Epidemiology Test

1. **Define epidemiology and explain its main objectives.**
Epidemiology is the study of how diseases and other health-related conditions are distributed in populations, and the factors that influence or determine this distribution. Its main objectives are to identify the causes and risk factors of diseases, describe their patterns in terms of time, place, and person, and use this information to control or prevent health problems. Essentially, epidemiology helps improve public health by guiding decisions and shaping policies that promote healthier communities.

2. **Differentiate between descriptive and analytical epidemiology, providing one example of each.**
Descriptive epidemiology focuses on describing the occurrence of diseases in populations according to factors such as age, sex, location, and time. It answers the questions who, where, and when. Example, studying the number of malaria cases in different regions during the rainy season is descriptive.

Analytical epidemiology, on the other hand, seeks to find out why and how diseases occur. It investigates associations between exposures and outcomes. E.g Comparing smoking habits between people with lung cancer and those without to determine the link between smoking and cancer is analytical.

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 components: agent, host, and environment.

The agent is the microorganism or factor that causes the disease, such as a virus, bacterium, or parasite.

The host is the organism, often a human or animal, that can harbor the disease. Factors like age, immunity, and behavior influence the host's susceptibility.

The environment includes external conditions that affect both the agent and the host, such as climate, sanitation, and living conditions.

The interaction among these three determines how a disease spreads. For example, in malaria, the agent is the Plasmodium parasite, the host is a human, and the environment includes stagnant water where mosquitoes breed. Altering any part of this triangle can influence the spread or control of the disease.

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

Determinants are factors or events that influence the occurrence, distribution, and outcome of diseases. They explain why some people get sick while others remain healthy.

Biological determinants include elements like genetics and immune status. For example, inherited conditions such as sickle cell trait can affect susceptibility to malaria, and low immunity increases the risk of tuberculosis.

Environmental determinants include physical and social surroundings that impact health. Poor sanitation and unsafe drinking water can lead to cholera, while air pollution increases the risk of respiratory illnesses.

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

Primary prevention aims to stop a disease before it occurs by reducing risk factors or increasing resistance. Example: Immunization against measles.

Secondary prevention focuses on early detection and prompt treatment to halt or slow disease progression. Example: Regular blood pressure checks to detect hypertension early.

Tertiary prevention aims to reduce the impact of an existing disease by preventing complications and improving quality of life. Example: Rehabilitation programs for stroke survivors.

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 investigated the pattern of cases and noticed that most were clustered around the Broad Street water pump. By mapping the cases and linking them to contaminated water, he demonstrated that cholera was waterborne rather than airborne. He persuaded authorities to remove the pump handle, which led to a sharp decline in cases. His method of systematic data collection and spatial analysis became a foundation for modern epidemiological research.

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 occur within a specific time period in a population at risk.

Prevalence measures the total number of existing cases,both new and old, at a particular point in time.
Understanding both is essential for diseases like diabetes because incidence shows how rapidly new cases are emerging, helping identify risk factors, while prevalence reflects the overall burden of the disease in the community, which is crucial for planning health services and resource allocation.

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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 the disease and who doesn’t, based on exposure status. It establishes a temporal relationship between exposure and outcome.
A case-control study, however, starts with people who already have the disease (cases) and compares them with those who don’t (controls), looking backward to find exposure differences.
Cohort studies are prospective and usually more costly, while case-control studies are retrospective and more efficient for rare diseases.

9. **Define and differentiate between relative risk (RR) and odds ratio (OR), including when each is typically used.**
Relative risk (RR) is the ratio of the probability of developing a disease among the exposed group to that among the unexposed group. It shows how much more (or less) likely the exposed

group is to develop the disease. RR is mainly used in cohort studies where incidence can be measured.
Odds ratio (OR) compares the odds of exposure among cases to the odds of exposure among controls. It is primarily used in case-control studies, where incidence data are not available.
Both RR and OR measure the strength of association between exposure and disease.

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 essential for planning, implementing, and evaluating public health practices. It helps detect outbreaks early, monitor disease trends, and assess the effectiveness of control measures.
During an emerging epidemic, surveillance enables rapid identification of new cases, helps trace contacts, and guides the allocation of resources such as vaccines, medications, or quarantine measures. In short, it serves as the backbone of early warning systems that protect populations from widespread health threats.