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Level; 300Level

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

Epidemiology can be defined as the distribution the determinants of health related state or event in a specified population and the application of this study to the control of health problems.

\*To describe patterns and magnitude of diseases: To describe the distribution of health and disease, including who is affected, where, and when. This includes identifying the overall burden of disease in a population.

\*To Identify the causes of disease that is: to determine the causes and risk factors of diseases,which involves identifying the etiology of a disease and understanding how it develops.

\*Implement and evaluate interventions: To provide the evidence needed to design, implement, and evaluate strategies for preventing, controlling, and treating diseases. This includes informing the public health policies, intervention and health promotion strategists ,It also includes setting public health priorities and evaluating the effectiveness of public health programs and policies.

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

Descriptive Epidemiology describes the distribution of a disease or health-related event by focusing on the basic characteristics of the affected population (person, place, and time). It answers questions like "what is happening?" , "who is getting sick?", where the outbreak is occuring and the time of the disease occurrence

Example: A study that reports on the number of cases of the flu, the age and gender distribution of those cases, the time period during which they occurred, and the geographic areas where they were most prevalent. The tools includes; Survey,case reports, case series, incidence and prevalence etc while

Analytical epidemiology focuses on why and how diseases occur ,it involves a test hypothesis and investigates the causes and determinants of disease by comparing groups. It answers questions like "why are certain people getting sick?" and "how is the disease spreading?".

It helps to determine the cause of an outbreak and measure the strength of associations between exposures and outcomes, case and control, exposure and unexposure



Example: A case-control study of a group of people who have food poisoning (cases) with a similar group who do not (controls) to identify specific foods eaten by the cases but not the controls that might have led to the illness. Their tools include case control study, cohort studies and risk ratio

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

Agent: The cause of the disease, such as a virus, bacterium, parasite, or other pathogen.

Host: The human or animal that is exposed to and harbors the disease. Hosts may or may not show outward signs of illness, and their characteristics can influence their susceptibility.

Environment: The external surroundings that allow the agent and host to interact. This includes physical, social, and biological factors like climate, water quality, population density, and behavior.

#### **How they interact in the spread of disease;**

An infectious disease occurs when the agent, host, and environment interact in a way that facilitates transmission.

The environment is crucial for bringing the agent and host together. For instance, poor sanitation (environment) can lead to contaminated water (agent) which infects a person (host).

The spread is a cycle: the agent infects the host, the host can carry the agent, and the environment facilitates transmission to new hosts.

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

Determinants; refers to the factors or exposures that increase or decrease the risk of disease..it also refers to the causes or factors that bring about a change in a health event.

Biological determinants refers all the individual characteristics of a person that have biological background,.

Examples are ; Genetics, pathology, etc

Environmental determinants includes factors in the environment that can increase or decrease the risk of disease, examples are Air pollution, water supply etc

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



each.

Prevention refers to the wide range of activities known as “interventions” which aim at reducing risks or threats to health. There are 3 levels of prevention which includes:

#### PRIMARY PREVENTION

Primary prevention aims to prevent disease or injury before it ever occurs. This is done by preventing exposures to hazards that cause disease or injury, altering unhealthy or unsafe behaviours that can lead to disease or injury, and increasing resistance to disease or injury should exposure occur. Examples include:

Education about healthy and safe habits (e.g. eating well, exercising regularly, not smoking, use of seatbelts and bike helmets, HCT (HIV Counseling and Testing program with free condom distribution).

Immunization against infectious diseases.

#### Secondary prevention

Secondary prevention aims to reduce the impact of a disease or injury that has already occurred. This is done by detecting and treating disease or injury as soon as possible to halt or slow its progress, encouraging personal strategies to prevent reinjury or recurrence, and implementing programs to return people to their original health and function to prevent long-term problems. Examples include:

Regular exams and screening tests to detect disease in its earliest stages (e.g. mammograms to detect breast cancer, HIV counseling and Testing program (HCT) including ART to help people with HIV positive status. etc

Suitably modified work so injured or ill workers can return safely to their jobs.

#### TERTIARY PREVENTION

Tertiary prevention aims to soften the impact of an ongoing illness or injury that has lasting effects. This is done by helping people manage long-term, often-complex health problems and injuries (e.g. chronic diseases, permanent impairments) in order to improve as much as possible their ability to function, and their life expectancy. Examples include:

cardiac or stroke rehabilitation programs, chronic disease management programs (e.g. for diabetes, arthritis, depression, etc.)



\*support groups that allow members to share strategies for living well such as support groups for people living with HIV/AIDS etc

\* vocational rehabilitation programs to retrain workers for new jobs when they have recovered as much as possible.

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 modern epidemiology by using a data-driven, scientific approach to identify the source of a cholera outbreak in 1854, challenging the prevailing miasma theory. His method involved;

Mapping the deaths: Snow created a spot map of London's Soho district, marking the home of every person who died from cholera.

Located water pumps: He then added the locations of the local water pumps to the map to see how they related to the deaths.

Identified a cluster: The map visually showed a high concentration of cases clustered around the Broad Street pump.

Investigated individual cases: Snow collected information by questioning residents and checking death records, determining that most victims had drunk water from the Broad Street pump.

Identified exceptions: He noted an exception where there were no deaths: a nearby brewery whose employees drank from their own deep well and received a daily ration of malt liquor, providing further evidence for his waterborne hypothesis.

Proved his theory: John Snow's convincing evidence led the local council to remove the handle from the Broad Street pump, after which the epidemic subsided in the area.

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

Compare;

Both Incidence and Prevalence are used to measure the frequency and duration of outbreak of a disease.

Contrast;

Incidence measures the number of new cases of a disease over a specific period of time, while Prevalence measures the total number of existing cases (new and old) in a population at a given



time.

Both are important for studying diabetes because;

Incidence helps in understanding the risk: Studying the incidence of diabetes helps researchers understand predisposing factors (like obesity, lifestyle, or genetics) that can cause new cases to develop, according to Britannica. It helps answer the question, "Who is at risk of getting diabetes?".

Prevalence helps in understanding the burden: Prevalence shows how many people have diabetes right now, including those diagnosed years ago and newly diagnosed individuals. This "total burden" is critical for public health officials to plan how to meet the current and future needs of the population, such as allocating resources for testing, treatment, and long-term management,

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

Common types of epidemiological study design are;

Observational study which involves observing outcomes without intervention examples are ;cross-sectional, case-control, and cohort) .and

Experimental study involves a deliberate intervention to measure its effect.examples;Randomized controlled trials(RCTs).

A cohort study follows a group of people over time to see how certain exposures relate to outcomes, starting with people free of the disease and grouping them by exposure status. In contrast, a case-control study starts by identifying people with the disease (cases) and those without it (controls) and then looks back to compare their past exposures.

A cohort study looks forward from exposure to outcome while

A case control study looks backward from the current disease status to past exposures

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

Relative risk (RR)

Definition: It is the ratio of the risk (probability) of an event occurring in an exposed group to the risk of the event occurring in a non-exposed group.

Odds ratio (OR)

Definition: The ratio of the odds of an event occurring in an exposed group to the odds of the event occurring in a non-exposed group. Odds are the number of times an event occurs divided



by the number of times it does not occur.

#### Difference between Relative Risk and Odds Ratio

Relative risk (RR) is the ratio of the probability of an event in an exposed group compared to an unexposed group, while the odds ratio (OR) is the ratio of the odds of an event occurring in an exposed group versus an unexposed group.

Relative Risk RR is typically used in cohort studies and randomized controlled trials (RCTs) to directly estimate risk, whereas Odds Ratio OR is most useful in case-control studies where risk cannot be directly calculated

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 to manage public health by providing an early warning system for outbreaks, tracking disease trends, and evaluating the impact of interventions.

#### Role of epidemiological surveillance in managing public health

Early warning system: It acts as an early warning system to detect unusual health events that could become larger public health emergencies.

Disease tracking: It monitors the patterns and trends of diseases, including infectious and noncommunicable diseases, to understand how they are spreading over time and place.

Intervention evaluation: It helps public health officials monitor and evaluate the impact of implemented health programs and control measures, allowing for adjustments as needed.

Priority setting: The data collected guides public health officials in prioritizing health problems and developing targeted interventions and policies.

Targeted interventions: It helps identify high-risk populations so that specific groups can be targeted for interventions and resources.

#### Role during an emerging epidemic

Rapid detection: It helps detect unusual health events quickly, allowing for a faster response.

Information for decision-making: Surveillance data provides the evidence needed to make informed decisions about the scale and timing of the response.

Guiding interventions: It helps identify populations at high risk and guides the targeting of specific groups for interventions.

Risk communication: Surveillance data is used to inform the public about risks and guide



communication strategies.

Monitoring resurgence: In situations where restrictions are lifted, surveillance allows for vigilance to detect any resurgence of cases that could lead to re-implementation of strict mitigation strategies.

