have enough budgets for administration, research, development, monitoring, and full control of the environment including air and water pollution in India.

1. Introduction

Air and Water pollution is a major problem of recent decades, which has a serious toxicological impact on human health and the environment. The sources of pollution vary from small unit of cigarettes and natural sources such as volcanic activities to large volume of emission from motor engines of automobiles and industrial activities. A long-term effect of air pollution on the onset of diseases such as respiratory infections and inflammations, cardiovascular dysfunctions, and cancer is widely accepted; hence, air and Water pollution is linked with millions of death globally each year. A recent study has revealed the association between male infertility and air pollution.

Air pollution is defined as all destructive effects of any sources which contribute to the pollution of the atmosphere and/or deterioration of the ecosystem. Air pollution is caused by both human interventions and/or natural phenomena. It is made up of many kinds of pollutants including materials in solid, liquid, and gas phases.

Although a number of physical activities (volcanoes, fire, etc.) may release different pollutants in the environment, anthropogenic activities are the major cause of environmental air pollution. Hazardous chemicals can escape to the environment by accident, but a number of air pollutants are released from industrial facilities and other activities and may cause adverse effects on human health and the environment [14]. By definition, an air and Water pollutant is any substance which may harm humans, animals, vegetation or material. As far as humans are concerned an air and Water pollutant may cause or contribute to an increase in mortality or serious illness or may pose a present or potential hazard to human health. The determination of whether or not a substance poses a

health risk to humans is based on clinical, epidemiological, and/or animal studies which demonstrate that exposure to a substance is associated with health effects. In the context of human health, "risk" is the probability that a noxious health effects may occur.

Air Pollution:

Air pollutants are usually classified into suspended particulate matter (PM) (dusts, fumes, mists, and smokes); gaseous pollutants (gases and vapors); and odors. Suspended PM can be categorized according to total suspended particles: the finer fraction, PM₁₀, which can reach the alveoli, and the most hazardous, PM_{2.5} (median aerodynamic diameters of less than 10.0 microns and 2.5 microns, respectively). Much of the PM_{2.5} consists of secondary pollutants created by the condensation of gaseous pollutants—for example, sulfur dioxide (SO₂) and nitrogen dioxide (NO₂). Types of suspended PM include diesel exhaust particles; coal fly ash; wood smoke; mineral dusts, such as coal, asbestos, limestone, and cement; metal dusts and fumes; acid mists (for example, sulfuric acid); and pesticide mists. Gaseous pollutants include sulfur compounds such as SO₂ and sulfur trioxide; carbon monoxide; nitrogen compounds such as nitric oxide, NO₂, and ammonia; organic compounds such as hydrocarbons; volatile organic compounds; polycyclic aromatic hydrocarbons and halogen derivatives such as aldehydes; and odorous substances. Volatile organic compounds are released from burning fuel (gasoline, oil, coal, wood, charcoal, natural gas, and so on); solvents; paints; glues; and other products commonly used at work or at home [15]. Volatile organic compounds include such chemicals as benzene, toluene, methylene chloride, and methyl chloroform. Emissions of nitrogen oxides and hydrocarbons react with sunlight to eventually form another secondary pollutant, ozone, at ground level. Ozone at this level

creates health concerns, unlike ozone in the upper atmosphere, which occurs naturally and protects life by filtering out ultraviolet radiation from the sun.

Water Pollution:

Chemical pollution of surface water can create health risks, because such waterways are often used directly as drinking water sources or connected with shallow wells used for drinking water. In addition, waterways have important roles for washing and cleaning, for fishing and fish farming, and for recreation. Another major source of drinking water is groundwater, which often has low concentrations of pathogens because the water is filtered during its transit through underground layers of sand, clay, or rocks. However, toxic chemicals such as arsenic and fluoride can be dissolved from the soil or rock layers into groundwater [13]. Direct contamination can also occur from badly designed hazardous waste sites or from industrial sites. In the United States in the 1980s, the government set in motion the Superfund Program, a major investigation and cleanup program to deal with such sites (U.S. Environmental Protection Agency 2000). Coastal pollution of seawater may give rise to health hazards because of local contamination of fish or shellfish—for instance, the mercury contamination of fish in the infamous Minamata disease outbreak in Japan in 1956. Seawater pollution with persistent chemicals, such as polychlorinated biphenyls (PCBs) and dioxins, can also be a significant health hazard even at extremely low concentrations.

2. Review of Literature

Environmental health has a very strong connection between the human health and healthy environment and it's often due to an imbalance resulting from poor adjustment between the individual and the environment [1]. It focuses on the external factors that cause disease, including elements of the natural, social, cultural, and technological worlds in which we live [2]. A disease is an abnormal change in the body's condition that impairs with physical or psychological functions [3]. According to [4], air, water and soil represent the environment as a whole. There are two types of environment: natural and man-made. Natural environment composes of everything that affects an organism during the course of its lifetime, such as air, water, soil, radiation, land, forest, wildlife, flora and fauna etc. From a human perspective, environmental issues involve concerns regarding science, nature, health, employment, profits, politics, ethics and economics [5-8]. Most social and political decisions are usually made with respect to the political jurisdictions. Environmental problems are not necessarily bound to these artificial, political worlds. Air pollution may simply involve from as low as governmental units to as serious as international states [9].

3. Health effects of air pollution

Though we have exploited our incredible ability to manipulate the environment, we are beginning to realize that every impact we bring upon the environment also has an impact on us. The analogy of environment and pollution given by Wagner in 1994 was Earth can be compared to a fish bowl. That is, the Earth, like a fish bowl, is a contained environment; what goes in stays in. Pollutants that are emitted or discharged do not disappear, but will remain to impact us. Due to the

unstoppable urbanization in this world and Malaysia especially, risk of getting affected by pollution is high. More than 2 million premature deaths each year can be attributed to the effects of urban outdoor air pollution and indoor air pollution (caused by the burning of solid fuels). More than half of this disease burden is borne by the populations of developing countries [10]. Heart attacks, respiratory diseases, and lung cancer are all significantly higher in people who breathe dirty air compared to matching groups in cleaner environments [11]. Hundreds of deaths have been directly related to poor air quality in cities. There was a case of air pollution that was harmful to human health. Air pollution in that area came from pollutants from a zinc plant and steel mills became trapped in the valley, and dense smog formed. Within five days, seventeen people died and 5910 persons became ill. The polluted atmosphere affected nearly 50 percent of the city's 12,300 inhabitants.

Surprisingly, study published in the Lancet Respiratory Medicine shows that air pollution during pregnancy may increase the risk of lower birth weight babies, even at lower air pollution level acceptable by the current European Union air-quality directives. Based from data by the European Study of Cohorts for Air Pollution Effects (ESCAPE), 14 cohort studies from 12 European countries, involving 74,000 women who had singleton babies between 1994 and 2011 were analysed. The findings showed that all air pollutants, particularly fine particulate matter (PM_{2.5} with a diameter of 2.5 micrometers or less), and traffic density reduced the average head circumference of a child at birth and increased risk of low birth weight at term. In the study population, average pollution exposure levels ranged from less than 10 micrograms per cubic meter (10 $\mu\text{g}/\text{m}^3$) to almost 30 $\mu\text{g}/\text{m}^3$. The researchers estimate that for every increase of 5 $\mu\text{g}/\text{m}^3$ in exposure to PM_{2.5} throughout pregnancy, the risk of low birth weight at term increases by 18% [12]. In referring to, several hours of exposure to air containing 0.001 percent of carbon monoxide can cause death. This is because CO remains attached to hemoglobin for a long time even with small amounts it tends to accumulate and reduce the blood's oxygen-carrying capacity. In addition, carbon monoxide produced in heavy traffic can cause headaches, drowsiness and blurred vision. Other than that, a heavy smoker in congested traffic is doubly exposed and may experience severely impaired reaction time compared to non-smoking drivers. Respirable particles that smaller than 2.5 micrometres are among the most dangerous of particulates matter because they can be drawn into the lungs, where they damage respiratory tissues. Asbestos fibers and cigarette smoke are categorized among the most dangerous respirable particles in urban and indoor air because they are carcinogenic. The danger is because carcinogen is a substance that can cause cancer.

The most severe health risks from normal exposures are related to particulates. People who suffering from respiratory diseases are the most likely to be affected by air pollutions. In addition, not just air pollution can cause health effects, study also shows that air pollution can cause stress to a human being. Study by stated that environment can affect stress in human beings. Good and healthy environment can cause positive impacts to people as well as unhealthy environment can cause problems and eventually stress. The study shows that bad atmosphere condition (air & temperature) surrounding

the living areas and living space which is near to pollution as among the factors of human stress.

4. Human health effects of water pollution

Water is essential for survival. It has been stated that our existence is "intimately connected with the quality of water available to us. 25% of the human body is made up of solid matter while the remaining 75% is water. If our bodies are not continuously supplied with water, our bodies become dehydrated and the vital organs will deteriorate until they are no longer viable for human life. Access to safe water is a fundamental human need and, therefore, a basic human right. Polluted water jeopardizes both the physical and social health of all people. It is an affront to human dignity. According to medical experts, an individual needs to consume at least 2 liters of water daily for basic survival. The health and livelihood of people depends on the availability of a safe drinking water supply. Unfortunately, drinking water may be susceptible to toxins. As the human population and development in modern technology increases, the risk for water pollution also increases. The causes of water pollution are listed below:

- **Urbanization:** As more and more people move into cities and towns, these factors cause pollution: the physical disturbance of land due to construction of houses, industries, roads, etc.; chemical pollution from industries, mines, etc.; inadequate sewage collection and treatment; increase in fertilizers to grow more food and litter, which causes disease and has a negative visual impact.
- **Deforestation:** Clearing land for agriculture and urban growth often leads to water pollution. When soil is stripped of its protective vegetation it becomes prone to soil erosion. This leads to an increase in the murkiness of the water which can cause the following: It can block the gills of fish; Bottom dwelling plants cannot photosynthesize as the sun's rays cannot reach them; there is an increase in disease as bacteria and viruses use the soil particles as a method of transportation.
- **Damming of Rivers:** Damming of rivers can have an impact on water in the following ways: Water flowing out of dams has reduced suspended material as a large amount settles to the bottom of dams and it is depleted of nutrients and is often more saline with detrimental effects on downstream agriculture and fisheries; Enhanced eutrophication may result due to the water spending a longer time in the dam; There is also increased evaporation in dams, especially those with a large surface area.
- **Destruction of Wetlands:** Wetlands are nature's way of cleaning water as well as damming water (they hold back water in summer and release it in winter). Destruction of wetlands destroys the habitat of many birds and fish; removes the natural filters capable of storing and degrading many pollutants, such as

phosphorus and heavy metals; destroys natural dams and causes flooding further downstream.

- **Industries:** Industries produce waste that can affect the: pH of water (whether it is acid, neutral or alkaline); colour of water; amount of nutrients (increase in nutrients can cause eutrophication); temperature (increase or decrease in temperature can have an impact on temperature sensitive organisms living in the water); amount minerals and salts (too much can cause health problems); murkiness of water (can block fish gills; bottom dwelling plants cannot photosynthesize as the sun's rays cannot reach them); increase in disease as bacteria and viruses use the soil particles as a method of transportation.
- **Mining:** Mines produce waste that can increase the amount of minerals and salts in the water (too much can cause health problems); can affect the pH of water (whether it is acid, neutral or alkaline); can increase the murkiness of the water.
- **Agriculture:** Agriculture increases soil erosion due to the physical disturbance of soil and vegetation due to ploughing, overgrazing, logging and road building. This effects the murkiness and the amount of salts and minerals in water; increases nutrients due to fertilizers and excreta, which contribute worrying amounts of nitrates and phosphates to water supplies (this can cause eutrophication) and increases pesticide use.

5. Conclusion

Air and water pollution can harm human health, the environment, and cause property damage. Various researches have proven the connection of air and Water quality towards human health. The epidemiology and laboratory studies demonstrated that ambient air pollutants contributed to various respiratory problems including bronchitis, emphysema and asthma. The objective of this study is to discuss the relationship between the human health and air quality. Human must understand the chain of causality in urban environmental health, because the chain of causality in environmental health begins with the impact of human factors (urbanization) on the environment and human health. Human factors are the driving force to the destruction of environment and air quality especially, such as urban development, traffic, etc. This driving force of human activities will result in the effects of human health. In conclusion, human are responsible with the waste emitted to the air and society must take necessary actions to overcome the air pollution matter. Air and Water pollution not just will harm human health but also other aspects of the environment such as visual qualities, vegetation, animals, soils and water quality.

References

1. Ahmed, R., (2010). Drinking water contamination and its effects on human health.

http://www.case.edu/med/epidbio/mp439/Drinking_Water.pdf

2. Anand, S.V., (2013). Global environmental issues. Open Access Scientific Reports, 2(2), 1-9.
3. Atkins, W.A., (2015). Education. <http://www.pollutionissues.com/EcFi/Education.html>
4. Savage, L. K. (2017). Urban Ecosystems and Human Health in South Africa: Examining the Relationships between Housing, Energy, Indoor Air Quality and Respiratory Health. Ontario, Canada: Queen's University.
5. Knapp, D., (2015). Environmental education and environmental interpretation: The relationships.
6. Mondal, P., (2015). Water pollution: Definition, types, effects and methods to reduce it. <http://www.yourarticlelibrary.com/water-pollution/>
7. Obafemi, A.A., Eludeyin, O.S. and Akinbosola, B.M., (2012). Public perception of environmental pollution in Warri, Nigeria. Journal of Applied Sciences and Environmental Management, 16(2), 233-240.
8. Peter, K.R., (2013). The benefits of mainstreaming environmental education in the school curriculum. Research Journal in Organizational Psychology & Educational Studies, 2(2), 54-59.
9. Rand Water Foundation, (2015). Causes of water pollution. <http://www.waterwise.co.za/site/water/environment/causes-of-waterpollution.html>
10. Safari, Z., Naderi, S. and Ghasemi, Z., (2014). Examine the role of education in reducing environmental pollution. Indian Journal of Fundamental and Applied Life Sciences, 4(S1), 1178-1183.
11. Spooner, A.M., (2015). How does water pollution endanger human health?. <http://www.dummies.com/howto/content/how-does-waterpollution-endanger-human-health.html>
12. Woodford, C., (2015). Water pollution: An introduction. <http://www.explainthatstuff.com/waterpollution.html>
13. Cunningham, B., Cunningham, M. A., & Saigo, B. W. (2015). Environmental Science: A Global Concern (8th ed.). Boston: McGraw Hill.
14. World Health Organization. (2016). WHO air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide: Global assessment: summary of risk assessment. Geneva, Switzerland: World Health Organization.