



Impact of pollution on human health: A mini review article

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Abstract

Exposures to environmental pollution remain a major source of health risk throughout the world. The combined effects of exposures and multiple exposures to different pollutants which might act synergistically all create difficulties in separating associations between environmental pollution and health. Pollution effects are indeed many and wide-ranging. There is no doubt that excessive levels of pollution are causing a lot of damage to human and animal health, tropical rainforests, as well as the wider environment. The present paper attempts to assess the impact of different pollutants by natural sources on human health and is expected to reveal not only the status of pollution-associated health problems but also form a baseline data for further detailed investigation on health impact assessment.

Key words: Disease, Environment, Health impact assessment, Health, Pollution, Tropical rainforest.

Introduction

Notwithstanding the major efforts that have been made over current years to cleanup the environment, pollution remains a major problem and poses continuing risks to health. The progressively larger number of people exposed to environmental pollution nevertheless means that even small increases in relative risk can add up to major public health concerns. Environmental pollution is the presence of an agent which is potentially damaging to either the environment or human health. Environmental issues arise from a growing awareness of problems caused by the interaction of society at all spatial scales and the natural world. They are increasingly important to policy makers, many types of businesses, health managers and food producers (Adams, 1990). Environmental concern snow influence, and in some cases cause, international agreements and laws, national environmental regulations and local government actions. The environment of the Earth has many close connections and relationships with human activity. It is also now more widely recognized that a profound transformation of the Earth's environment is taking place and that many of these changes are the result of human action. A wide variety of processes that produce these

changes institutional and technological forces. More immediate causes include human activities at local scales, including cropland expansion, development have also been documented. These represent a mix of environmental, social, economic, political, of transportation network, changes in markets, resettlement and wood extraction for fuel. The main types of pollution by medium – biosphere, hydrosphere and atmosphere, including a consideration of pesticides, sewage, nitrates and phosphates, urban smog, marine pollution, nitrogen and sulphur emissions and acidification; transboundary pollution. The nature, significance and trends of natural hazard impacts, such as earthquakes, hurricanes and floods. The variety of strategies that can be adopted to minimize hazards; poverty and disasters; risk transference (Blaikie, 2003).

Health disorders by air, water, soil and solid waste pollutants

Pollution increases not only due to increase in population with decrease in the available living space for each person but also because of continuously increasing per capita consumeristic demands. An estimated 3 million people die each year because of air pollution. This figure represents about 5% of the total 55 million deaths per annum in the world. According to WHO air pollution

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causes 8 00 000 premature deaths from lung cancer, cardiovascular and respiratory diseases worldwide, in addition to increased incidence of reduced lung functioning, irritation of eyes, nose, mouth and throat, asthma attacks, respiratory symptoms such as coughing and wheezing, increased respiratory disease such as bronchitis, reduced energy levels, headaches and dizziness, disruption of endocrine, reproductive and immune systems, neurobehavioral disorders, Cardiovascular problems, Cancer in adults (Harrison, 2001). The link between pollution and health is both a complex and contingent process. Pollution causes illness in two main ways. First, it may cause illness directly by poisoning us, as in the cases of lead poisoning and lung cancer. Second, pollution may cause illness indirectly because many infectious diseases spread in polluted environments. Pollution causes not only physical disabilities but also psychological and behavioural disorders in people. Health consequences of environmental pollution are inevitable (Hill, 2004). We are exposed to small amounts of chemicals every day, in food, in the air we breathe, and sometimes in the water we drink. Almost any chemical can be harmful if taken in, or ingested, in large enough amounts. The impact of society has caused a change in natural conditions to the point at which human life or health is at the risk, this is considered an environmental problem. Human impact on natural systems: where human action has caused a loss of habitat, destruction of species or individual organisms, or other disruption of the natural systems, by pollution, this is also considered an environmental problem. The question is whether the concentration of any particular chemical in the environment is high enough to be harmful. One may think of pollution as being entirely caused by people, but some pollutants occurs naturally in the environment. Naturally occurring pollutants usually become hazardous to health when they are concentrated above their normal levels in the environment. One example is the radioactive gas radon. In some areas, radon from granite bedrock may seep into buildings, where it becomes concentrated. Because it is an odourless gas, people may unknowingly breathe it in. Air pollution is a major environmental health problem affecting the developing and the developed countries alike (Markham, 1996). The effects of air pollution on health are very complex as there are many

different sources and their individual effects vary from one to the other. It is not only the ambient air quality in the cities but also the indoor air quality in the rural and the urban areas that are causing concern. In fact in the developing world the highest air pollution exposures occur in the indoor environment. Air pollutants that are inhaled have serious impact affecting the lungs and the respiratory system; they are also taken up by the blood and pumped all-round the body. These pollutants are also deposited on soil, plants, and in the water, further contributing to human exposure.

Air pollutants consist of gaseous pollutants, odours, and SPM, (suspended particulate matter) such as dust, fumes, mist, and smoke. The concentration of these in and near the urban areas causes severe pollution to the surroundings. The largest sources of human-created air pollution are energy generation, transportation, and industries that use a great deal of energy sources. Depending on their source and interactions with other components of the air, they can have different chemical compositions and health impacts. Since these pollutants are generally concentrated in and around urban areas, the outdoor urban pollution levels are far higher than in the rural areas (Sacramento, 2008).

Fires are another major source of air pollution and can lead to severe problems if the smoke is inhaled for a period of time. These fires can either be forest fires, well fires, burning of leaves in the backyard or as in the case of rural areas, large-scale burning of agricultural waste. Other sources include industries and power plants located in these areas.

Health disorders by specific air pollutants

- Tobacco smoke cause cancer, not only to the smoker but affecting passive smokers too. It causes burning sensation in the eyes or nose, and throat irritation, bronchitis, severe asthma, and a decrease in lung function.
- *Biological pollutants* are mostly allergens that can cause asthma, hay fever, and other allergic diseases.
- Volatile compounds can cause irritation of the eye, nose and throat. In severe cases there may be headaches, nausea, and loss of coordination. In the longer run, some of them are suspected to cause damage to the liver and other parts of the body.



- Prolonged exposure of lead can cause damage to the nervous system, digestive problems, and in some cases cause cancer. It is especially hazardous to small children.
- Exposure of ozone gas makes our eyes itch, burn, and water and it has also been associated with increase in respiratory disorders such as asthma. It lowers our resistance to colds and pneumonia.
- CO (carbon monoxide) combines with haemoglobin to lessen the amount of oxygen that enters our blood through our lungs. The binding with other haeme proteins causes changes in the function of the affected organs such as the brain and the cardiovascular system, and also the developing foetus. It can impair our concentration, slow our reflexes, and make us confused and sleepy.
- SO₂ (sulphur dioxide) in the air is caused due to the rise in combustion of fossil fuels. It can oxidize and form sulphuric acid mist. SO₂ in the air leads to diseases of the lung and other lung disorders such as wheezing and shortness of breath. Long-term effects are more difficult to ascertain as SO₂ exposure is often combined with that of SPM.
- Suspended matter SPM consists of dust, fumes, mist and smoke. The main chemical component of SPM that is of major concern is lead, others being nickel, arsenic, and those present in diesel exhaust. These particles when breathed in, lodge in our lung tissues and cause lung damage and respiratory problems. The importance of SPM as a major pollutant needs special emphasis as (1) it affects more people globally than any other pollutant on a continuing basis; (2) there is more monitoring data available on this than any other pollutant; and (3) more epidemiological evidence has been collected on the exposure to this than to any other pollutant.

Water quality issues are a major challenge that humanity is facing in the twenty-first century. Emphasis is placed on chemical pollution, particularly on inorganic and organic micro pollutants including toxic metals and metalloids as well as a large variety of synthetic organic chemicals (Johnson, 1989). Some aspects of water borne diseases and the urgent need for improved

sanitation in developing countries are also discussed. The review addresses current scientific advances to cope with the great diversity of pollutants. It is organized along the different temporal and spatial scales of global water pollution. Persistent organic pollutants (POPs) have affected water systems on a global scale for more than five decades; during that time geogenic pollutants, mining operations, and hazardous waste sites have been the most relevant sources of long-term regional and local water pollution. Agricultural chemicals and waste-water sources exert shorter-term effects on regional to local scales (Daniels *et al.*, 1997).

Much of the pollution in our environment is a by-product of inadequate waste disposal. Waste water from cities can carry oil and dozens of toxic chemicals into our water ways, and mining can release toxic contaminants into streams and rivers. Pollution of pristine Ecuador rainforest by Texaco / Chevron Oil Corporation represents perhaps one of the most outrageous cases of oil pollution ever. Some levels of pollutants left by the company on its sites of oil exploration have been calculated to exceed the US safety standards by as much as 1,000 times, causing such side effects as children born with fused fingers and deformed eyes, high cancer rates, etc. A problem in many parts of the world is the contamination of drinking or bathing water with human waste. This leads to the spread and recycling of many infectious and parasitic diseases.

- Waterborne diseases caused by polluted drinking waters are: typhoid, amoebiasis, giardiasis, ascariasis, hookworm.
- Waterborne diseases caused by polluted beach water are: Rashes, ear ache, pink eye, Respiratory infections Hepatitis, encephalitis, gastroenteritis, diarrhoea, vomiting, and stomach aches
- Disease caused when water polluted by chemicals (such as pesticides, hydrocarbons, persistent organic pollutants, heavy metals etc.): Cancer, included prostate cancer and non-Hodgkin's lymphoma, hormonal problems that can disrupt reproductive and developmental processes, damage to the nervous system, liver and kidney damage, damage to the DNA.
- Exposure by mercury in the womb may cause neurological problems including slower



reflexes, learning deficits, delayed or incomplete mental development, autism and brain damage. In adults: Parkinson's disease, multiple sclerosis Alzheimer's disease, heart disease, and even death

Other causes are:

- Water pollution may also result from interactions between water and contaminated soil, as well as from deposition of air contaminants (such as acid rain)
- Damage to people may be caused by fish foods coming from polluted water (a well-known example is high mercury levels in fish)
- Damage to people may be caused by vegetable crops grown / washed with polluted water.

Soil pollution effects are:

- Causes cancers including leukaemia.
- Lead in soil is especially hazardous for young children causing developmental damage to the brain.
- Mercury can increase the risk of kidney damage.
- Causes neuromuscular blockage as well as depression of the central nervous system.
- Also causes headaches, nausea, fatigue, eye irritation and skin rash

Other reasons of soil pollution are:

- Contact with contaminated soil may be *direct* (from using parks, schools etc) or *indirect* (by inhaling soil contaminants which have vaporized)
- Soil pollution may also result from secondary contamination of water supplies and from deposition of air contaminants (for example, via acid rain)
- Contamination of crops grown in polluted soil brings up problems with food security
- Since it is closely linked to water pollution, many effects of soil contamination appear to be similar to the ones caused by water contamination (Rene, 2010).

Health Disorders from Natural sources

The most common pollutants from natural sources are dust, soot, and other particulates. These particles become trapped in the tiny air sacs in our

lungs and cause irritation. This irritation can make lung conditions, such as chronic bronchitis and emphysema, worse. Another important type of pollution from natural sources is the heavy metals. Dangerous heavy metals include the elements arsenic, cadmium, lead, and mercury. These metals occur naturally in rocks and soil. Most of these elements cause nerve damage when they are ingested beyond their threshold dose. Selenium, also found naturally in many soils, is actually a beneficial element when taken in very small quantities. But larger doses pose health risks to humans. Human activities release thousands of types of chemicals into the environment, but we know surprisingly little about the health effects of most of them. Because we know so little about the effects of chemicals on our health, new health risks are discovered frequently (NPIC, 2015). For example, scientists now think that chemical pollution may be at least part of the cause of Parkinson's disease and Alzheimer's disease (Blaikie *et al.*, 2003).

Health Disorders by pesticides

Pesticides can enter the human body through inhalation of aerosols, dust and vapour that contain pesticides; through oral exposure by consuming food and water; and through dermal exposure by direct contact of pesticides with skin. Pesticides are sprayed onto food, especially fruits and vegetables, they secrete into soils and groundwater which can end up in drinking water and pesticide spray can drift and pollute the air (Eskenazi *et al.*, 1999). The effects of pesticides on human health are more harmful based on the toxicity of the chemical and the length and magnitude of exposure. Every human contains a percentage of pesticides found in fat samples in their body (Lorenz, 2009). Children are more susceptible and sensitive to pesticides because they are still developing and have a weaker immune system than do adults. Children under the age of six months are more apt to experience exposure from breast milk and inhalation of small particles. Pesticides may be absorbed through dermal contact, ingestion, and inhalation and tracked into the home from family members increase the risk of toxic pesticide exposure which is normally area specific. Also, toxic residue in food may contribute to a child's exposure to a certain pesticide (Paul *et al.*, 2014). Exposure to



pesticides can range from mild skin irritation to birth defects, tumours, genetic changes, blood and nerve disorders, endocrine disruption, and even coma or death. Developmental effects have been associated with pesticides. Recent increases in childhood cancers in throughout North America, such as leukaemia, may be a result of genotoxic and nongenotoxic pesticides due to somatic cell mutations. Pesticides can act in the promotion and proliferation of cancer while causing hormone imbalance (Getis, 1991).

Conclusion

It is a challenge that gives geography, and geographical technologies, a strong practical relevance as economic development, population growth and land use changes continue, in the face of continued environmental changes and hazards. It appears that polluted environment is a global issue and world community would bear worst results more as they already faced. More research is undoubtedly needed on a range of emerging environmental health issues. Effective action, however, requires an understanding not only of the magnitude of the problem, but also its causes and underlying processes, for only then can intervention be targeted at where it is most needed and likely to have greatest effect.

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