



Community Medicine

Summary

Slide # 10

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Environmental health

Environmental health is the study and management of environmental conditions that affect the health and well being of humans. It differs from the study of how humans affect the environment, because it focuses on people's health. For example, an environmental scientist might study how water pollution is hurting fish. An environmental health scientist would study what happens to the health of people from eating those fish.

CDC' definition: "environmental health is the discipline that focuses on the interrelationships between people and their environment, promotes human health and well-being, and fosters a safe and healthful environment."

The environment: is all the external conditions, circumstances and influences surrounding and affecting the growth and development of an organism or community of organisms.

- External environment (Macro-environment) → all that is external and in constant interaction with a human host (living and non living). It is responsible for millions of preventable diseases originating in it.
- Micro-environment → the domestic environment in which man lives.
- Internal environment is some times used for the environment inside the body.

Components of the environment:

- Physical: Air, water, soil, housing, climate, geography, heat, light, noise, radiation, etc.
- Biological: man, viruses, animals, and plants, etc.
- Psychosocial: cultural values, customs, beliefs, habits, attitudes, morals, religion, education, lifestyle, community life, health services, social and political organization.

An environmental health hazard: is a substance that has the ability to cause an adverse health event. This includes physical ,chemical, biological, psychosocial, sociological, or site and location hazards (factors that are external to a person).

Concept of disease → results from complex interaction between man, agent and environment.

Ecological point of view: disease is defined as “maladjustment of the human organism to the environment”.

Hazards can be natural or man-made. Examples:

Air, water and soil pollution from transportation, agriculture, industry and other sources such as: chemicals, toxic waste, radiation, disease-causing microorganisms and plants, pesticides, heavy metals, climate, extreme temperatures and weather events, where you live home and community design, chemicals in consumer products.

1. Biological hazards: living organisms or their products that are harmful to humans. Such as:

- Water-borne diseases → transmitted in drinking water. The disease organisms are passed down in feces and can produce illness to those who consume contaminated water. (Disinfecting water is required).
Ex: polio virus, hepatitis A, salmonella, shigella, cholera, amoebic, dysentery and Giardia.
- Food-borne diseases → transmitted in or on food. To protect against it, verification that food is stored and handled properly is required.
Ex: salmonella, escherichia, etc.
- Vector-borne diseases → transmitted by insects or other arthropods. Outbreaks are caused by improper environmental management.
Ex: encephalitis (by mosquitoes), plague and typhus (by fleas).

2. Chemical hazards: mismanagement or misuse of chemicals.

- Pesticides → manufactured to reduce populations of undesired organisms (pests). They mostly kill non-target organisms as well. Wise use can protect human health. Misuse of it can cause illness and death. Ex: herbicides and insecticides. Some pesticides such as DDT (developed in the 20th century) were persistent (remained in the environment for a long time). Newer ones are less persistent.
- Environmental tobacco smoke (ETS) → produced by those who smoke. ETS is a carcinogen and causes diseases such as lung cancer and cardiovascular diseases. Smoking is restricted from public buildings and private work sites. Regulation of smoking is the best way to control this pollutant.
- Lead → a natural element used to manufacture many industrial and domestic products. Health problems caused by lead: anemia, birth defects, bone damage, neurological damage, kidney damage, etc.

Exposure is by ingestion and inhalation.

Children are at risk from eating peeling lead paint.

Occupational exposure is the major source of intake by adults.

Solution: prevention by education, regulation and prudent behavior.

3. Physical hazards: includes airborne particles, humidity, equipment design and radiation.

- Randon gas exposure → arises naturally and sometimes at dangerous levels in buildings and homes. Disease association: lung cancer.
- UV radiation → it reaches humans as short wavelength energy that can damage cells by ionization. Disease association: skin cancer.

Protection: reduce UV exposure, stay inside, wear protective clothes or sunscreen.

4. Psychological hazards: environmental factors causing psychological changes such as stress , depression, hysteria.

5. Sociological hazards: factors that result from living in a society where one experiences noise, lack of privacy and overcrowding. Example of such factors: population growth.

6. Site and location hazards: natural disasters such as cyclones, earthquakes, floods, hurricanes, tornadoes, typhoons, and volcanic eruption. They are geographical and meteorological events that cause damage and injuries to communities and might increase biological, psychological and sociological hazards as a result.

THE 7 CORE CONCEPTS :



- Toxicity
- Exposure
- Dose/response
- Individual susceptibility
- Risks and benefits
- Environmental justice
- Community resources and action

1. Toxicity:

Toxicology is the study of how environmental hazards(natural or human-made chemicals) can enter our bodies and make us sick.

People working in environmental health-related jobs have taken classes in Toxicology. Different chemicals are studied by understanding their toxicity.

A Toxicity Scale

Toxicity Rating	Signal Words on Package	Symbol on Package
Highly Toxic	DANGER or POISON	
Moderately Toxic	WARNING	
Slightly Toxic	CAUTION	
Not Toxic	none	

EXAMPLES

➔ Bleach

➔ Toilet bowl cleaner

➔ Detergent

➔ Baking soda

2. Exposure: environmental health scientist use the term exposure to describe the total amount of a hazard that comes in direct contact with your body.

Environmental hazards that we are exposed to ➔ bacteria, viruses, UV rays, etc. (Could be natural hazards or from human activities).

THE 3 PARTS OF EXPOSURE:

- Sources of those hazards ➔ cars, industries, volcanic eruption, etc.

The hazard travels along an environmental pathway from the source to us for exposure.

- Environmental pathways ➔ air, water, food, soil, etc.

- The contact → inhaled fumes, etc.

Which route will the hazard take?

- Route#1: Inhalation (breathing)

Chemicals can get stuck in the lungs and/or be taken up into the bloodstream.

- Route#2: Ingestion (swallowing)

Chemicals can easily be taken up into the bloodstream.

- Route#3: dermal absorption (through the skin, including the eyes)

Chemicals can sometimes enter the bloodstream through this route of exposure.

Those are the 3 main routes of exposure. They are the same routes in which vitamins, nutrients, and medicines enter the body.

- You can also get it directly into your body though an injection.
3. Dose/response: it depends on 3 factors → duration of exposure (how long) frequency of exposure (how often), body size (a teaspoon of medicine might be right for an adult, but too large for an infant).

For most hazards, the larger the dose, the more extreme the response will be.
For example: drinking 5 cans of soda might make you feel light-headed and sick.

4. Individual susceptibility: some people are more susceptible to environmental hazards because of their genetics , body size, age, gender, or general health. This is called *individual susceptibility*.
5. Risks and benefits:

Risks & Benefits

BENEFITS

- No bugs!
- Better looking fruit that is more visually appealing
- Bigger crops so farmers can make more profit



RISKS

- People ingest pesticides with the fruit and get sick
- Pesticides get into dirt and water
- Animals ingest pesticides and get sick

6. Environmental justice (EJ): means that everyone has a right to live in an environment that's doesn't make them sick, regardless of their race, culture or income.

The EJ process: who is producing the hazard? Who is being exposed? Who are the decision makers? Empowering community members to bring about change, etc.

7. Community resources and action:

Where can you go for information? Government agencies, schools, libraries, universities , doctors, nurses, hospitals, health department, Internet, etc.

ENVIRONMENTAL PUBLIC HEALTH

Effective practice of environmental public health to reduce morbidity and mortality this response requires three areas of emphasis:

- Surveillance and tracking → data is collected continuously that monitors environmental factors (food, air, water, housing, etc), environmental exposures and human disease rates. Such system should be aimed at local level.
Biomonitoring data is better used to characterize individual exposures. We need to use these data to understand complex interacting exposures.
- Research → use of data collected to extract knowledge by analyzing and interpreting them to estimate disease risks in real life, predict trends, and suggest hypotheses that can be followed up though scientific studies.
- Implementation → use of knowledge to reduce health risks. Regulation should be continued where appropriate but much of what protects our health happens at our kitchen tables. Our daily personal choices have a profound effect on our health (types of food we eat, indoor air quality, whether we smoke or/and drink alcohol, etc)

WHAT IS A GREEN HOUSE GAS?

Any gas that traps heat in the atmosphere(by absorbing infrared radiation) therefore are responsible for the greenhouse effect which causes global warming. Gas molecules such as water vapor, Carbon dioxide, ozone, and methane with three or more atoms can capture infrared rays and so are greenhouse gases.

CLIMATE CHANGE

Human activities such as burning of fossil fuels have released CO₂ and other greenhouse gases, trapping heat in the lower atmosphere changed global climate

which can affect the human health by numerous ways. For example, it can increase frequency of extreme weather events such as hurricanes, disturbing the ecosystem, altering the geographic range and seasonality of certain infectious diseases).

Although global warming might decrease winter deaths and increase food production (in some countries) , the overall effects are likely to be negative. It affects social and environmental determinants of health (clean air, safe drinking water, sufficient food and secure shelter).

Extreme high air temperatures contributes to death from cardiovascular and respiratory diseases especially among the elderly.

High temperatures increase levels of ozone (and other pollutants) and pollens (and other aero allergens). This can trigger asthma which affects around 300 million people around the globe.

NATURAL DISASTERS AND VARIABLE RAINFALL PATTERNS

- They have tripled globally since the 1960s.
- Results in 60,000 deaths each year (mainly in developing countries).
- Rising sea level and increasingly extreme weather events destroy homes, medical facilities and other essential services.
- People living by the sea might be forced to move which can cause mental disorders and communicable diseases.

Those people represent more than half of the world's population.

- Variable rainfall patterns can supply unsafe water.
Increased risk of diarrhoeal disease which kills approximately 760,000 children aged under 5 each year.
Climate change is likely to increase the frequency and intensity of drought regionally and globally.
- Floods: can cause contamination of fresh-water, increase waterborne diseases, increase Vector-borne diseases, drownings and physical injuries, damage homes and disrupt medical and health services.
- Rising temperatures is likely to decrease production of staple food in the poorest countries → malnutrition (causes 3.1 million deaths per year).

PATTERNS OF INFECTION:

- Changes in climate may cause waterborne diseases and lengthen the transmission seasons of Vector-borne diseases.

Ex: malaria which is transmitted by Anopheles mosquitoes kills almost 600,000 people every year mainly African children under 5 years old.

Climate change is likely to increase the Aedes mosquito vector of dengue.

Measuring the health effect from climate change is only an approximate. 250,000 additional deaths per year from 2030-2050 is concluded by WHO:

- 38,000 due to heat exposure in elderly people, 48,000 due to diarrhoea, 60,000 due to malaria, and 95,000 due to childhood undernutrition.

All populations will be affected by climate change but some are more vulnerable than others (people living in coastal, polar and mountainous regions, children in poor countries, elderly and people with pre-existing medical conditions).

Developing countries which have weak health infrastructure are the least to cope.

WHO response: policies and individual choices have the tendency to reduce greenhouse gases and increase health benefits (Ex: cleaner energy system).

Just read this slide :")

In 2015, the WHO Executive Board endorsed a new work plan on climate change and health. This includes:

- **Partnerships:** to coordinate with partner agencies within the UN system, and ensure that health is properly represented in the climate change agenda.
- **Awareness raising:** to provide and disseminate information on the threats that climate change presents to human health, and opportunities to promote health while cutting carbon emissions.
- **Science and evidence:** to coordinate reviews of the scientific evidence on the links between climate change and health, and develop a global research agenda.
- **Support for implementation of the public health response to climate change:** to assist countries to build capacity to reduce health vulnerability to climate change, and promote health while reducing carbon emissions.

Occupational health → health and safety in the workplace to primary prevent hazards that can lead to cancer, accidents, musculoskeletal diseases, respiratory diseases, hearing loss, circulatory diseases, stress related disorders, communicable diseases and others.

Employment and working conditions embrace other important determinants such as working hours and salaries.

Occupational health and safety should protect and prevent workers from risk factors adverse to health (physically, mentally and socially) for adaptation of work.

Poor working conditions are found everywhere, both indoors and mainly outdoors.

It can have harmful effects not only on workers, but their families and on the physical environment around the workplace as well. For example, workers spraying pesticides are exposed to toxic chemicals. Their families living in the same area can be exposed as well by drinking contaminated water, inhaling the pesticides, etc. Chemicals can get absorbed into the soil or leach into the ground water supplies leading to adverse effects that can be permanent.

Overall, efforts must aim to prevent hazards and at the same time recognize the connection between worker health and safety in the workplace, and the environment in the workplace.

Everyday workers all over the world are faced with health hazards such as dusts, gases, noise, vibration, and extreme temperatures. Unfortunately, some employers take little responsibility for the protection of the workers, and as a result work accidents and diseases occur. That's why occupational health and safety is important.

Direct costs of an injury for workers: pain and suffering, loss of income, possible loss of job, health care costs.

Direct costs for employers: payment for work not performed, medical and compensation payment, halt in production, increased training expenses and administration costs, etc.

OCCUPATIONAL DISEASES:

- Asbestosis → cause by Asbestos which is common in insulation, automobile break, etc. Asbestos is a mineral which can be released into the air in which a worker can inhale. It can cause parenchymal asbestosis, asbestosis related pleural abnormality, lung cancer and mesothelioma. When exposed to asbestosis, stop the exposure first and contact a doctor to receive chest x-ray, pulmonary function tests and annual flu shots and a pneumococcal vaccine. Quite smoking too.
- Silicosis → caused by silica which is common in mining , sandblasting, etc.
- Lead poisoning → caused by lead which is common in battery plants, paint factories, etc.

- Noise induced hearing loss → caused by noise, common in airports and other workplaces with noisy machines such as presses and drills.

Health and safety programmes control workplace hazards by informing workers and employers about them, maintaining records of any exposure, committees that include both workers and management , and making health of workers a priority to employers.

GOOD LUCK