



ENVIRONMENTAL PHYSIOLOGY

Health

• State of complete Physical, Mental & Social well-being of individual.

→ Physical Dimension-Good comp, well-built, good appetite, sound sleep, systems function normally, senses intact, P.R.,R.R.,B.P. normal. Assessed by Clinical exams & Lab investigation

→ Mental Dimension-A state of balance with surrounding, intelligence, memory, accept criticism, self-confidence, self-control, normal judgment. Assessed by behavior and attitude.

→ Social Dimension- Accepted, Respected & loved by all

■ Spiritual, Emotional, Vocational

→ Spiritual Dimension- Sound mind in a sound body with a philosophy, simple life with high thinking

→ Emotional Dimension- Not to lose temper & not to develop tension & has self-control

→ Vocational Dimension- Capable of earning sufficiently to lead life successfully.

Positive Health

Highest standard of health →

Enjoying a state of health

- Is a fundamental human right.
- Is an essence of productive life.
- Is the integral part of development.
- Is central to the concept of quality of life.
- Is world-wide social goal.

Well-Being →

- Subjective components-
 - Relates to “Quality of life”
 - Determined by health, happiness, education, social & intellectual factors, freedom of action

- Objective components-
 - Relates to “Standard of living”
 - Includes educational level, income, occupational status, standard of housing, nutrition, sanitation & other comforts

- Health never static.
- Varies with struggle, suffering & failures.
- Death & positive health.
- Transition is gradual like "VIBGYOR" spectrum of rainbow.

Determinants of Health →

- Genetic(biological) factors.
- Environmental factors.
 - a) Internal environment- Organs & systems of body(Homeostasis)
 - b) External environment- Physical(air, water, soil), Biological(plants & animals), Social(traditions, culture, customs)

Life Style → Way of living(Health Behavior)

- Includes cultural patterns, social values, behavior of habit(eg. Smoking, alcoholism etc.)
- Associated diseases eg. AIDS, CHD, Obesity, Lung Cancer.
- Promotion of Health eg. Adequate nutrition, yoga, meditation, enough sleep

Socio-economic conditions →

- Education- Illiteracy, associated with increased morbidity & mortality
- Occupation- Unemployment causes psychological & social damage
- Income- The key factor determines standard of living & quality of life

Concept of Prevention →

a) Health Promotion:-

- Health Education
- Sex Education
- Adequate Nutrition
- Improvement in Environmental Sanitation
- Promotion of Breast feeding & Weaning
- Family Planning & spacing of Births
- Genetic Counseling
- Efficient Ante and Post Natal Care
- Recreation Facilities & Improvement of Literacy Level
- Yoga, Exercise & Meditation

b) Specific Promotion:-

- Immunization
- Condom against AIDS
- Use of Nutrients Vit. A, Iodized Salt
- Lead Apron avoid Radiation Hazards
- Sterilization
- Pasteurization
- Quality control of foods, drugs and cosmetics

Primordial Prevention → Health education from childhood avoiding HT, DM, Obesity etc.

Environmental physiology

- Ext. factor present around the man.
- Influence on the Health of Human.
- State of Dynamic Equilibrium.
- Disturbance causes ill Health.

It includes:-

- Effect at High Altitude.
- Deep Sea Physiology.
- Effect of Exposure to cold.
- Effect of exposure to heat.
- Effects Of Pollution on Human Physiology

Effect at High Altitude

Effect of Hypoxia →

- On blood - Erythropoietin stimulates R.B.M.
- On C.V.S. - Increased Heart Rate, Cardiac Output, B.P.
- On Respiration – Increased Respiratory rate.
- On Digestive System – Loss of Appetite, Nausea, Vomiting
- On Kidney – Alkaline urine is excreted.
- On C.N.S. – Depression, loss of self-control, talkativeness, rudeness, ill-tempered, shouting, loss of judgment, memory impaired, lack of coordination, fatigue of muscles, loss of consciousness & death.
- Mountain Sickness – Pulmonary edema, Cerebral edema

Effect Of Expansion Of Gases

- Painful Distension of stomach & intestine.
- Destroy the Alveoli
- Gases evolve as bubbles

Acclimatization

- Blood – Hematocrit rises to 59%, Hb. 20%
- C.V.S. – Increased Vasculature
- Respiratory System – Increased Pulmonary Ventilation, diffusing capacity of gases increases in alveoli
- Oxidative Enzymes increased

Deep Sea Physiology

- Compression effect on body & internal organs.
- Decrease in volume of gases.
- Nitrogen narcosis
- Decompression →
 - Bubbles in Myelin sheath of S.N.F. produces pain & numbness, in M.N.F. produces temporary paralysis
 - Cramps in Muscles
 - Bubbles in Blood may occlude coronary artery.
 - Fatigue, unconsciousness & death.

Effects of Exposure to Cold

- Loss of temp. regulating capacity
- Loss of hypothalamic function
- Metabolic activity suppressed
- Coma due to C.N.S. depression

Effects of Exposure to Heat

- Heat Exhaustion
- Dehydration
- Heat cramps
- Heat Strokes → Dizziness, headache, vertigo, confusion, paralysis, unconsciousness

Environmental Components

- Physical → Water, air, soil, radiation, light, noise, vibration, refuse, wastes.
 - Biological → Plants, animals, rodents, insects, microbes
 - Social → Occupation, literacy, income, religion, standard of living, life style, H.S.
 - Cultural → Tradition, culture, custom, habits etc.
 - Pollution → Industrialization, urbanization, man activities.
 - Sanitation → Safeguarding of Health (Diseases are due to poor sanitation)
 - Contamination of Water, Pollution of air, soil.
 - Unhygienic disposal of sewage, refuse, waste, Infestation of insects.
- Supplemented by – Social factors like poverty, illiteracy, ignorance, overcrowding etc.

Water

- Influence on health, directly & indirectly
- Water may be contaminated(pathogens & chemicals) & polluted(impurities)

Health Hazards of Water Contamination

- Chemical Hazards
- Deficiency of Fluoride < 1mg/l dental caries.
- Excess of Fluoride causes dental & skeleton Fluorosis
- Decreased Iodine results in goiter.
- Excess of Nitrates > 45mg/l cause cyanosis
- Sulphates & chlorides cause Diarrhoea, Dyspepsia
- Salts of lead, iron, zinc causes constipation colicky abdomen
- Excess lead causes Plumbism & Mica causes diarrhoea
- Due to contact diseases eg. Infection of ear, nose, throat, vulvo-vaginitis
- Mosquito-borne diseases, water washed diseases
- Biological Hazards
- Viral Diseases- Viral Hepatitis, Poliomyelitis
- Bacterial Diseases- Typhoid, Paratyphoid fever, E. coli diarrhoea
- Protozoal Diseases- Amoebiasis, Giardiasis

Air

- Immediate physical environment
- Breathing, cooling, smell & hearing
- Transmission of diseases
- 78% Nitrogen, 21% Oxygen, 0.03% Carbon Dioxide

Changes in air due to Human Occupancy

- Increased Temperature, increased R.H., decreased air movement
- Unpleasant odors, bacterial pollution
- Increased Carbon Dioxide & decreased Oxygen
- Affects health, comfort, efficiency of occupants

Effects of Vitiated Air

- Lassitude, Headache, Nausea, Vertigo, Vomiting, collapse & death..
- Anemia, debility, digestive disturbances, Nutritional & metabolic disorders, decreased resistance

Comfort Zone

Temperature \rightarrow 25-27⁰C, R.H. \rightarrow 30-65%,
P₄SR \rightarrow 1-3L, dry kata- 6 & above, wet
kata- 20 & above

Air pollution

Air Pollution → Public Health & Economic Problem

Sources domestic, industrial, vehicular etc.

Pollutants →

- Dust, smoke, sand, soot, grit
- CO₂, H₂S, CH₄, NO₂, SO₂, M.I.C., fluoro hydrocarbons etc.
- Arsenic, copper, Zinc, lead, carcinogens
- Pathogens, Spores

Pollutants affected by →

- Sun Light & Temp. Inversion
- U.V. rays act on oxides of nitrogen & hydrocarbons → Photooxidants
- Under T.I. fog+water vapour → smog
- Respiratory illness, suffocation & death

Temperature Inversion →

- Belgium in Dec., 1930(5 days) killed 63 people
- London, 1952 due to smog 4000 people died.
- Bhopal, 1984 leakage of M.I.C. killed thousands of people.

Hazards of Air Pollution

- Conjunctivitis, rhinitis, pharyngitis, bronchitis.

Global effects of air pollution

- Acid Rain → Deforestation, desertification, destroying aquatic life, soil erosion, damage to buildings and metals.
- Global Warming → Greenhouse effect
 - a. Rise of $0.3-0.6^{\circ}\text{C}$, dry climate, reduction in food production, melting of ice-caps, increased sea level, smog formation and cataract.
- Depleted ozone shield → inhibition of photosynthesis, disruption of marine food chain, impairment of immunity, skin cancer

Noise

- Unwanted sounds having frequency and amplitude.
- Whispering → 20-30dB, Normal Conversation → 30-65dB (limit 85dB), shouting → 100dB, train and aeroplane engine → 120dB, Threshold of pain → 140dB, Mechanical Damage → 150-160dB

Hazards of Noise

- Auditory Fatigue (whistling & buzzing)
- Temporary deafness → due to 4000-6000Hz
- Permanent deafness → due to 100dB
- Rupture of Tympanic membrane → 160dB
- Interference with speech, irritability, impatience, decreased efficiency, lack of consideration.
- Physiological changes → Interference with sleep, rise in B.P., heart rate, breathing, sweating, intracranial

LIGHT

- Health Hazards → Excessive light or glare results in blurring of vision, discomfort, accidents
- Poor Light → Headache, accidents & visual strain
- Biological effect → Degradation of bilirubin in Premature new born, stimulation of melanin & Vitamin D synthesis.

RADIATION

(Non-Ionising Radiations)

- U.V. rays → Natural → Sun
- Artificial → Mercury vapor tubes,
arc, electric
- carbon
welding

Effects

- On Skin → Melanin Pigment, Histamine
Thickening of layers, synthesis of
Vitamin D
Degeneration of Skin
Decrease in elasticity
Cancer of the skin
- On Eyes → Conjunctivitis, keratitis, photophobia
Flash Burns
Corneal Ulcer

IONISING RADIATIONS

- Electromagnetic radiations e.g. X-rays, Gamma rays
- Corpuscular radiations made up of sub-atomic particles

HEALTH HAZARDS

(1 to 9 Gray)

- Anorexia, nausea, vomiting, fatigue, sweating, oliguria
- Fever, anemia, leucopenia, thrombocytopenia, injury to C.S.
- Effect on skin and eyes.
- Genetic effects → Gonads exposed and chromosomes injured results in still births, congenital defects, neonatal effects, sterility.

Industrialization and Urbanization

- Hazards → Physical, Environmental, psychological and social etc.
- Motor vehicles produce hydrocarbons, nitrous oxide, CO₂ & lead particles.
- Effects of air pollution → Reduced Visibility, fog formation, reduced solar radiation

Soil

- It is sustainable resource → Modern techniques are designed to get maximum profits.
- Main objective is control soil degradation & improve soil productivity.

Land Degradation

Natural causes- Earthquakes, landslides, soil erosion, desertification, drought, floods.

Man-made causes- Mining, farming, deforestation, waste disposition and development activities like habitations, transport, communication, construction of dams & bridges.

Flood- Destroy agricultural land through sand deposition & salinisation
- Destroy forests, wildlife, leaching off soil cover of nutrients

Drought- Shortage of food production

- Lower level of ground water
- Lower rate of microbial decomposition in soil
- Decrease rate of mineral formation in soil
- Increase number of forest fires

Population Problems

- Pressure on land
- Created Environmental & socio-economic problem
- Increased demand of agriculture
- Increased use of insecticides & pesticides(non-bio degradable)
- Unemployment
- Consume more than production

Dumping of Wastes

- Solid waste disposal
- mining wastes
- industrial refuse

Green House Effect

Carbon Dioxide → Plants absorb & oceans.

Methane → Five times more effective than carbon dioxide.


Chlorofluorocarbons → Rising at the rate of 5% responsible for 15-20% of global warming

Nitrous Oxide → It is 230 times more efficient than carbon dioxide in global warming.

-Destruction of ozone layer.

Ayurved Concept(Janpadodhavansh)

- Effect of Kal & Ritu
- Vitiation of Jal, Vayu, Desh, Kal.
- Pragyapradha



If you want to learn about
the health of a population,
Look at the air they breathe,
The water they drink and
The places where they live.

Thanks