Unit-III

Air pollution, Noise and Health

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- Functions and importance of air in human body

Air- A mixture of nitrogen, oxygen and minute amounts of other gases that surrounds the earth and forms its atmosphere

Air is a mixture of about

78% Nitrogen
21% Oxgen
0.9% Argon
And very small amount of other gases

0.04% carbon dioxide
1% water vapour

Functions of air @TRIP CO

1. Oxygen Supply- Air provides oxygen essential for cellular respiration, a process where cells generate energy.

2. Carbondioxide removal- Exhalation eliminates CO_2, a byproc of metabolism, preventing its buildup.

3. Respiratory Gas exchange- Enables the exchange of oxygen and CO_2 in the lungs, supporting efficient respiration.

4. pH Regulation- contributes to maintaining a balanced pH level in bodily fluids, crucial for biochemical reactions.

5. Blood oxygenation- Oxygen from the air is transported by blood to tissue and organs, supporting their functions.

6. Immune System support- Filters out pathogens and foreign particles, assisting the immune system in defense.

7. Thermoregulation. Breathing influences heat exchange, contributing to the body's temperature regulation.

8. Speech and Vocalization. Airflow through the vocal cords allows for speech and vocal expression.

Importance of air: @SCHEM

1. Survival - Adequate oxygen intake from air is vital for human survival.
2. Energy production. Oxygen obtained supports the production of energy through cellular respiration.
3. Metabolic processes. Facilitates metabolic reactions necessary for growth, repair and maintenance of tissues.
4. Health maintenance. Supports overall health by aiding in waste removal and immune system function.
5. Cognitive function. Oxygen is crucial for brain function, affective cognition and mental alertness.
6. Homeostasis. Contributes to the body's internal balance and stability.

- Criteria air pollutants

Air pollution

The term "air pollution" signifies the prevence of in the ambient (surrounding) atmosphere of substances (eg. gases, mixture of gases & particulate matter) generated by the activity of man in concentrations that interfere with human health, safety or comfort or injurious to vegetation & animals & other environmental media resulting in chemical entering the food chain or being present in the drinking water & thereby constituting additional source of human exposure.

Air pollutants

a. Gases and vapours
- Sulphur dioxide, carbon monoxide, hydrogen cyanide gases
- Vapours of trichloroethylene, benzene, xylene, etc.

b. Suspended particulate matters
- Dusts
- Fumes
- Smoke
- Mist
- Fog
- Smog

The WHO reports on six major air pollutants

1. Particle pollution
2. Ground level ozone
3. Carbon monoxide
4. Sulphur oxides
5. Nitrogen oxides and
6. Lead

Classification of Pollutants

- Primary pollutants. Primary pollutants are directly produced from a process, such as
- oxides of nitrogen
- the carbon monoxide gas from a motor vehicle exhaust
- sulfur dioxide released from factories.

- Secondary pollutants. Secondary pollutants are not emitted directly or secondary. they form in the air when primary pollutants react or interact. such as
- ground level ozone
- acid rain
- peroxy- acetyl nitrate (PAN)

Classification of air pollution

- Sources of indoor air pollution @DAIS STCC

- Domestic fuel, wood burning
- Incineration/burning of waste: household and commercial waste, agricultural burning. Industrial and hazardous waste incineration.
- Tobacco smoke
- stove
- aerosol sprays
- Cigarettes
- Coal combustion

Sources of ambient air pollution

1. Mobile sources/ transportation - Include motor vehicle, rail, ship, aircraft
2. Stationary sources - Include utility, industrial, institutional and commercial facilities. Examples are powerplant, heating plant, paper pulp industry, petroleum refineries, municipal waste combusters.
3. Forest fire, volcanic eruptions, pollen grains, certain bacteria, viruses (natural)
4. Chemicals and materials used in different processes (perchloroethylene, methylchloride)
5. Resuspension from road

Air Pollution and Health risks

	Pollutants	Adverse effect
1.	Oxide of nitrogen	Respiratory tract irritation, bronchial hyperactivities, impaired lung defenses
2.	Hydrocarbon	Lung cancer
3.	Ozone	cough, substernal discomfort, broncho constriction, decreased exercise performa respiratory tract irritation
4.	Lead	Impaired neuropsychological developmen in children
5.	Sulphur dioxide	Exacerbation of asthma and COPD, respiratory tract irritation, hospitalizatio

may be necessary, and death may occur in severe exposure.

Management of air pollution: measurement, monitoring and control

ways to reduce air pollution

. At home

- Recycle paper, plastic, glass bottles, cardboad, and aluminium cans
- keep woodstoves and fireplaces well maintained.
- plant deciduous trees in locations around your home
- converve energy

. Buy smart

- choose efficient, low-polluting models of vehicles.
- choose products that have less packaging and are reusable.
- shop with a canvas bag instead of using paper and plastic bags.
- Buy rechargeable batteries for devices used frequently

. Drive wise

- keep tires properly inflated and aligned.
- Get regular engine tune ups and car maintenance checks
- Use an energy-conserving (ec) grade motor oil.
- Report smoking vehicles to your local air agency.

Prevention and control of air pollution

The WHO has recommended the following procedures:

- Containment- That is, prevention of escape of toxic substance into the ambient air.
- Replacement- That is, replacing a technological process causes air pollution, by a new process that does not.
- Dilution- Dilution is valid so long as it is within the self cleaning capacity of the environment. For example, some air pollutants are readily removed by vegetation.
- Legislation- Air pollution is controlled in many countries by suitable legislation. eg. Clean air acts.
- International action- To deal with air pollution on a world wide scale, the WHO has established an international network of laboratories for the monitoring and study of air pollution.

- Definition of noise

Sound that is unwanted or that disrupts the activity or balance of human or animal life is called noise. when there is lot of noise in the environment, it is termed as noise pollution.

sound become undesirable when it disturbs the normal activities such as, working sleeping, and during conversati

Noise Pollution

Noise pollution is displeasing or excessive noise that may disrupt the activity or balance of human or animal life.

Noise means disgust or discomfort hearing from environment.

Sources of Noise Pollution

- Mabhines
- Transportation systems
- Motor vehicles
- Aircrafts
- Trains
- Poor urban planning

- Noise levels and health effects

Noise level standard of Nepal (2069)

S.N	Area	Noise level dB(A)	
		Day time	Night time
1.	Silent zone	50	40
2.	Industrial ~~zone~~ area	75	70
3.	Business area	65	55
4.	Rural Residential area	45	40
5.	Urban Residential area	55	45
6.	Mixed Residential area	63	40

source: Nepal Rajpatra, Kartik 13, 2069

. Health effects

1. Chronic exposure to noise may cause noise-induced hearing loss. Older males exposed to significant occupational noise demonstrate significantly reduced hearing sensitivity than their non-exposed peers.

2. Unwanted noise can damage physiological and psychological health. Noise pollution can cause annoyance and aggression, hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances, and other harmful effects.

3. High noise levels can contribute to cardiovascular effects and exposure to moderately high levels during a single eight hour period causes a statistical rise in blood pressure of five to ten points and an increase in stress and vasoconstriction leading to the increased blood pressure noted above as well as to increased incidence of coronary artery disease.

Effects on animals and aquatic life

1. Noise can have a detrimental effect on animals, increasing the risk of death by changing the delicate balance in predator or prey detection and avoidance, and interfering the use of the sounds in communication especially in relation to reproduction and in navigation.

2. An impact of noise on animal life is the reduction of usable habitat that noisy areas may cause, which in the case of endangered species may be part of the path to extinction. Noise pollution has caused the death of certain species of whales that beached themselves after being exposed to the loud sound of military sonar.

3. Some other effects on wildlife and aquatic animals are:

- Hormone imbalance
- Chronic stress
- Panic & escape behavior
- Abandonment of offspring
- Injury
- Increase in loudness of interspecies communication

- Noise health effects are the physical and psychological health consequences of regular exposure to consistent elevated sound levels. Elevated workplace or environmental noise can cause hearing impairement, hypertension, ischemic heart disease, annoyance, and sleep disturbance

- Management of Noise

i) Workers should be provided with equipments such as ear plugs and earmuffs for hearing protection.

ii) Similar to automobiles, lubrication of the machinery and servicing should be done to minimize noise generation.

iii) Soundproofs doors and window can be installed to block unwanted noise from ~~noise~~outside.

iv) Regulations should be imposed to restrict that usage of play loudspeakers in crowded areas and public places.

v) Factories and industries should be located far from residential areas.

vi) community development or urban management should be done with long-term planning, along with an aim to reduce noise pollution.

vii) Social awareness programs should be taken up to educate the public about the causes and effects of noise pollution.