Diseases Related to Environmental Hazards

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Session Objectives

- Enlist and understand diseases related to environmental changes; Internationally and Nationally
- Respiratory diseases (asthma, allergies, respiratory problems)
- Cancers and chronic diseases
- Vector-borne diseases and zoonotic diseases
- Water born, water related diseases
- Food born and nutrition related diseases

Human Environment

The Field of Environmental Health

- Multidisciplinary field.
- Focus on natural and man-made agents (physical, chemical or biological), transmitted through the media of air, food, water and soil to human by **inhalation, ingestion or skin absorption.**

Diseases Related to Environment

- Most of the diseases caused by or influenced by environmental factors.

Usually linked to:

- Unsafe water/food
- Poor sanitation
- Indoor air pollution
- Outdoor air pollution

Environmental Health Impact

Depends on:

- Frequency of Exposure
- Individual characteristics:
  - Age
  - Sex
  - Genetic predisposition
  - Individuals health and disease status
  - Nutrition
  - Physical activity

Environmental Burden of Disease (According to WHO)

- Environmental factors are a root cause of a significant disease burden, particularly in developing countries.
- An estimated 25% of death and disease globally, and nearly 35% in regions such as sub-Saharan Africa, is linked to environmental hazards.

- Some key areas of risk include the following:

Environmental Burden of Disease

- **Unsafe water, poor sanitation and hygiene** kill an estimated 1.7 million people annually, particularly as a result of diarrhoeal disease.

- **Indoor smoke from solid fuels** kills an estimated 1.6 million people annually due to respiratory diseases.

Environmental Burden of Disease

- **Malaria** kills over 1.2 million people annually, mostly African children under the age of five.
  - *Contributing factors to the most common vector-borne diseases including malaria, dengue and leishmaniasis.*
    - Poorly designed irrigation and water systems
    - Inadequate housing
    - Poor waste disposal and water storage

Environmental Burden of Disease

- **Urban air pollution** generated by vehicles, industries and energy production kills approximately 800 000 people annually.

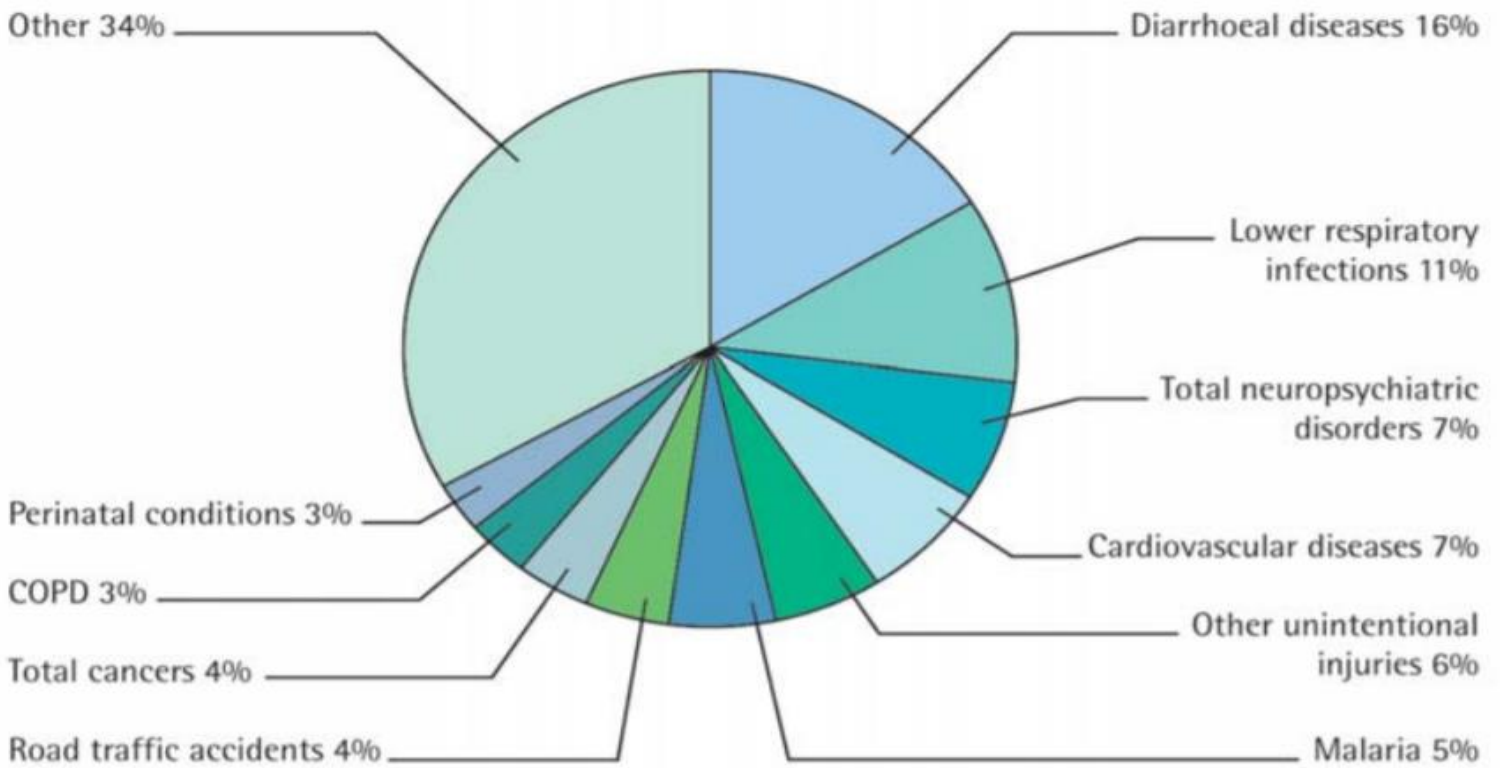
- **Unintentional acute poisonings** kill 355 000 people globally each year.
  - In developing countries, where two-thirds of these deaths occur, such poisonings are associated strongly with excessive exposure to, and inappropriate use of, toxic chemicals and pesticides present in occupational and/or domestic environments.

Environmental Burden of Disease

- **Climate change** impacts including more extreme weather events, changed patterns of disease and effects on agricultural production, are estimated to cause over 150 000 deaths annually.

Environmental Burden of Disease

FIGURE 8 MAIN DISEASES CONTRIBUTING TO THE ENVIRONMENTAL BURDEN OF DISEASE, FOR THE TOTAL POPULATION [a]



[a] COPD = chronic obstructive pulmonary disease.

Common Environmental Diseases

- Asthma, Respiratory Allergies, and Airway Diseases
- Cancer
- Cardiovascular Disease and Stroke
- Foodborne Diseases and Nutrition
- Heat-Related Morbidity and Mortality
- Mental Health and Stress-Related Disorders
- Neurological Diseases and Disorders
- Vectorborne and Zoonotic Diseases
- Waterborne Diseases

Diseases Related To Air Pollution

Diseases Related To Air Pollution

Primary Pollutants include

- Nitrogen oxides (NOx) - especially nitrogen Carbon monoxide - is a colourless, odorless, non-irritating but very poisonous gas

- Carbon dioxide (CO_2) - a colourless, odorless, non-toxic greenhouse gas associated with ocean acidification, emitted from sources such as combustion, cement production, and respiration

Diseases Related To Air Pollution

Primary Pollutants include (Cont.)

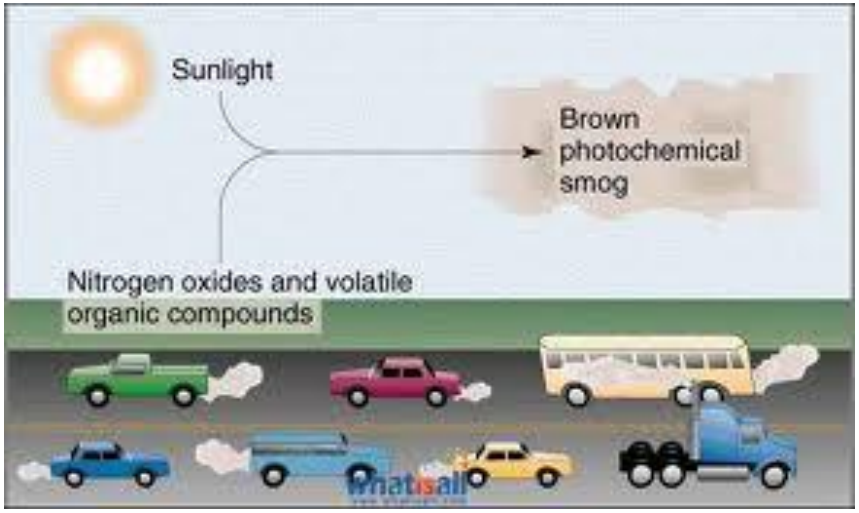
- Particulate matter - Particulates, alternatively referred to as particulate matter (PM) or fine particles, are tiny particles of solid or liquid suspended in a gas.

- Toxic metals, such as lead and copper.

Diseases Related To Air Pollution

Secondary Pollutants include

- Are not emitted directly. Rather, they form in the air when primary pollutants react or interact.
- Include: Particulate matter formed from gaseous primary pollutants and compounds in photochemical smog.



Diseases Related To Air Pollution

There are two main types of air pollution

- Ambient air pollution (outdoor pollution)
- Household (or indoor) air pollution refers to pollution generated by household burning of fuels (caused by burning fuel such as coal, wood or kerosene) using open fires or basic stoves in poorly ventilated spaces.

- Both indoor and outdoor air pollution can contribute to each other, as air moves from inside buildings to the outside, and vice versa.

The Health Effects of Air Pollution

- Microscopic pollutants in the air can slip past our body's defences, penetrating deep into our respiratory and circulatory system, damaging our lungs, heart and brain.
- One third of deaths from stroke, lung cancer and heart disease are due to air pollution.
- This is having an equivalent effect to that of smoking tobacco, and much higher than, say, the effects of eating too much salt.

Household Air Pollution

- kills 4 million people a year and tends to affect countries in Africa and Asia, where polluting fuels and technologies are used every day particularly at home for cooking, heating and lighting.

- Women and children, who tend to spend more time indoors, are affected the most.

Household Air Pollution

The main pollutants:

- Particulate matter, a mix of solid and liquid droplets arising mainly from fuel combustion and road traffic
- Nitrogen dioxide from road traffic or indoor gas cookers
- Sulphur dioxide from burning fossil fuels
- Ozone at ground level, caused by the reaction of sunlight with pollutants from vehicle emissions.

The Health Effects of Air Pollution

- **PM2.5** can penetrate the lung barrier and enter the blood system. They can increase the risk of heart and respiratory diseases, as well as lung cancer.

- **Ozone** is a major factor in causing asthma (or making it worse)
- **Nitrogen dioxide and sulfur dioxide** can also cause asthma, bronchial symptoms, lung inflammation and reduced lung function.

The Health Effects of Air Pollution

Air pollution has a disastrous effect on children.

- Worldwide, up to 14% of children aged 5 – 18 years have asthma relating to factors including air pollution.
- Every year, 543 000 children* younger than 5 years die from respiratory disease linked to air pollution.
- Air pollution is also linked to childhood cancers.

Air pollution effect on Pregnant women

- It can affect fetal brain growth.
- Air pollution is also linked to cognitive impairment in both children and adults.

Water-borne Diseases

Water-borne Diseases

- Waterborne diseases are caused by pathogenic microorganisms that most commonly are transmitted in contaminated fresh water.
- Infection commonly results during bathing, washing, drinking, in the preparation of food, or the consumption of food thus infected.
- Examples of Water-borne diseases: Polio, Malaria, Cholera, Dengue, Scabies and Typhoid

Water-borne Diseases

Diarrhoea

- Diarrhoea is one of the most common diseases caused by water pollution.
- It is most often caused by water-borne viruses. But bacteria and parasites from water contaminated with faeces are also common causes.
- It results in passage of loose, watery stools that can cause dehydration and death to young children and infants.

Water-borne Diseases

Cholera

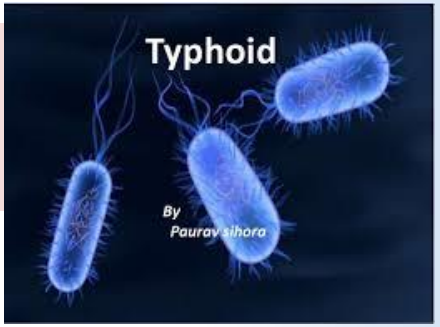
- Is an infection of the small intestine by the bacterium Vibrio Cholerae.
- This disease can kill within hours if not treated on time.
- Symptoms of cholera include diarrhoea and vomiting, as well as abdominal cramps and headache.
- According to the WHO, every year, there are 21,000 to 143,000 deaths worldwide due to this infection.

Water-borne Diseases

Dysentery

- It is bloody diarrhoea, i.e. any diarrhoeal episode in which the loose or watery stools contain visible red blood.
- It is most often caused by Shigella species (bacillary dysentery) or Entamoeba histolytica (amoebic dysentery).
- It is a combination of nausea, abdominal cramps coupled with severe diarrhoea. In cases of acute dysentery, one may also experience a high fever
- When either of these is ingested through contaminated water or food, one will develop dysentery within a period of four days.

Water-borne Diseases



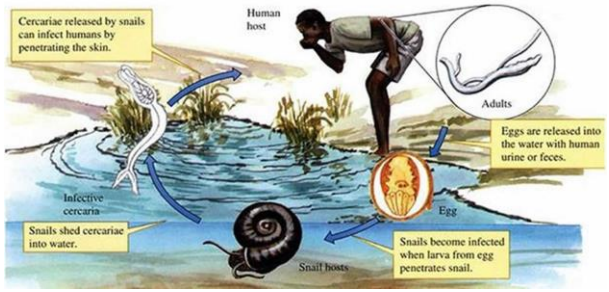
Typhoid fever

- Around 12 million people are affected by Typhoid fever across the world annually, .
- This infection is caused by Salmonella Typhi bacteria.
- This disease is contracted by consuming contaminated food or water.
- The bacteria pass through the intestinal tract and can be identified in stool samples.
- Its symptoms include nausea, loss of appetite, and headache.

Water-borne Diseases

Schistosomiasis

- This disease is caused by worms that are spread by freshwater snails living in polluted water.
- It's very common in rural areas where people use local water bodies for bathing and recreational purposes.
- The worms in the water penetrate into one's skin while in contact with the contaminated water, causing infections in the liver, lungs, intestines, and bladder.



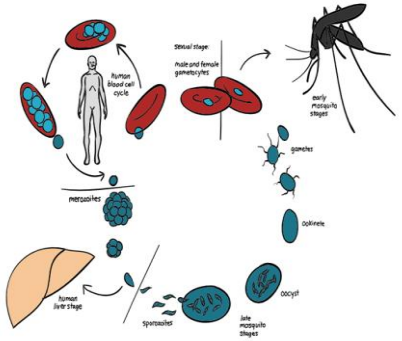
Water-borne Diseases

Trachoma (Eye Infection)

- This infection is caused by bacterium Chlamydia Trachomatis that's found in contaminated water.
- Trachoma results in a coarsening of the inner surface of the eyelids.
- This leads to pain in the eyes, lesion on the outer surface or cornea, and eventual blindness.
- Trachoma spreads because of poor sanitation and hygiene conditions.

Vector-borne Diseases

Vector-borne Diseases



Malaria

- Water pollution has resulted in increased breeding of parasite-carrying mosquitoes.
- Malaria is a disease caused by parasites, which are spread by female mosquitoes called Anopheles
- **Insect**: mosquitoes, **Organism:** protozoan, *Plasmodium falciparum, P. vivax, P. ovale, P. malariae, P. knowlesi*
- When mosquitoes bite a person infected with malaria, they can spread the infection to other people.
- This disease causes high fever, headache, and shivering. In severe cases, it can even lead to complications like severe anaemia, coma, and death.

Vector-borne Diseases

Yellow fever

- Yellow fever is an acute viral haemorrhagic disease transmitted by infected mosquitoes. The "yellow" in the name refers to the jaundice that affects some patients.
- **Symptoms** of yellow fever include fever, headache, jaundice, muscle pain, nausea, vomiting and fatigue.
- Insects: Mosquitoes
  Organism: Virus, Flavivirus
- Is a haemorrhagic fever that originated in the central belt of Africa but spread to South America in the 17th century with the slave trade.
- It is endemic in 34 countries in Africa where the majority of the estimated 30,000 deaths from 200,000 infections a year occur

Vector-borne Diseases

Dengue fever

- Is the most important mosquito-borne viral disease in the world
- The infection causes flu-like illness, and occasionally develops into a potentially lethal complication called severe dengue.
- According to WHO, which has targeted it as one of 17 Neglected Tropical Diseases for major campaigns for awareness and eradication.
- It is endemic in over 100 countries across the tropics, from central and South America, Africa, South and Southeast Asia and to the Pacific Islands.
- It has increased rapidly over the last few decades in urban sprawls that provide ideal conditions for breeding.
- The WHO estimates that there are 50-100 million infections a year and half the world's population live in countries where it is endemic.

Summary

Key areas of risk linked to environmental hazard include the following:

- Unsafe water, poor sanitation and hygiene
- Indoor smoke from solid fuels
- Urban air pollution
- Water and food borne diseases
- Unintentional acute poisonings
- Climate changes


thank
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