International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2016): 79.57 | Impact Factor (2015): 6.391

Impact of Flood-Caused Pollutants and Micro-Organisms on Human Health

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Abstract: ***The extreme havoc played in this era of fast industrialization and modernization, has caused disruptions in our ecosystems. One of the worst natural disasters occurring due to serious alternations in the environment are 'the floods'. The increase in climatic changes leads to the risk of increased flash flooding too. Flash floods are the most serious type of flood for mortality risk often caused by drowning the flood water, not only devastate homes, agriculture, public goods, but the threat to human health and safety increases in its worst form. Floodwater are contaminated with various toxic pollutants and pathogenic micro-organisms that are usually responsible for high health risks and raised death-toll. Floods, therefore are considered as one of the environmental calamities that show deterious effects on human health.***

Keywords: Flood, Health, Environment, Pollution

1. Introduction

Man's activities along with his over-indulgence in the environmental interaction have disturbed the ecological equilibrium. The consequent active forces within the earth and environment, are the cause of environmental hazards like earthquakes, droughts, and floods. Such disasters leads to destructions, and likely damages both lives and property.

The ecosystem imbalance arises when physical growth and development trails fast with rapid urbanization. It leads to the construction of large scale water impoundments, destruction of forest areas, development of industries with ill-management of waste drains, and paving of major highways. As ecosystem changes, future complications arises due to the exposure to pathogens, toxic, radiations, loss of water or food resources etc. majority of the sources essential for sound health, longevity, and in a nutshell, to sustain life, are usually harmed due to natural disasters.

The pollutants, pesticides, industry-waste, pathogenic micro-organisms contaminated in the flood-waters during the flood and its aftermath have hazardous impact on human health. Hence, the public in such areas, is often warned to avoid exposure to such contaminated flood water (Gerencher, 2005). The present paper reviews the various sources of health risks due to flood, mainly including the pollutants and some microbes whose impact on human health proves dreadful.

2. Sources of Health-Risks Due To Flood

Usually, the general attention is paid towards the risk of physical property destruction caused by floods. At the same time, it is very important to follow some basic practices and precautions to prevent possible diseases and injuries suffered during and after flooding. Also, it is important to know about the sources of health risks caused due to flood.

- **Contaminated water and poor sanitation**

Flood water is generally contaminated by various pollutants, such as sewage, human and animal faeces, pesticides etc. it thus impairs the clean water sources, due to which drinking and washing with such contaminated water becomes dangerous to health. Industrial wastes and the garbage fillings flow along the flood water and spread contamination. The pollutants also saturate into the ground water, and the waste-water treatment plants get flooded and malfunctioned. This results into backflows of raw sewage to homes, and also blockages in the private sewage disposal systems. All this acts as favourable habitat for micro-organisms and vector insects, resulting in diseases. (CDC Fact sheets-10th Sept. 2004. & 10th Sept. 2005).

- **Toxic and Unsafe Food**

Floodwater carry away along with whatever is present on the ground and upstream. Human and animal waste, oil, dirt, bacteria and chemicals present in it, when comes in contact with food crops and edible items, makes food unsafe to eat and harmful to human health. The power failures caused by floods damages stored food. Frozen and refrigerated floods become bacteria-prone and harmful for consumption. Floodwater also spoils the food packed in cardboards, plastic bags, jars and bottles. Toxicity of food increases due to its contamination.

- **Out-Brust Of Vectors and Carriers Of Microbes**

The polluted flood areas and prolonged rainfall lead to the increased chances of the new breeding grounds for the vectors and microbes. Wet areas and stagnant pits encourage rapid breeding of mosquitoes and flies. This causes increases in

vectors that become the easy mode of transmission of pathogens such as *Plasmodium* and many infections viruses, and hence the increased risk of the respective diseases. The vectors like wild animals, rats and rodents also carry diseases causing harmful viruses. Wet and damp areas also constitutes the habitats for the rapid growth of molds and mildews.

3. Important Impact of Flood on Human Health

The contaminated sources of flood water, and the vectors and pathogens developed due to the flood, causes many vector-borne diseases, stress, toxic effects as some of harmful impact on human health.

- **Out-break of vector-borne and pathogenic diseases:**

The increased number of vectors and microbes in the flood water are the causative factors of ill-health in human beings as well as in animals. Many disease- causing viruses and bacteria increase the risk of the diseases such as cholera, typhoid, jaundice, influenza, cold, cough and gastro-intestinal disorders (Rogers and Randolph, 2000).

The vector-borne infectious diseases and transmitted to animals and humans. Mosquitoes and flies are the important vectors responsible for the spread of common diseases, such as dengue, malaria, swine flu, diarrhoea, dysentery, amoebiasis and colic infections. Some of the vector-borne bacterial diseases caused due to the floods are leptospirosis and plague (Ross,2005;WHO)

The key vector of dengue and other *arboviruses*, such as *chikungunya virus* is the Asian tiger mosquito, *Aedes albopictus*. The *Leishmania* parasite is transmitted by the *sandfly* causing visceral leishmaniasis, usually prevailed in the Mediterranean region. (Lindgren *et al*., 2005). The mosquitoes of culex and anopheles families are the common carries of microbes.

Many other flood caused health impacts includes more importantly, the tick-borne disease. Zoonotic tick- transmitted diseases are lyme borreliosis and tick-borne Encephalitis which are an increasing health burden in Europe. Ticks of animals are easy carriers of many micro-organisms that are quite harmful for health.

- **Respiratory Disorders and Allergies.**

Many pollutants and allergens in the flood water causes many physiological problems and allergies. The hazardous particles and dissolved organic compounds in water interfere with the general physiology. The consequent common symptoms are upset bowel, acidic gases and nausea, vomiting, stomach ache and respiratory ailments like difficulty in breathing, bronchitis and lung-infections.

The common allergies include the severe headaches, fatigue, irritation of nose, red, swollen and watering eyes, sneezing and skin infections. Molds and mildews growing in the wet, damp areas, such as infiltrated walls, floors, carpets, toilets and bathrooms also causes allergies. Molds spores can be easily inhaled by humans and cause allergic reactions, and asthmatic attacks. Infants, elderly peoples and pregnant women are considered most vulnerable to mold-induced health problems.

- **Carbon monoxide poisoning**

Carbon monoxide poisoning is a very common post-flood impact in many developed countries. CO is found in combustion fumes, generally generated by small gasoline engines, stoves, gas ranges, and also by burning charcoals and woods. In case of power outrages following floods, the flood victims tend to use alternative sources of fuel and electricity, without appropriate air ventilation. Thus, CO from such sources causes poisoning for humans and animals enclosed, completely or partly in houses or buildings. CO poisoning results in allergies, irritation of organs and respiratory disorders (Environmental Health Centre, 2001).

- **Mental Stress, Anxiety And Fatigue:**

One of the very serious health hazards of floods is the increased level of anxiety, mental stress and fatigue. Having experienced the devastating flood, seen the loved ones lost or injured, and homes or property destroyed, leaves the flood victims in psychological distress. The financial and emotional burden increases with cost, labor and solitary coping required to repair and recover flood damaged assets. Prolonged post-flood recovery commonly causes depression, anxiety, anger, sleeplessness and mental disorders. Lethargy and often suicide in extreme cases are other effects amongst the flood victims. Hypertension and heart problem in elders and betwetting in children, are the behavioral changes noticed in post-flood effects (Noji, 1997;Boulder,2002)

- **Other health-hazards due to post-flood clean-ups and restoration**

Apart from the flood-caused health impacts, the past-flood clear-ups and flood debris also causes many other health-hazards. As the floodwaters recede, the fallen power lines of electricity, and gases leaks from pipelines and tanks can trigger other disastrous outcomes, such as fire and explosion, leading to injuries and deaths. Extreme caution must be used with possible chemical hazards during flood recovery due to pesticides and fertilizers. Broken bottles, woods stones and walls as flood debris may cause wound or cut while cleaning, serious health hazards occurs when dusts and molds in the ducts, fans and ventilators are circulated in the home environment and inhaled by the people engaged in cleanups.

4. Discussion & Conclusions

Floods, one of the most worst natural disasters not only make the victims homeless and financially disabled, but also cause mental stress, diseases and shattered life. It is difficult for the depressed flood victims to ever identify where to start while avoiding potential health risks and hazardous effects of devastating floods. The threats to one's health and safety during and after the flood are unimaginable. In the flood that occurred in Bangladesh in 1988, diarrhea spread as the most

common illness and a major causes of many a deaths (Siddiqui *et al.*, 1991). The high morbidity and death toll in devastated areas is due to acute sanitation problems and various water- and vectors-borne diseases, such as dysentery, cholera and typhoid. The lack of access to safe drinking water, medicine and hygienic food, especially for the poor and vulnerable, is the main threat factor. According to the *Public Health Laboratory services* (2000), the industrialized countries have low risks of infection due to floods, however, the contaminated pollutants in the long run cause severe affects. The Hurrican Ktrina, one of the worst natural flood disasters ever occurred in the United States, resulted in dreadly bacteria and lead hazards (Gerencher, 2005). In many developing countries, leptospirosis or weil's disease, a harmful zoonotic bacterial disease has been reported to accompany floods, which is associated predominantly with rats-sore throat, watery eyes, wheezing, cold, respiratory and allergic problems have been also reported (CDS 2006).

A number of guidelines and the instructions in detailed manner for restoration have been already issued by local governments, health centers and international organizations. They are involved with disaster relief and assistance in order to protect the flood victims and rescue them from various health threats. The handbook about flood protection in flood-sensitive areas could be very useful as it prepares the common people as how to cope with the concrete actions during flood and its aftermaths, National, regional and community flood management plans could be helpful by raising public awareness and precautionary measures about health ricks (Boulder, 2002).

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