



Introduction to Environmental Health and hazards

Objectives:

- To understand the definition of environmental health
- To identify the components of the environment
- To describe the interaction between different factors with the environment to produce disease
- To enumerate different environmental hazard concerns
- To describe sources of water hazards
- To describe sources of air hazards
- To be able to decide on appropriate method for water treatment
- To list the steps for environmental risk assessment

Done by:

Team leaders: Khalid Aleisa & Ghada Alhadlaq

Team members: Sadiq Arab, Reem Alsergani & Faisal Alabbad

Revised by: Yara Aldigi

Important | Extra | Notes

[Editing file](#)

Environment:

All external factors, living and non-living, surrounding man. Air, water, light community

Components of the environment	
Physical environment	Noise, radiation, temperature
Chemical	Air, toxic waste, pesticides, water lthas minerals
Biological environment	Disease organisms, allergens, insects
Social environment	Culture, habits, access to healthcare

Environmental Health

the science and practice of preventing human injury and illness and promoting well-being by:

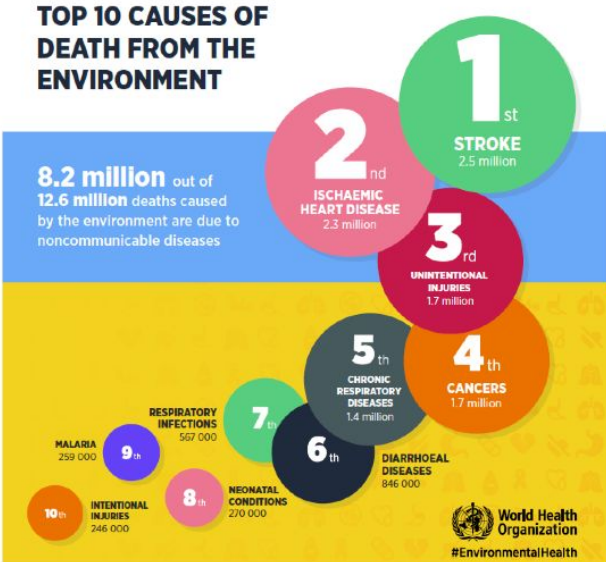
- 1- identifying and evaluating environmental sources and hazardous agents and
- 2- limiting exposures to hazardous physical, chemical, and biological agents in air, water, soil, food, and other environmental media or settings that may adversely affect human health”.

23% of global deaths are related to environment

because china has the factories and europeans put their factories in china so they wont exceed pollution threshold



Built environment : skyscrapers
 Agricultural practices: the chemicals that we put in the soil that gives me the produce that i will ingest
 Occupational: builders, paint factories , asbestos



Disasters: 1. natural : volcanos and wildfires the air is ashy and people cant go out
 2. man made

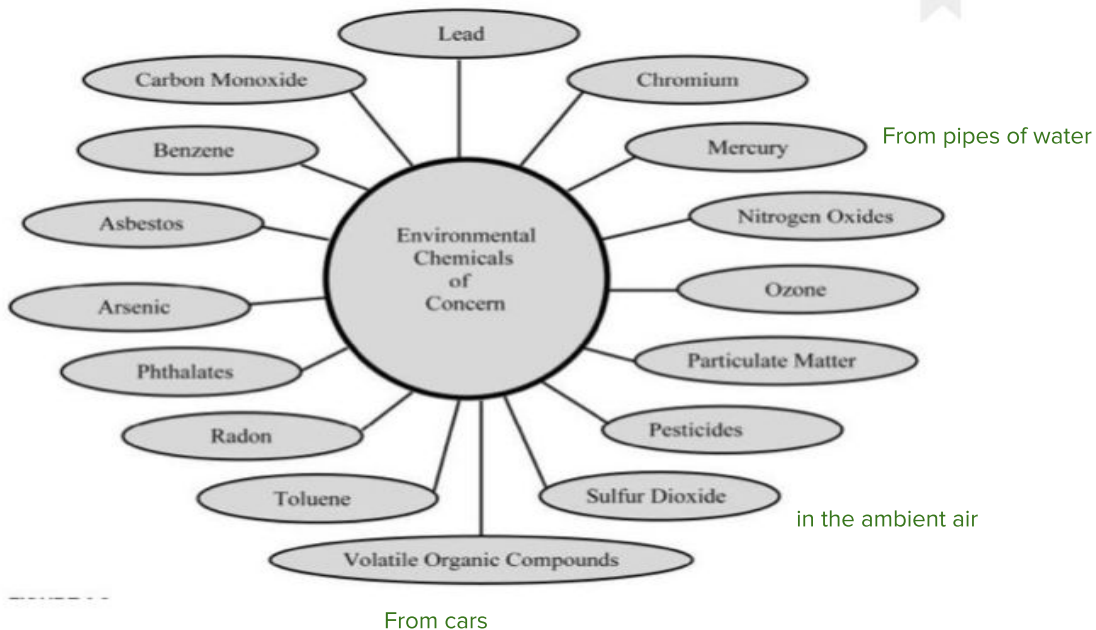
How do humans damage the environment?

- 1- Air
- 2- water
- 3-soil
- 4- Biota (biological organism)

by industrialization and taking away forests

Chemicals

Chemical Concerns



its imp to know
 How to measure the chemical itself? (and know the amount therefore control it)
 like the ozone for example, what can u do?
 Community education for e.g, suggest carpooling and not using cars at the same time, Try to decrease combustion, also planting and agriculture.

1) Air Quality

- **Air pollution:** the introduction of chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or cause damage to the natural environment or built environment, into the atmosphere.
- **Air pollutant:** A substance in the air that can cause harm to humans and the environment. Pollutants can be in the form of solid particles, liquid droplets, or gases. In addition, they may be natural or man-made.

==> Types of pollutants:

Primary (directly emitted) <i>Immediately goes to the body</i>	Secondary (form in air when primary pollutants interact)
Sulphur oxide, Nitrogen oxides, carbon monoxide (CO), CO ₂ , volatile organic compounds, particulate matter, persistent free radicals, chlorofluorocarbons, ammonia, odors, radioactive material	Ozone , smog, peroxyacetyl nitrate <i>oxygen itself is not harmful but when it goes to the ozone it creates free radicals and kills cells— chronic inflammation</i>

2) Water Sanitation and Availability:

➤ In order for water to be Safe for human consumption:

- ✓ Free of pathogenic agents
- ✓ Free of harmful chemical substances
- ✓ Pleasant to taste
- ✓ Usable for domestic purposes

Issues with water:

- Humans need 2 litres of water per day
- Water should be available
- Should be sanitary

1.quality of water
 2.availability of water

➤ Sources of water:

1. Rain
2. Surface water (River, stream, lake) river and streams are clear but Lakes: stagnant so im afraid of protozoa
3. Ground water (Wells, springs)

➤ Water pollution:

- Water appears naturally with impurities (not hazardous):
 1. Dissolved gasses (CO₂, N, H₂S)
 2. Dissolved minerals (Ca, Mg, Na)
 3. Suspended impurities (Clay, sand, mud)
- Pollution of water due to industrialization (hazardous) so not only does this affect us directly this also affects the aquatic life
 1. Sewage contaminated water by human excreta (fecal oral infections)
 2. Toxic waste
 3. Agricultural pollutants (insecticide, fertilizers)
 4. Heat and radioactive materials

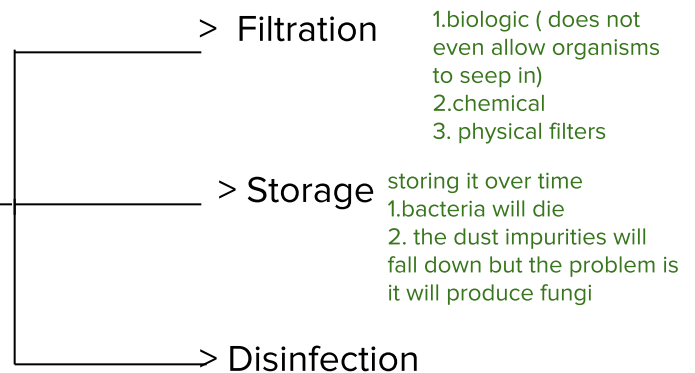
➤ Water related disease:

- Biological causes: (Viral, bacterial, protozoal, helminthic, snail (*schistosoma*), cyclopes,)
 - Chemical causes: 1) Cyanides, dyes, heavy metals, bleaching agents (it is used to disinfect water but too much is bad), ammonia
- 2) Directly cause disease or indirectly (fish life).

➤ Water purification:

- **Depends on source:**

- 1- Wells and springs -> only disinfection
- 2- Surface water -> needs more treatment



➤ Water storage:

- To preserve water from further contamination and pollution
 - Provides a small amount of purification
1. Number of bacteria die out
 2. Suspended impurities fall by gravity
 3. Chemical composition changes (↓free ammonia, ↑nitrates)
- Must be stored within a certain period
1. Prolonged periods cause vegetable growth (algae)

it doesnt kill hep A polio
cocksakie, salmonella

➤ **Methods for disinfection:**

1. Heat (boiling for 10-20 min kills most organisms and sterilizes water)
2. Chlorination (kills bacteria but not spores and viruses)
3. Ozonation
4. Bleaching powder (chlorinated lime)
5. Bromination

fluoride in the water to prevent tooth decay

➤ **Challenges with disinfection:**

- Sterilization (boiling) is impractical at a large scale (only feasible at homes)
- Chlorination is the most widely method used
- Organisms resistant to chlorination (E coli, salmonella, polio, HAV)
- Decision for disinfection method depends on:
 1. Costs; availability of technology and method
 2. Target organism to get rid of
 3. Ability to produce residual to provide post- treatment disinfection

3) Risk Assessment:

➤ **What is risk assessment?**

- The process of estimating the potential impact of a chemical, physical, microbiological or psychosocial hazard on a specified human population or ecological system under a specific set of conditions and for a certain time frame.
- In other words, we try to estimate the risk for exposure to a specific hazard in the environment, based on the several assumptions .

➤ **Environmental risk assessment involves assessing impacts of:**

1. Chemical pollutants and contaminants in air, water, soil and food
2. Pathogenic microbiological contaminants in food and water
3. Radiation sources
4. Electromagnetic fields (EMFs)
5. Climate and climate change

➤ Things to keep in mind when attempting risk assessment

- Heavily relies on assumptions (not what really happens)
- Does not take into account the different interaction of environment with other factors
- Exposures and outcomes on which the risk assessment is based are poorly defined

For example: gas and ozone is hard to measure

➤ Types of environmental risk assessment

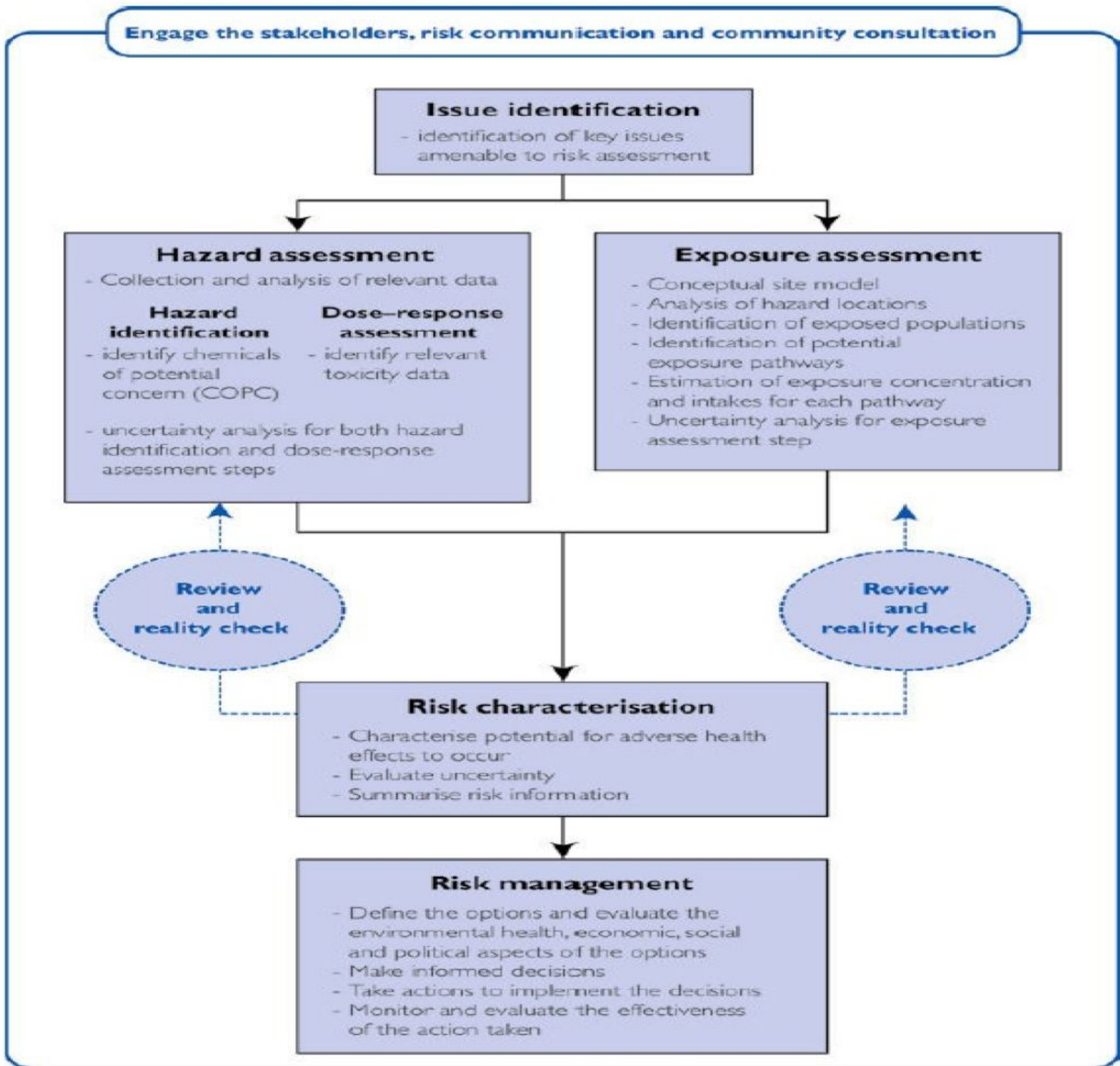
- Individual (for example: radiologists measure radiation exposure by device) and population-based
- Quantitative and qualitative
 - Categories of risk vs. numeric estimation

The five stages of environmental hazard risk assessment



<p>Issue identification</p>	<ul style="list-style-type: none"> <input type="checkbox"/> What is the problem in question? <input type="checkbox"/> Can the problem be addressed by the proposed risk assessment? <input type="checkbox"/> Do we have the technology and capabilities to apply the assessment process? <input type="checkbox"/> Are there any factors that contribute to persistence of that risk? <input type="checkbox"/> Did the risk come about as a breach in public health measures?
<p>Hazard identification</p>	<ul style="list-style-type: none"> <input type="checkbox"/> How severe are the health effects? And are they reversible? <input type="checkbox"/> Is there interaction between this hazard and other agents in the environment? <input type="checkbox"/> Is the onset of the effect immediate or delayed after exposure to hazard? <input type="checkbox"/> Is there a critical window for exposure?
<p>Dose response assessment</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Does the exposure to the hazard exhibit a dose- response relationship for the effect to appear? <input type="checkbox"/> Is there a critical threshold for exposure? (cut-off point over which the effects will take place) <small>for example : viral load for bacteria: are they viable, are they resistant to antibiotic?</small>
<p>Exposure Assessment</p>	<ul style="list-style-type: none"> <input type="checkbox"/> What is the nature of exposure? <input type="checkbox"/> Is there a specific frequency of exposure? <input type="checkbox"/> Is there a latency period for exposure? <input type="checkbox"/> Can the critical time of exposure be determined? In order to be targeted for prevention and control measures <input type="checkbox"/> Has the route for exposure been identified? Is there more than one route? <input type="checkbox"/> Is exposure one time, continuous or intermittent?
<p>Risk characterization</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Is there genetic variability in exposure to the hazard? <input type="checkbox"/> Do personal characteristics play a role in exposure to hazard? Or do they play a role in the development of the health outcome following exposure to hazard? <input type="checkbox"/> Should we consider any population characteristics or dynamics? <small>migration = crowding, pollutants of cars increase</small>

Figure 1: Environmental health risk assessment model



4) Prevention and control:

➤ **Monitoring Water:**

- Biological surveillance of water:
 1. Sanitary surveys.
 2. Inspection of manufacturing of water bottles and ice.
 3. Inspection of reservoirs and wells.
 4. Establishing policies and procedures for extracting water from wells, and maintaining water safety and storing water.

➤ **Monitoring air pollution:**

- Monitoring the concentration of:
 1. Sulphur dioxide the worst that causes direct harm
 2. Smoke
 3. Suspended particles

Summary:-

Environmental Health: the science and practice of preventing human injury and illness and promoting well-being by identifying and evaluating environmental sources and hazardous agents and limiting exposures to hazardous agents.

Components of the environment: Physical, Chemical, Biological, Social.

1) Air Quality

Air pollution	Air pollutants	Types of pollutants
the introduction of materials that cause harm to humans or other living organisms, or cause damage to the natural environment or built environment, into the atmosphere.	A substance in the air that can cause harm to humans and the environment.	<ul style="list-style-type: none"> ● Primary (directly emitted): Sulphur oxide, Nitrogen oxides, carbon monoxide (CO)... ● Secondary (form in air when primary pollutants interact): Ozone, smog, peroxyacetyl nitrate

2) Water Sanitation and Availability

Sources of water	Water pollution	Water related disease
<ol style="list-style-type: none"> 1. Rain. 2. Surface water. 3. Ground water. 	<p><u>NOT hazardous:</u> Dissolved gasses (CO₂, N, H₂S), Dissolved minerals (Ca, Mg, Na), Suspended impurities (Clay, sand, mud)</p> <p><u>Hazardous:</u> Sewage, Toxic waste, Agricultural pollutants (insecticide, fertilizers), Heat and radioactive materials</p>	<ul style="list-style-type: none"> ● Biological causes: Viral, bacterial... ● Chemical causes: Cyanides, dyes...
Water purification	Water storage	Methods for disinfection
<ol style="list-style-type: none"> 1. Filtration 2. Storage 3. Disinfection 	<ul style="list-style-type: none"> ● To preserve water from further contamination and pollution. ● Provides a small amount of purification. ● Must be stored within a certain period. 	<ol style="list-style-type: none"> 1. Heat. 2. Chlorination (can't kill spores and viruses) 3. Ozonation. 4. Bleaching powder. 5. Bromination.

3) Risk Assessment

What is risk assessment?

The process of estimating the potential impact of a chemical, physical, microbiological or psychosocial hazard on a specified human population or ecological system under a specific set of conditions and for a certain time frame.

It involves assessing impacts of:

1. Chemical pollutants
2. Pathogenic microbiological contaminants
3. Radiation sources
4. Electromagnetic fields (EMFs)
5. Climate and climate change

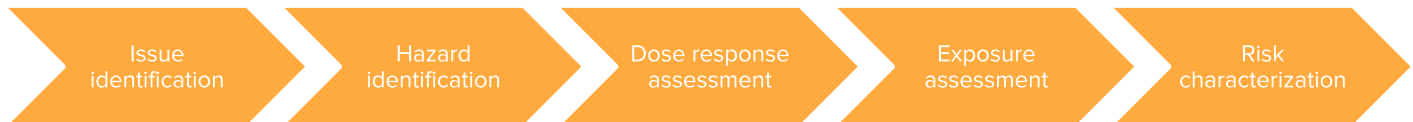
keep in mind when attempting risk assessment:

- Heavily relies on assumptions
- Does not take into account the different interaction of environment with other factors
- Exposures and outcomes on which the risk assessment is based are poorly defined

Types of environmental risk assessment:

- Individual and population-based
- Quantitative and qualitative

The five stages of environmental hazard risk assessment:



4) Prevention and control

Monitoring Water:

- Biological surveillance of water:
 1. Sanitary surveys.
 2. Inspection of manufacturing of water bottles and ice.
 3. Inspection of reservoirs and wells.
 4. Establishing policies and procedures for extracting water from wells, and maintaining water safety and storing water.

Monitoring air pollution:

- Monitoring the concentration of:
 1. Sulphur dioxide
 2. Smoke
 3. Suspended particles

Good luck!

