



Diseases related to Environmental hazards

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

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Important | Extra | Notes

[Editing file](#)

1) The Field of Environmental Health:

anything surrounding the human

- 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.

2) Diseases Related to Environment:

- Most of the diseases caused by or influenced by environmental factors.
- **Usually linked to:**
 1. Unsafe water/food
 2. Poor sanitation
 3. Indoor air pollution
 4. Outdoor air pollution

smoking is both indoor and outdoor but mainly indoor and both smokers and ex smokers have an effect

Charcoal (fuels) > indoor pollution

Detergents and chemical substances like paint and pesticides > indoor pollution

Factories, car exhaust , also smoking > outdoor air pollution

3) Environmental Health Impact:

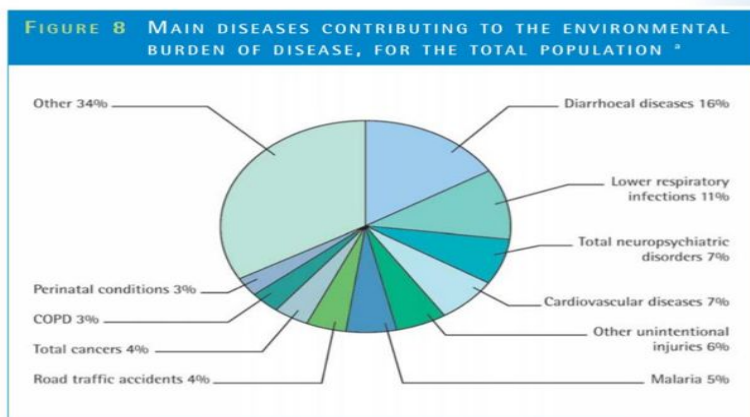
- **Depends on:**
 1. Frequency of Exposure (in history :we ask how many hours did you get exposed it?)
 2. **Individual characteristics:** Age(elderly or children) , Sex (male), Genetic predisposition ,Individuals health and ,disease status , Nutrition ,Physical activity .)

4) Environmental Burden of Disease (According to WHO):

- Environmental factors are a root cause of a significant disease burden, particularly in developing countries. (because fuels and charcoal are more there)
- 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:

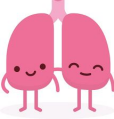








➤ Environmental Burden of Disease:

- 1. **Unsafe water, poor sanitation and hygiene** kill an estimated 1.7 million people annually, particularly as a result of diarrheal disease. (in children , cholera, typhoid...)
- 2. **Indoor smoke from solid fuels** kills an estimated 1.6 million people annually due to respiratory diseases.
- 3. **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.**
 1. Poorly designed irrigation and water systems
 2. Inadequate housing
 3. Poor waste disposal and water storage
- 4. **Urban air pollution** generated by vehicles, industries and energy production kills approximately 800 000 people annually.
- 5. **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. (also lead)
- 6. **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.



* COPD = chronic obstructive pulmonary disease.

5) Common Environmental Diseases:

<p>Asthma, Respiratory Allergies, and Airway Diseases</p> 	<p>Vector-borne and Zoonotic Diseases</p> 	<p>Heat-Related Morbidity and Mortality (occupational)</p> 	<p>Neurological Diseases and Disorders</p> 	<p>Cancer</p>
<p>Cardiovascular Disease and Stroke</p> 	<p>Foodborne Diseases and Nutrition</p> 	<p>Mental Health and Stress-Related Disorders</p> 		<p>Waterborne Diseases</p> 

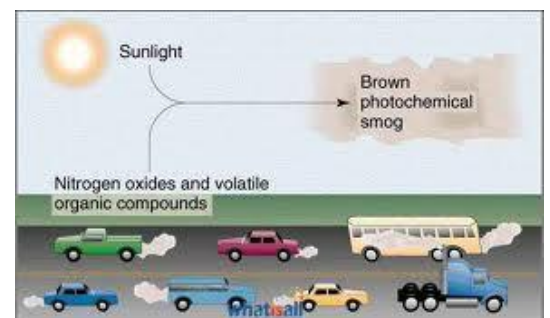
6) Diseases Related to Air Pollution:

- **Primary Pollutants include**

1. Nitrogen oxides (NOx) - especially nitrogen Carbon monoxide - is a colorless, odorless, non-irritating but **very poisonous gas**
2. Carbon dioxide (CO2) - a colorless, odorless, **non-toxic** greenhouse gas associated with ocean acidification, emitted from sources such as combustion, cement production, and respiration
3. Particulate matter - Particulates, alternatively referred to as particulate matter (**PM**) or fine particles, are **tiny particles of solid or liquid suspended in a gas**. (its a measure or indicator of air pollution)
4. Toxic metals, such as lead and copper.

- **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. (like sunlight reacting with any particle)



➤ **There are two main types of air pollution:**

1. Ambient air pollution (outdoor pollution)
 2. 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.

7) The Health Effects of Air Pollution:

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

8) 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. men mostly outdoor air pollution
 - **The main pollutants:**
1. Particulate matter: a mix of solid and liquid droplets arising mainly from fuel combustion and road traffic
 2. Nitrogen dioxide: from road traffic or indoor gas cookers
 3. Sulphur dioxide: from burning fossil fuels
 4. Ozone: at ground level, caused by the reaction of sunlight with pollutants from vehicle emissions. (cause skin cancer)

● 9) 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



➤ **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

- 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

Diarrhea

- Diarrhea 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 feces are also common causes.
- It results in passage of loose, watery stools that can cause dehydration and death to young children and infants.



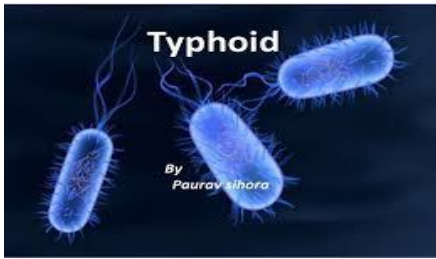
Cholera

- ❖ 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 diarrhea 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.



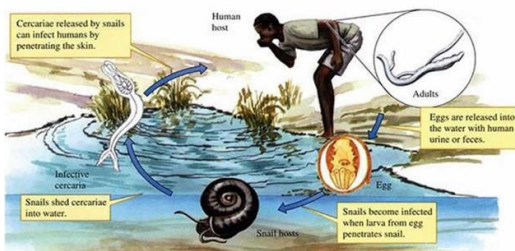
Dysentery

- ✓ It is bloody diarrhea, i.e. any diarrheal 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 diarrhea. 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.



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



Schistosomiasis

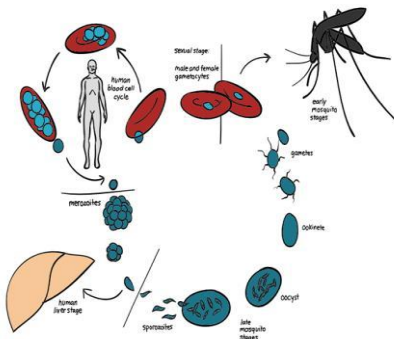
- This disease is caused by **worms** that are spread by freshwater snails living in polluted water.
- It's very common in rural areas where people use local water bodies for bathing and recreational purposes.
- The worms in the water penetrate into one's skin while in contact with the contaminated water,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



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 of cornea, and eventual blindness.
- ❑ Trachoma spreads because of poor sanitation and hygiene conditions.

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.



Yellow fever

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



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.

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

1. Unsafe water, poor sanitation and hygiene
2. Indoor smoke from solid fuels
3. Urban air pollution
4. Water and food borne diseases
5. Unintentional acute poisonings
6. Climate changes

Summary

1) The Field of Environmental Health: That focus on **natural and man-made agents**

2) Diseases Related to Environment linked to:

1. Unsafe water/food
2. Poor sanitation
3. Indoor air pollution
4. Outdoor air pollution

3) Environmental Health Impact Depends on:

1. Frequency of Exposure
2. **Individual characteristics**

4) Environmental Burden of Disease (According to WHO): key areas of risk include:

- **Environmental Burden of Disease:**

1. **Unsafe water, poor sanitation and hygiene**
2. **Indoor smoke from solid fuels**
3. **Malaria**

Contributing factors to the most common vector-borne diseases including malaria, dengue and leishmaniasis.

1. Poorly designed irrigation and water systems
2. Inadequate housing
3. Poor waste disposal and water storage
4. **Urban air pollution** generated by vehicles, industries and energy production
5. **Unintentional acute poisonings**
6. **Climate change**

5) Common Environmental Diseases:

1. Asthma, Respiratory Allergies, and Airway Diseases
2. Vector-borne and Zoonotic Diseases
3. Heat-Related Morbidity and Mortality
4. Neurological Diseases and Disorders
5. Cancer
6. Cardiovascular Disease and Stroke
7. Foodborne Diseases and Nutrition
8. Mental Health and Stress-Related Disorders
9. Waterborne Diseases

6) Diseases Related to Air Pollution:

- **Primary Pollutants include :**

1. Nitrogen oxides (NO_x) very poisonous gas 2. Carbon dioxide (CO₂) - non-toxic
3. Particulate matter 4. Toxic metals, such as lead and copper.

The delayed exposure to lead is weeks to months

- **Secondary Pollutants include :** Particulate matter formed from gaseous primary pollutants and compounds in photochemical smog.

There are two main types of air pollution:

1. Ambient air pollution (outdoor pollution) 2. Household (or indoor) 3. Both indoor and outdoor air pollution can contribute to each other,

7) The Health Effects of Air Pollution:

deaths from **stroke, lung cancer and heart disease**

8) Household Air Pollution: **The main pollutants:**

1. Particulate matter 2. Nitrogen dioxide 3. Sulphur dioxide 4. Ozone

9) The Health Effects of Air Pollution:

- ❖ **PM_{2.5} -Ozone -Nitrogen**
- ❖ **Air pollution has a disastrous effect on children.**
- ❖ **Air pollution effect on Pregnant women**

The biological consequences of the ozone depletion are: increased skin cancer, cortical cataracts, and reduction of plankton populations.

Water-borne Diseases:

commonly results during bathing, washing, drinking, in the preparation of food, or the consumption of food thus infected. **Examples** :: Polio, Malaria, Cholera, Dengue, Scabies and Typhoid

Diarrhea	<ul style="list-style-type: none"> ● Caused by <u>water-borne viruses</u>. <u>But bacteria and parasites</u> from water contaminated with feces are also common causes. ● Watery stools can cause dehydration and death to young children and infants.
Cholera	<ul style="list-style-type: none"> ● Is an infection of the small intestine by the bacterium <i>Vibrio Cholerae</i>. ● Can kill within hours if not treated on time. ● Symptoms :diarrhea and vomiting, as well as abdominal cramps and headache.
Dysentery	<ul style="list-style-type: none"> ● Diarrheal contain <u>visible red blood</u>. ● It is most often caused by <i>Shigella species</i> or <i>Entamoeba histolytica</i> ● Combination of nausea, abdominal cramps coupled with severe diarrhea.
Typhoid fever	<ul style="list-style-type: none"> ● This infection is caused by <i>Salmonella Typhi bacteria</i>. ● This disease is contracted by consuming contaminated food or water. ● Its symptoms include nausea, loss of appetite, and headache
Schistosomiasis	<ul style="list-style-type: none"> ● This is caused <u>by worms</u> that are spread by freshwater snails living in polluted water.
Trachoma (Eye Infection)	<ul style="list-style-type: none"> ● Caused by <i>Chlamydia Trachomatis</i> ● Trachoma results in a <u>coarsening of the inner surface</u> of the eyelids. ● This leads to pain in the eyes, lesion on the outer surface of cornea, and eventual blindness.

Vector borne Diseases

Malaria	<ul style="list-style-type: none"> • Water pollution has resulted in increased breeding of parasite- carrying mosquitoes. • Insect: mosquitoes, Organism: protozoan, Plasmodium falciparum, P. vivax, P. ovale, P. malariae, P. knowlesi • This disease causes high fever, headache, and shivering. In severe cases, it can even lead to complications like severe anaemia, coma, and death.
Yellow fever	<ul style="list-style-type: none"> ○ <u>Acute viral hemorrhagic</u> disease transmitted by infected mosquitoes. The "yellow" in the name refers to the jaundice that affects some patients. ○ Symptoms : fever, headache, jaundice, muscle pain, nausea, vomiting and fatigue. Insects: Mosquitoes Organism: Virus, Flavivirus
Dengue fever	<ul style="list-style-type: none"> ➤ Is the most important mosquito-borne viral disease in the world ➤ 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.

Questions :

Q1: Which of the following is the 'Delay exposure' to lead?

- A. Seconds to minute
- B. Minutes to hour
- C. Hours to week
- D. Weeks to months

Q2: What are the biological consequences of the ozone depletion ?

- A. Increase oral cancer,central cataract,reduction of animal populations
- B. Increase lung cancer,glaucoma,reduction of younger populations
- C. Increased skin cancer ,cortical cataracts,reduction of plankton populations
- D. Increased laryngeal cancer,glaucomatous cataracts,reduction of different population

Q3: Which of the following is caused by Plasmodium falciparum ?

- A. Typhoid fever
- B. Trachoma
- C. Yellow fever
- D. malaria

Q4: Which of the following is a Secondary Pollutant?

- A. Nitrogen oxides (NOx)
- B. Photochemical smog
- C. Particulate matter
- D. Lead

Q5: All of the following is a contributing factors to the most common vector-borne diseases except:

- A. Poor ventilation
- B. Poorly designed irrigation and water systems
- C. Inadequate housing
- D. Poor waste disposal and water storage

Q1:D

Q2:C

Q3:D

Q4:B

Q5:A

Good luck!

