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## 14. ENVIRONMENTAL HAZARDS AND ITS IMPACT ON HUMAN HEALTH

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### ABSTRACT

**T***his paper provides the insight view about the environmental hazards and its impact on human health. Environmental hazards means every type of disorder that occur in the environment. Hazards can present themselves to us in various media e.g. air, water. The influence they can exert on our health is very complex and may be modulated by our genetic makeup, psychological factors and by our perceptions of the risks that they present. Every year thousands of deaths are reported because of environmental hazards. Environmental hazards can affect a particular organ or body system, directly damaging it or leading to further complications. In this paper we discuss about various hazards such as physical hazards (electromagnetic radiation and ionizing radiation), chemical hazards (combustion of coal, petroleum), biological hazards (contamination of water) and psychosocial hazards (stress). And also various types of pollution caused by the environmental hazards which results in various health problems such as liver damage, chronic headaches, mental retardation or damage to reproductive organs. These hazards place extra stress on our bodies.*

### INTRODUCTION

Environmental hazards may be defined as those extreme events either natural or anthropogenic which exceed the tolerable magnitude within or beyond certain time limits, make adjustment difficult, resulting catastrophic losses of property, income and lives and become head lines of different news media at world level. The term environmental hazard may be distinguished from environmental disaster as follows. Hazards are the processes which cause an accident or extreme event or danger whereas disaster is a sudden adverse or unfortunate extreme event which causes great damage to human beings as well as plants and animals, i.e., disasters occur rapidly, instantaneously and indiscriminately. Thus, environmental hazards are the processes whereas environmental disasters are the results or responses of environmental hazards. Hazardous chemicals escape to the environment by a number of natural and/or anthropogenic

activities and may cause adverse effects on human health and the environment. Increased combustion of fossil fuels in the last century is responsible for the progressive change in the atmospheric composition. Air pollutants, such as carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOCs), ozone (O<sub>3</sub>), heavy metals, and respirable particulate matter (PM<sub>2.5</sub>), differ in their chemical composition, reaction properties, emission, time of disintegration and ability to diffuse in long or short distances. Air pollution has both acute and chronic effects on human health, affecting a number of different systems and organs. It ranges from minor upper respiratory irritation to chronic respiratory and heart disease, lung cancer, acute respiratory infections in children and chronic bronchitis in adults, aggravating pre-existing heart and lung disease, or asthmatic attacks. In addition, short- and long-term exposures have also been linked with premature mortality and reduced life expectancy. These effects of air pollutants on human health and their mechanism of action are briefly discussed here.

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. By definition, an air pollutant is any substance which may harm humans, animals, vegetation or material. As far as humans are concerned an air 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.

## NATURAL HAZARDS

A natural hazard is a naturally occurring event that might have a negative effect on people or the environment. It includes geophysical hazards which encompass geological and meteorological phenomena such as earthquakes, coastal erosion, volcanic eruption, cyclonic storms, and drought.

Natural hazards are further subdivided into two categories:

**Planetary Hazards**

**Endogenous Hazard**

Hazards which originate inside the surface of the earth are termed as endogenous hazard or terrestrial hazard. Eg. Volcanoes, Earthquake.

**Exogenous Hazard**

Hazards which originate above the surface of the earth (in the atmosphere) are called exogenous hazard. Eg. Cyclone, Drought, Rainfall etc.

**Extra Planetary Hazards**

Hazards which originate outside the region of the planetary orbits.

**Anthropogenic Hazards**

Manmade disasters are hazards caused by human action or inaction. They are contrasted with natural hazards. Manmade disasters may adversely affect humans, other organisms and biomes and ecosystems. The frequency and severity of hazards are key elements in some risk analysis methodologies.

## PHYSICAL HAZARDS

Physical hazards affect populations all over the world, regardless of wealth, location or other factors which tend to differentiate people and cultures from one another. Physical hazards in the environment are naturally occurring events and disasters with the capability of threatening physical safety. Hurricanes, volcanic eruptions, tornados, earthquakes, floods, and landslides are all different types of physical hazards that can have devastating effects on mankind (Library Index, Natural Hazard, 2011).

There are primary and secondary effects to these physical hazards. Primary effects are a result of the event or disaster itself. For instance, flood waters damaging houses and buildings, or the collapse of structures due to an earthquake, hurricane, landslide or sinkhole. Secondary effects occur because a primary effect has caused them to happen. An example of a secondary effect is a power outage, or a fire started because of an earthquake. Although we cannot predict a precise location or the magnitude of a physical hazard, some of the consequences can be greatly reduced by strategies such as building design, better land management and regulations, and education on how we can better use our land.

## IMPACTS OF PHYSICAL HAZARDS ON HEALTH

Important issues concerning physical hazards include those relating to health effects of electromagnetic radiation and ionising radiation. If one excludes the occupational environment, then noise and other physical hazards may present a nuisance to many inhabitants, and impair general wellbeing. Environmental noise does not usually contribute to deafness but notable exceptions may include noisy discotheques and "personal stereos".

Electromagnetic radiation ranges from low frequency, relatively low energy, radiation such as radio and microwaves through to infrared, visible light, ultraviolet, X-rays and gamma rays. These last as well as other forms of radioactivity such as high energy subatomic particles (e.g. electrons - Beta rays) can cause intracellular ionisation and are therefore called ionising radiation. Exposure to ultraviolet (UV) radiation carries an increased risk of skin cancer such as melanoma, and of cataracts which are to an extent exposure related. Some pollutants such as chlorofluorocarbons (CFCs) used as refrigerants or in aerosol propellants or in the manufacture of certain plastics can damage the "ozone layer" in the higher atmosphere (stratosphere) and thus allow more UV light to reach us, and harm us directly. Radioactivity is associated with an exposure dependent risk of some cancers notably leukemia. Contrary to popular belief however, most radiation to which the average person is exposed is natural in origin, and, of the manmade sources, medical diagnosis and treatment is on average the largest source to the individual. A very important issue is the extent to which radon gas arising from certain rock types beneath dwellings can contribute to cancer risk..

## CHEMICAL HAZARDS

Chemicals can be broken down into hazard classes and exhibit both physical and health hazards. It is important to keep in mind, that chemicals can exhibit more than one hazard or combinations of several hazards. Several factors can influence how a chemical will behave and the hazards the chemical presents, including the severity of the response:

- Concentration of the chemical.
- Physical state of the chemical (solid, liquid, gas).
- Physical processes involved in using the chemical (cutting, grinding, heating, cooling, etc.).
- Chemical processes involved in using the chemical (mixing with other chemicals, purification, distillation, etc.).

Other processes (improper storage, addition of moisture, storage in sunlight, refrigeration, etc.).

### **IMPACT OF CHEMICAL HAZARDS ON HEALTH**

General airborne pollution arises from a variety of causes but can usefully be subdivided into pollution from combustion or from other sources. The image shows the silhouette of a power station - an important source of airborne products of combustion. Combustion of coal and other solid fuels can produce smoke (containing polycyclic aromatic hydrocarbons - PAH) and sulphur dioxide besides other agents such as those also produced by:

Combustion of liquid petroleum products which can generate carbon monoxide, oxides of nitrogen and other agents. Industry and incineration can generate a wide range of products of combustion such as oxides of sulphur and nitrogen, polycyclic aromatic hydrocarbons, dioxins etc. Combustion of any fossil fuel generates varying amounts of particulate matter. It also adds to the environmental burden of carbon dioxide - an important "greenhouse" gas but in these low concentrations it does not affect human health directly.

Health effects of concern are asthma, bronchitis and similar lung diseases, and there is good evidence relating an increased risk of symptoms of these diseases with increasing concentration of sulphur dioxide, ozone and other pollutants. Although high occupational exposures to exhaust especially from diesel, and to benzene does increase the risk of some cancers, reliable direct evidence of an increased to cancer risk to the population at large from the lower levels to which they are exposed is lacking. Incineration can also generate hazardous substances if substances not best suited for disposal by incineration are "disposed" of in this way or if incineration is carried out at too low a temperature (for example this may generate dioxins).

→ Large scale industrial releases with serious acute effects are fortunately rare but you might recollect some events such as in Bhopal (India). Various smaller scale events occur such as leaks from road tankers, or fires in warehouses and factories. Special local environmental exposures can arise for example in communities exposed to drifting pesticide sprays containing say, organophosphates. Some natural phenomena such as volcanic eruptions can present serious risks to health. Fortunately they are rare but can be catastrophic.

Water can be an important source of chemical hazards. It can leach lead from pipes especially if

the water is soft. There is good epidemiological evidence that this can have a relatively small but measurable harmful effect especially on neurological function even at levels hitherto considered "acceptable". Other adverse effects can arise from chemicals added to the water.

### **BIOLOGICAL HAZARDS**

Biological hazards are micro-organisms such as viruses, bacteria, fungi, microscopic, parasitic worms, or other pathogens. These harmful micro-organisms are described as a substance that is naturally occurring which can be harmful to humans, causing disease and illness. These hazardous biological agents can enter the body in different routes.

### **TYPES OF BIOLOGICAL HAZARDS**

→ Biological hazards can be put into different categories. The most common biological hazards include: Bacteria - microscopic organisms that live in soil, water, organic matter or the bodies of plants and animals and are characterized by lack of a distinct nucleus and the inability to photosynthesize.

→ Viruses - a group of pathogens that consist mainly of nucleic acids and that lack cellular structure. viruses are totally dependent on their hosts for replication.

→ Fungi - any of a major group of lower plants that lack chlorophyll and live on dead or other living organisms.

Examples of different types of biological hazards:

→ Bacteria - Escherichia coli (E.coli), Mycobacterium tuberculosis (TB), tetanus

- Viruses - common cold influenza, measles, SARS, Hantavirus, rabies.

- Fungi - athlete's foot, mould, Rusts, mildew, smut, yeasts, mushrooms.

- Insects stings/bites

- Allergic reactions e.g., peanuts, pollen grains, bee stings

- Poisonous plants/animals e.g., poisonous ivy, cobras.

### **IMPACTS OF BIOLOGICAL HAZARDS ON HEALTH**

Many infectious diseases can spread from contact between people.

For example:

- Athlete's foot - can be spread by sharing footwear and walking barefoot in public showers or change rooms.

- Eye infections - can spread through sharing of makeup applicators, brushes and wipes or by hand to eye contact; e.g., rubbing eyes.

- Colds or flu—can spread through close personal contact; e.g., hand to hand, then the hand is placed near mouth, nose or eye.
- Mononucleosis—can spread through mucus and saliva by kissing or sharing drinks/ water bottles and cigarettes.
- HIV – can spread by exposure to blood and body fluids.
- Hepatitis—two strains hepatitis (B and C) can be spread by exposure to blood or body fluids.

HIV and hepatitis B and C are very serious diseases that can lead to death.

### CONCLUSION

It appears that polluted environment is global an issue and world community would bear worst results more as they already faced. As effective response to pollution is largely based on human appraisal of the problem and pollution control program evolves as a nationwide fixed cost-sharing effort relying upon voluntary participation. Education, research, and advocacy, are lacking in the region as preventive strategy for pollution especially in Asia. At present the adoption of environmental auditing in any economic sector is voluntary but future legislation could well make it mandatory and still time available to use technology and information for environmental health decision. Healthy people mean human resources are the main object of any successful business or country. This brief presents the adverse effects of a number of pollutants in human health. The main conclusion is that, in view of increased exposure of human in a diversity of pollutants, dietary interventions, rich in plant –derived foods, may protect or decrease their effects on different organs.

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