

UNIVERSITY COLLEGE HOSPITAL IBADAN

ADEJAYAN FUNKE BLESSING

EPIDEMIOLOGY AND DISEASES CONTROL

300L



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1. Define epidemiology and explain its main objective

Epidemiology is the branch of public health that studies how diseases and health-related conditions are distributed in populations, what factors determine their occurrence, and how to control or prevent them.

Main Objectives:

To identify the causes of diseases.

To describe the distribution of diseases (who, where, and when).

To predict future occurrences.

To guide public health polic

y and preventive strategies.

2. Descriptive and Analytical Epidemiology

Descriptive Epidemiology: Describes the patterns of disease occurrence by time, place, and person.

It helps to generate hypotheses about causes of disease.

Example: A study showing that malaria cases increase during the rainy season in Nigeria.

Analytical Epidemiology:

Tests hypotheses to find causes or risk factors of diseases.

It compares exposed vs. unexposed groups to identify relationships.

Example: A study comparing people who use mosquito nets with those who don't to see if nets reduce malaria.

3. Components of the Epidemiologic Triangle

The epidemiologic triangle helps explain how diseases occur and spread. It includes:

1. Agent: The microorganism or factor that causes disease (e.g., bacteria, virus, parasite).

Example: *Mycobacterium tuberculosis* causes tuberculosis

2. Host: The organism (often a human) that harbors the disease.

Example: A person with weak immunity exposed to TB bacteria



3. Environment: External factors that affect both the agent and the host.

Example: Overcrowding, poor ventilation, or contaminated water.

Interaction:

When a susceptible host encounters a pathogenic agent in a favorable environment, disease transmission occurs

4. Determinants in Epidemiology

Determinants are factors or conditions that influence health, either positively or negatively.

Types:

Biological Determinants: Age, sex, genetics, immunity, nutrition.

Example: Infants are more vulnerable to measles due to immature immunity.

Environmental Determinants: Climate, housing, sanitation, pollution.

Example: Poor drainage and stagnant water increase mosquito breeding.

Determinants help epidemiologists understand why and how diseases occur.

5. Levels of Prevention

Public health aims to prevent diseases at three levels:

1. Primary Prevention:

Prevents the disease before it occurs.

Example: Vaccination against polio, health education, and use of insecticide-treated nets.

2. Secondary Prevention:

Detects and treats disease early to stop progression.

Example: Screening for breast cancer or blood sugar testing for diabetes.



3. Tertiary Prevention:

Reduces complications or disability after disease occurs.

Example: Rehabilitation and physiotherapy for stroke survivors.

6. John Snow's Contribution to Modern Epidemiology

John Snow (1813–1858) is called the Father of Modern Epidemiology.

During the 1854 cholera outbreak in London, he used mapping and data collection to find that most cholera cases occurred near the Broad Street water pump.

Method Used: Collected data on cholera cases.

Created a map showing where victims lived.

Discovered all victims used water from the same pump.

Recommended removal of the pump handle – cholera cases dropped sharply.

This showed that cholera spread through contaminated water, not air, proving the importance of data in disease control.

7. Incidence vs. Prevalence

Term	Definition	Meaning	Example (Diabetes)
Incidence	Number of new cases in a given period	Measures risk	500 new diabetes cases in 2024
Prevalence	Total number of existing cases (new + old) currently living with diabetes	Measures burden	5,000 people

Importance:

Incidence helps identify new risk factors and monitor disease trends.



Prevalence helps plan healthcare services and resources.

8. Epidemiological Study Designs

Main Types:

1. Descriptive studies: Describe disease patterns (who, where, when).

2. Analytical studies: Examine causes and associations.

Cohort Study: Follows healthy people over time to see who develops disease. Measures Relative Risk (RR).

Example: Following smokers and non-smokers to see who develops lung cancer.

Case-Control Study: Starts with diseased (cases) and healthy (controls) people, looks backward to find exposure. Measures Odds Ratio (OR).

Example: Comparing smoking habits of lung cancer patients vs. non-patients.

3. Experimental studies: Researcher intervenes (e.g., clinical trials testing vaccines).

9. Relative Risk (RR) and Odds Ratio (OR)

Measure	Definition	Used In	Interpretation
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Relative Risk (RR)	Risk of disease among exposed divided by risk among unexposed	Cohort studies	$RR > 1 \rightarrow$ exposure increases risk; $RR < 1 \rightarrow$ exposure protects
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Odds Ratio (OR)	Odds of exposure among cases divided by odds among controls	Case-control studies	$OR \approx RR$ if disease is rare
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Example: If $RR = 3$ for smokers, it means smokers are 3 times more likely to develop lung cancer than non-smokers.

10. Epidemiological Surveillance and Its Role



Definition:

Surveillance is the continuous, systematic collection, analysis, and interpretation of health data needed for planning, implementing, and evaluating public health practice.

Roles:

Detect outbreaks early.

Monitor disease trends.

Guide control measures and health policies.

Evaluate effectiveness of interventions.

During an Epidemic (e.g., COVID-19):

Helps track new cases and hotspots.

Informs resource allocation.

Guides public health responses like isolation, vaccination, and travel restrictions.

