

(1)

Define Epidemiology and its main objectives

1. Epidemiology is the study of distribution and determinants of health related state or event in a specified population, and the application of the study to the control of health problems. It is also considered as the cornerstone of public health and serve as a fundamental discipline for understanding disease patterns, causes and preventive measures.

#### OBJECTIVES

I. To describe the health status of the population:By identifying patterns and the frequency of the disease, to measure and know (Who, where and when).

II. To predict the occurrence of the diseases: By estimating the risks and the forecasting future health trends. And also by using patterns and scientific methods to estimate that a particular population will develop a certain disease in the future.

III. To control and prevent diseases:This means by informing public health policy,intervention,and the health promotion strategies to prevent or stop disease from spreading and reduce the effects.

IV. To identify the causes of disease:By investigating the determinants or risk of the disease, to find out why and how the disease happens.

V. To evaluate Health programs and interventions:To access how well public health programs or treatment are working .I.e to check if control and campaign are reducing infection rates.

(2)

Differentiate between Descriptive and Analytical epidemiology providing one example each.

2. Descriptive Epidemiology:This is the study of distribution of disease in a population. It focuses on (what, who, where and when)and also define the patterns of the occurrence and the tools included e.g surveys,case-reports,case-series,correlational study, cross-sectional study, incidence and prevalence rate.

EXAMPLE;

(a) case report.

WHILE

Analytical Epidemiology:This is the study of the causes of diseases. This focuses on (why and how) diseases occurs. It is also involved a test hypothesis about relationships between exposure and outcome, cases and control exposure and unexposed.The tools involve case control studies , cohort studies and risk ration.

EXAMPLE:

(a) cohort study.

(3)

Discuss the components of the epidemiologic triangle and how they interact in the spread of an infectious disease.

- I. AGENT: This is the causes of the disease. And it can be a living organism or non living organism factor.
- II. HOST: This is the person that can get the disease, and that can be infected by the Agent. It determines how likely the person get sick or how severe the disease will be.
- III. ENVIRONMENT: This is the external factor that affects both Agent and Host. It includes all outside conditions that allow the diseases to spread or survive.

#### THEIR INTERACTION

Agent is the factors that actually produce the disease. It must be present and able to infect.

Host is the living being that can be infected by the agent. It must be susceptible (no immunity or defense)

Environment is the one that helps the agent and host interaction, It affects how easily the disease spread. Environment must support the agent survival or transmission.

(4)

Explain the concept of 'determinants' in epidemiology and give two examples of biological and environmental determinants

- I. Biological determinants: These are factors within the human body that can influence a person health, it can make someone likely to develop a disease. They can also affect how body fights infections, how people respond to diseases or treatments.

EXAMPLES:

- (a) AGE; The risk of some disease changes with age
- (b) IMMUNITY; The body ability to resist infection.

- II. Environmental determinants: These are external conditions that affect the health. They can be physical, biological, chemical and social that affect health and also the surrounding and living conditions that influence people's health and disease risks.

EXAMPLES:

- (a) Air pollution; causes respiratory diseases like asthma and lungs cancer.
- (b) overcrowded housing; helps to spread tuberculosis and influenza.

(5)

Describe the three levels of prevention in public health, and provide a real-life example for each .

- I. Primary prevention: it focuses on promoting health and protecting against exposure to risk factors. It stop diseases before it start and takes action before the disease occurs to prevent it from starting.

EXAMPLE:

- (a) Immunization (eg polio, measles vaccine)
- (b) Health education on hygiene
- (c) balanced diet and regular exercise.

II. Secondary prevention: It detect and treat disease early, after the disease has begun but the symptoms become serious. To detect it early and start treatment quickly.

EXAMPLE:

- (a) Screening for hypertension, diabetes and cancer.
- (b) Testing and early treatment of tuberculosis or HIV.

III. Tertiary prevention: After the disease has caused damage, it reduces the complications, disability or death and help people to live better and healthier.

EXAMPLES:

- (a) Insulin treatment for diabetes.
- (b) Rehabilitation for drugs or alcohol addiction
- (c) Health education for patients to manage chronic illness.

(6)

How did John Snow contribute to the development of modern epidemiology? Describe the method he used during the cholera outbreak.

John snow contributed to the development of the modern epidemiology by investigating during the (1854) Cholera outbreak in London in mid-19 century and trace its source to a contaminated water pump.

The methods he used during the Cholera outbreak:

- (a) Using forms of mapping.
- (b) Data collection.
- (c) statistical analysis.

(7)

Compare and contrast incidence and prevalence. Why is it important to understand both when studying a disease like diabetes?

I. Incidence: measures the number of new cases of disease in a population over a specific period.

II. Prevalence: measures the total number of existing cases of a disease in a population at a specific period.

Why it is important to study both for disease like "Diabetes"

- (a) To identify causes and risks, (incidence) helps to find what causes new cases e.g poor diet and helps in prevention.
- (b) To understand disease burden (prevalence) shows how many people are currently affected.
- (c) To evaluate prevention and treatment programs: if (incidence) decreases, prevention is working. And if (prevalence) increases but incidence stays the same, it means people are living longer with diabetes due to better treatment.

(8)

What are the common types of epidemiological study designs, and how does a cohort study differ from a case-control study.

1. Observation studies: simply means it observe what happens naturally among people. The types are; (a)Descriptive studies (b)cross sectional studies (c) case control studies (d) cohort studies (e) Ecological studies.

I. Experimental studies: it helps to describe,analyze and test the causes and control of disease in population e.g by giving a new drugs, vaccine or health program.The types are:(a) Field trial (b)Community trial (c)Randomized controlled trial.

How does a cohort study differ from a case-control study.

Both are analytical epidemiology studies,they helps to find causes or risk factors for a disease.

Case-control studies; starts with disease status( people who already have or don't have the disease). It looks backward in time to find exposure or risk factors. It is (retrospective).

Cohort study:it starts with exposure status (people expose or not exposed to a risk factor).it follows them forward in time to see who develop the disease.it is (prospective).

(9)

Define and differentiate between relative risk (RR) and odds ratio (OR), including when each is typically used.

I. Relative risk(RR):

The ratio of the risk of disease in the exposed group to the risk of disease in the unexposed group. It tells how much more (or less) likely an exposed person is to develop the disease compared to someone unexposed.

II. Odds Risk(OR):

The ratio of the odds of exposure among cases to the odds of exposure among controls. It estimates the risk when the true risk cannot be measured directly (like in case-control studies).

Difference

Relative Risk (RR) measures how much more likely an exposed person is to develop a disease.

Odds Ratio (OR) measures the odds of exposure among people with and without the disease.

Relative Risk (RR) is used in cohort studies. while Odds Risk(OR) is used in case-control studies.

(10)

Explain the role of epidemiological surveillance in managing public health. How can it help during an emerging epidemic?

Epidemiological surveillance plays a crucial role in managing public health by providing continuous, systematic collection, analysis, interpretation, and dissemination of health data. Its primary goal is to guide public health action for the prevention and control of diseases.

1. Early detection of outbreaks:

Surveillance helps identify unusual increases in disease cases (e.g.,Cholera)

Early detection allows rapid response to stop the disease from spreading.

II. Monitoring Disease Trends:

Tracks how diseases change over time whether they are increasing, decreasing, or stable and also help evaluate long-term health patterns in the population.

III. Evaluating Control and Prevention Programs:

Surveillance provides data to assess whether public health interventions (like vaccination campaigns) are working.

IV. Guiding Health Policy and Planning:

Data from surveillance supports evidence-based decision-making and resource allocation.

Example: If tuberculosis rates rise in a region, government can allocate more funds and staff for TB control.

V. Detecting Emerging or Re-emerging Diseases:

Helps identify new diseases or the reappearance of old ones.

Example: Detecting Ebola outbreaks or new strains of influenza before they spread widely.

VI. Supporting Research and Training:

Provides valuable data for epidemiological research, helping understand disease causes and risk factors.

VII. Improving Communication and Public Awareness:

Surveillance ensures that health workers and the public are informed about current health threats.

Epidemiological surveillance helps during an emerging epidemic by enabling early detection, tracking, response planning, evaluation, and communication.

It turns health data into actionable information allow to contain the outbreak quickly and save lives.