University College Hospital, Community health officer, 300l

Epidemiology – Test Questions and Answers

1. **Define epidemiology and explain its main objectives.**

Epidemiology is the study of how diseases occur and spread within populations, and the factors that influence their distribution. Its main objectives are to identify the causes of health problems, understand how they spread, and develop strategies to prevent or control them. In simple terms, it helps public health officials know who gets sick, why, and how to stop it from happening again.

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

Descriptive epidemiology focuses on describing the occurrence of diseases in terms of person, place, and time. It answers questions like who, where, and when. For example, a study showing that malaria cases rise during the rainy season in rural areas is descriptive.

Analytical epidemiology, on the other hand, looks for why and how diseases occur by examining the relationships between exposures and outcomes. For example, comparing people who drink unboiled water to those who don't to see who is more likely to develop typhoid fever is an analytical study.

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

The epidemiologic triangle consists of three main components: the agent, the host, and the environment.

The agent is the microorganism or pathogen that causes the disease, such as a virus or bacteria.

The host is the organism (usually a human or animal) that can be infected.

The environment includes the external conditions that allow the disease to thrive and spread, like climate, sanitation, or social factors.

These three elements interact continuously. For example, in malaria, the agent is the Plasmodium parasite, the host is a human, and the environment includes standing water where mosquitoes breed. Controlling any one of these components can help stop the disease from spreading.

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

Determinants are the factors that influence a person's risk of developing a disease. They can be biological, environmental, social, or behavioral.

Biological determinants include factors such as age, sex, and genetic makeup. For instance, older adults are more vulnerable to cardiovascular diseases.

Environmental determinants include elements like air quality or water sanitation. For example, poor waste disposal can lead to outbreaks of cholera or typhoid fever.

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

1. **Primary prevention** aims to stop disease before it starts. Example: Immunization against measles.

2. **Secondary prevention** involves early detection and treatment to stop disease progression. Example: Regular blood pressure screening to detect hypertension early.

3. **Tertiary prevention** focuses on managing established disease to reduce complications or disability. Example: Physiotherapy for stroke patients to improve mobility.

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

John Snow is often called the "father of modern epidemiology." During the 1854 cholera outbreak in London, he mapped the locations of cholera cases and discovered that most were clustered around the Broad Street water pump. By removing the pump handle, he stopped the outbreak, proving that contaminated water ,not bad air, was the cause. His use of mapping and statistical reasoning laid the foundation for modern epidemiological methods.

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

Incidence refers to the number of new cases of a disease that develop in a specific time period.

Prevalence is the total number of existing cases (both new and old) at a given time.

For a chronic disease like diabetes, incidence helps track how many people are newly diagnosed each year, while prevalence shows the overall disease burden in the population. Understanding both helps in planning prevention programs and healthcare resources effectively.

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

Common study designs include cross-sectional, case-control, cohort, and experimental studies.

A cohort study follows a group of people over time to see who develops a particular disease based on their exposure status. It measures incidence and can establish cause-effect relationships.

A case-control study, in contrast, starts with people who already have the disease (cases) and compares them with those who do not (controls) to look back and identify possible risk factors. It's faster and cheaper but more prone to bias.

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

Relative Risk (RR) measures the risk of developing a disease among the exposed group compared to the unexposed group. It's used mainly in cohort studies.

Odds Ratio (OR) measures the odds of exposure among cases versus controls and is used primarily in case-control studies.

If RR or OR is greater than 1, it suggests a positive association between exposure and disease; if it equals 1, there's 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. It helps identify outbreaks early, track their spread, and guide public health interventions.

During an emerging epidemic, surveillance allows health authorities to detect new cases quickly, isolate affected individuals, trace contacts, and implement control measures. For example, during the COVID-19 pandemic, real-time surveillance helped countries monitor infection trends and plan vaccination campaigns.