(1) **What is Epidemiology and explain it's main objective**

Epidemiology is the branch of medical science that deals with the incidence, distribution, and control of diseases in a population.

Main objectives include:

1.To identify the causes of diseases and risk factors.

2.To determine the extent and distribution of diseases in the population.

3.To study the natural history and prognosis of diseases.

4.To evaluate the effectiveness of health programs and interventions.

5.To provide a foundation for public health policy and preventive measures.

(2). **Differentiate between descriptive and analytical epidemiology, providing one example of each.**

1.Descriptive epidemiology describes the occurrence of disease in terms of person, place, and time.

Example: Studying malaria cases in different regions of Nigeria to identify high-risk areas.

2.Analytical epidemiology examines the relationships between exposures and outcomes to determine causes.

Example: Investigating whether mosquito exposure increases malaria risk in specific populations.

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

The three components are:

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

2. Host: The organism (usually human) that can be infected.

3. Environment: External factors that allow disease transmission (e.g., water, sanitation, climate).

Interaction: Disease occurs when a susceptible host is exposed to a sufficient dose of an agent in a conducive environment — for instance, cholera spreads when Vibrio cholerae (agent) contaminates water (environment) consumed by humans (host).

(4).**Explain the concept of 'determinants' in epidemiology and give two examples of biological and environmental determinants.**

Determinants are factors that influence the occurrence, distribution, and outcome of health conditions.

1.Biological determinants: Genetics, age, sex, immune status.

Examples: (1) Genetic predisposition to hypertension(2) weak immune system.

2.Environmental determinants: Climate, sanitation, housing, water quality.

Examples: (1) Poor waste disposal(2)contaminated water source.

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

1. Primary prevention: Prevents disease before it occurs.

Example: Immunization against measles.

2. Secondary prevention: Detects and treats disease early to prevent complications.

Example: Screening for breast cancer using mammography.

3. Tertiary prevention: Reduces disability and helps rehabilitation.

Example: Physiotherapy for stroke patients.

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

John Snow, known as the “Father of Modern Epidemiology,” investigated the 1854 cholera outbreak in London.He mapped cholera cases and discovered that most were linked to the Broad Street water pump.By removing the pump handle, he stopped the outbreak — demonstrating the importance of observation, data collection, and environmental factors in disease control.

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

1.Incidence: The number of new cases of a disease within a specific period.

2.Prevalence: The total number of existing cases (new + old) in a population at a given time.

Importance:Incidence measures risk and helps in studying causes.

Prevalence helps in assessing disease burden and resource needs.

For example, in diabetes, high incidence shows increasing new cases, while high prevalence indicates long-term management challenges.

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

Common designs include:

1.Descriptive studies

2.Analytical studies (cohort, case-control, cross-sectional)

3.Experimental studies (clinical trials)

Cohort study: Follows exposed and unexposed groups over time to observe who develops the disease.

Case-control study: Compares people with a disease (cases) to those without (controls) to identify risk factors.

Difference: Cohort studies look forward in time, while case-control studies look backward.

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

1.Relative Risk (RR): The ratio of disease risk among exposed individuals to that among unexposed.

Used in cohort studies.

2.Odds Ratio (OR): The ratio of odds of exposure among cases to the odds among controls.

Used in case-control studies.

Interpretation:

RR or OR > 1 → increased risk

RR or OR < 1 → protective effect

RR or OR = 1 → no association

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

Epidemiological surveillance is the continuous, systematic collection, analysis, and interpretation of health data for planning and response.

Roles:

1.Early detection of outbreaks

2.Monitoring trends in disease occurrence

3.Evaluating control measures and vaccination programs

4.Guiding resource allocation during epidemics

Example: During COVID-19, surveillance helped track case numbers, detect new variants, and guide public health decisions.