

# "CONCEPTS OF DISEASE"

Definition of Disease:

- A condition in which body health is impaired
- A departure from the state of health
- An alteration of the human body interrupting the performance of vital functions (Webster's definition)

 Ecological concept:

Disease is a maladjustment of the human organism to the environment.

 Important note:

- WHO defines health but does NOT define disease

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Spectrum of Disease 


Most diseases do not present in a single uniform form. Instead, they show a range of manifestations and severities, known as the spectrum of disease.

◆ In infectious diseases, this spectrum is called the gradient of infection.

Example: Poliomyelitis 

Polio infection → Different clinical outcomes:

- 95% → Subclinical (asymptomatic)
- 4% → Mild flu-like illness
- 1% → Paralytic poliomyelitis

 Exam point:

Presence of a large subclinical portion explains why disease transmission continues silently in the community.

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Disease, Illness & Sickness (Susser's Concept) 

According to Susser:

## 1. Disease

- A physiological or psychological dysfunction
- Objective and diagnosed by a physician

## 2. Illness

- A subjective state
- Person feels and perceives that they are not well

## 3. Sickness

- A state of social dysfunction
- The individual assumes a sickness role in society

 Key distinction:


- Disease → Doctor's perspective
- Illness → Patient's perspective
- Sickness → Society's perspective

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Epidemiological Iceberg 

Disease occurrence in a community can be compared to an iceberg:

- Tip of the iceberg → Clinically apparent, diagnosed cases
- Submerged portion →
  - Subclinical cases
  - Undiagnosed cases
  - Unapparent infections

 Public health importance: Most disease burden lies below the surface → surveillance based only on diagnosed cases underestimates true prevalence.

Example: Dog Bite 

Dog bite occurrence annually:

- Total dog bites → 3.73 million
- Medically treated → 451,000
- Emergency room visits → 334,000
- Hospitalizations → 13,360
- Deaths → 20

→ Shows how only a small fraction of total events are visible at the tip.

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## Concepts of Causation of Disease

Major theories explaining disease causation: (EE - WW - MSG)

1. Supernatural theory
  2. Ecological theory
  3. Germ theory
  4. Epidemiological triad
  5. Multifactorial causation
  6. Web of causation
  7. Wheel theory
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## Supernatural Theory of Disease

- Disease believed to be caused by:
  - Curse of God

- Evil spirits / demons
- Management strategies included:
  - Prayers and offerings
  - Witchcraft and rituals

 Historical importance only; no scientific basis.

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## Ecological Theory

- Proposed by Hippocrates (around 463 BC)
- He advised searching the environment for causes of disease

 Significance:

- Foundation of modern epidemiology
  - First step away from supernatural explanations
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## Germ Theory

- Proposed that microorganisms (germs) cause disease
- Strong proponents:
  - Louis Pasteur
  - Henle
  - Robert Koch

### Key features

- Microorganisms demonstrated in patient secretions/excretions
- Emphasizes one-to-one relationship between agent and disease

### Limitation:

- Most diseases are not caused by a single agent alone
- Host and environmental factors also play a role

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### Epidemiological Triad ▲

Disease occurs when the agent, host, and environment interact appropriately.

## Components

### Agent factors

- Biological
- Chemical
- Physical

### Host factors

- Age, sex, heredity
- Immunity, nutrition
- Behavior

### Environmental factors

- Physical
- Biological
- Socio-economic

 Primarily used to explain infectious diseases.

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## Advanced Epidemiological Triangle (Chronic Diseases)

Used for chronic diseases and behavioral disorders.

Components include:

### Group / Population factors

- Age, gender, ethnicity
- Religion, customs
- Occupation, heredity

### Environment

- Behavior and culture
- Physiological factors
- Ecological factors

### Time

- Duration of exposure
- Latent period

### Causative factors

- Biological
  - Chemical
  - Physical
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## Multifactorial Causation

- Proposed by Pettenkofer of Munich (1819–1901)
- Explains modern diseases of civilization

## Diseases explained

- Hypertension
- Diabetes mellitus
- Coronary heart disease (CHD)

## Basis

- Diseases result from multiple interacting factors:
  - Social
  - Economic
  - Cultural
  - Environmental

📌 Cannot be explained by germ theory alone.

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## Web of Causation

- Proposed by McMahon & Pugh
- Disease results from a complex interaction of multiple factors

## Characteristics

- Factors form a web, not a linear chain
- Each factor:
  - Has relative importance
  - Interacts with others
  - Modifies disease outcome

## Example: CHD

- Smoking
- Hypercholesterolemia
- Hypertension
- Sedentary lifestyle


→ Stress

→ Coronary heart disease

 Key advantage:

Identifies multiple intervention points for prevention.

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Application of Models 

Epidemiological Triad

→ Best suited for communicable diseases

Web of Causation

→ Best suited for non-communicable diseases

→ Can also be applied to communicable diseases

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Wheel Theory 

Concept

- Visualizes disease as a wheel

Components

Central hub → Genetic component

Peripheral part → Environmental component

Environmental component divided into:

- Biological
- Physical
- Social

 Key idea:

- Disease results from interaction between genetic susceptibility and environmental exposure
- Removes emphasis on a single causative agent

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## Natural History of Disease

It signifies the way in which a disease evolves over time, starting from:

Pre-pathogenesis → Pathogenesis → Termination  
(recovery, disability, or death)

## Key characteristics ★

- Unique to each disease
  - Not the same in all individuals suffering from the same disease
  - Essential for understanding and applying preventive measures and interventions
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## Natural History of Disease - Overview Flowchart

Period of Pre-pathogenesis (before man is involved) →

Interaction of agent, host, and environment →

Disease-provoking stimulus generated

Period of Pathogenesis (disease process in man) → Entry

of agent into host → Multiplication of agent →

Host-agent interaction → Physiological and pathological

changes → Clinical horizon crossed → Signs and

symptoms appear (illness)

Outcome:

- Recovery
  - Chronic state
  - Defect
  - Disability
  - Death
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Periods of Natural History of Disease 

### 1. Pre-pathogenesis Phase

- Preliminary phase before onset of disease
- Disease agent has not yet entered the human host
- Factors favoring interaction already exist in the environment

 Focus is on:

- Host susceptibility
- Environmental conditions
- Presence or absence of agent

## → Target of Primary Prevention


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### 2. Pathogenesis Phase

- Begins with entry of agent into human host
- Disease process becomes established

#### Early pathogenesis

- Pathological changes occur
- Changes are below the level of clinical horizon
- No signs or symptoms

 In chronic diseases, this phase is called the pre-symptomatic phase

#### Advanced pathogenesis

- Progressive tissue damage
- Signs and symptoms appear
- Disease becomes clinically apparent

## → Target of Secondary and Tertiary Prevention

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## Clinical Horizon 🚓

Point at which:

Pathological changes → Become sufficient to produce signs and symptoms → detectable clinically

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## Outcomes of Disease 🏁

After the pathogenesis phase, disease may end in:

- Recovery (with or without immunity)
  - Convalescence
  - Chronic disease
  - Defect
  - Disability
  - Death
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## Levels of Prevention & Natural History 🔒

## Primary Prevention

- Applied during pre-pathogenesis phase

Modes of intervention:

- Health promotion
  - Specific protection
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## Secondary Prevention

- Applied during early pathogenesis

Modes of intervention:

- Early diagnosis
  - Prompt treatment
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## Tertiary Prevention

- Applied during advanced pathogenesis

Modes of intervention:

- Disability limitation
  - Rehabilitation
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## Causative Factors of Disease

Development of disease requires interaction, not just presence, of:

- Harmful agent
  - Susceptible host
  - Appropriate environment
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## Harmful Agent

A substance or force, living or non-living, tangible or intangible, whose:

- Excess
- Deficiency
- Presence

may initiate or perpetuate a disease process.

 First link in disease transmission

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## Host

A susceptible host is a person or animal that:

- Allows lodgment of an infectious agent
- Under natural conditions

Host factors determine:

- Exposure
  - Susceptibility
  - Response to disease
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## Environment

All external conditions that:

- Affect the agent

- Influence opportunity for exposure
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## Interaction of Factors - Summary Flow

- Agent factors
  - Host factors
  - Environmental factors
- Health or Illness
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## Agent Factors

### Types of agents:

- Biological → Microorganisms
- Physical → Temperature, radiation, trauma
- Chemical →
  - Endogenous: bile, urea, uric acid, ketones
  - Exogenous: fumes, dust, insecticides, acids, alkalis, poisons, tobacco, drugs
- Environmental → Nutrients, allergens

- Nutritional → Under-nutrition or over-nutrition
- Mechanical → Chronic friction → sprain, dislocation, crushing
- Psychological → Stressful experiences
- Deficiency / excess of essential factors → Insulin, calcium imbalance, agammaglobulinemia

 Important agent characteristics:

- Infectivity
- Pathogenicity
- Virulence
- Dose

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## Host Factors

Intrinsic factors influencing exposure, susceptibility, or response:

- Biological → Genetics, blood groups, immunity, immunization

- Behavioral (Lifestyle) → Diet, tobacco use, exercise, living habits
  - Demographic → Age, gender, ethnicity, socio-economic status
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## Environmental Factors (Extrinsic)

Factors affecting the agent and exposure:

- Physical → Climate, temperature, humidity, rainfall, geology
  - Biological → Vectors, insects
  - Psychosocial →
    - Social and economic conditions
    - Cultural practices
    - Overcrowding
    - Sanitation
    - Availability of health services
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## Risk Factors

For many diseases where the agent is unknown, etiology is discussed in terms of risk factors.

### Definition

A risk factor is:

- An attribute significantly associated with development of disease
- A determinant that can be modified by intervention

 Modification of risk factors → reduces disease occurrence

### Important note

- Risk factors are often suggestive
- Absolute proof of cause-effect relationship is usually lacking

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-> The End <-