ADEGIWA BLESSING OLUWAPELUMI
EPIDEMIOLOGY TEST
(1)*Define epidemiology and explain its main objectives**

Epidemiology is the study of how diseases affect the health and illness of populations. It involve the analysis of the distribution, patterns and determinants of health related events,conditions or diseases within specific populations

The main objective of Epidemiology is to understand the causes of factors that influence the occurrence and spread of diseases

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

(I) *Descriptive Epidemiology**: Focuses on the distribution of health events by characterizing the who,what,when and where of diseases occurrences. It helps identify patterns on trends in health related events across different population and time frames

Example: A study examining the incidence of influenza in various age groups during a specific flu season, detailing cases by age,gender and geographic location, is a descriptive epidemiological study.

(II) *Analytical Epidemiology*:Is on the other hands, seeks to understand the causes or risk factors associated with health events. It often involves comparing groups to determine associations between exposures and outcomes.

Examples: A cases control study investigating whether sampling is a risk factor for lung cancer by comparing the smoking habits to lung cancer patients(cases) with those of a similar group without lung cancer(control) is an analytical epidemiology study

(3) *Discuss the components of the epidemiological triangle and how they interactin the spread of infectious disease*

The Epidemiological triangle is a model used to understand the dynamics of infectious diseases transmission. It consists of three main components; The Agent,Host and Environment with each playing a crucial role in the spread of diseases

(I)*The Agent*; This refers to pathogen that causes the disease such as bacteria,viruses,fungi or parasite. The characteristics of the agents its virulence, infectivity and pathogenicity affect how easily it can spread and causes illness.

(II) *The Host*:The host is the organism,usually a human or animal,that becomes infected by the agent. Host factors such as Age,Sex,Genetic predisposition,Immune status and behavior can influence susceptibility to the disease and its severity.

(III)*The Environment*:Thus encompasses the external factors that affect the agent and host. It includes physical,social and economics factors such as climate,sanitation living conditions and health care access which can facilitate or Linder disease transmission.

Interactions In Diseases Spread;

*Agent must be present and capable of causing disease for example;A virus needs a suitable environment to survive and spread.

*Host susceptibility can be influenced by their health status,behavior (e.g hygiene practices) and presence of underlying conditions which can increase or decrease the likelihood of infection.
*Environment plays a critical role in facilitating or impeding the transmission of the agent to the host. Factor like overcrowded living conditions can enhance disease spread,while good sanitation and vaccination programs can reduce it.
(4) **Explain the concepts of 'determinants' in epidemiology and give two examples of biological and environmental determinants **

In epidemiology'determinants' refers to the factors that influence the occurrence,distribution and control of health related events. These determinants can be classified into various categ including Biological,Environmental,Social and behavioral factors

Examples of Biological and Environmental determinants

(1) *Biological Determinant*;

(I) *Genetic factors*:Certain genetics predisposition can increases an individual's risk for specific diseases. For instance, mutations in the BRCA1and BRCA2 genes significantly elevate the risk of breast and ovarian cancers in woman

(II)*Age*: is a crucial biological determinant as susceptibility to ma at disease varies with age. For example older adults are at a higher risk for infections like pneumonia and chronic diseases such as cardiovascular issues

(2)*Environmental Determinants*;

(I) *Air Quality*:Poor air quality which can be influenced by pollution from vehicles,industrial emissions and other sources is an environmental determinant that can lead to respiratory diseases and exacerbate conditions like Asthma

(II)*Access to clean water and* *sanitation*:The availability of clean water and adequate sanitation facilities is critical for preventing water borne diseases. Communities without these resources face higher risk of illness such as cholera and dysentery

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

The three level of prevention in public health are Primary,Secondary and Tertiary prevention

(I) *Primary Prevention*:Prevent disease or injury before it's occur. *Example*, Vaccination program i.e, immunizing children against measles,polio and other diseases to prevent outbreak and protects vulnerable populations

(II) *Secondary Prevention*: Detects and treats problems early often before symptoms appear. *Examples*, Screening for hypertension i.e, Regular Blood pressure check help detect hypertension early,allowing for timely intervention and reducing cardiovascular risks

(III) *Tertiary Prevention*: Manages and treats existing diseases or conditions to prevent complications. *Examples*;Diabetes management programs i.e; providing education medication and lifestyle support to individuals with diabetes help manage the condition,prevent complications and improve quality of life

(6) *How did John Snow contribute to the development of modern epidemiology? Describe the development he used during the cholera outbreak*
John Snow is a British physician,made significant contributions to modern epidemiology,particularly during the 1854 cholera outbreak in London
John Snow contribution
* *Identified the source*: Snow hypothesized that cholera was spread through contami water,contradicting the prevailing “miasma”theory
* *Mapped cases*: He created a map of cholera cause, revealing a cluster around a specific water pump on BroadStreet (niw broadwick street)
* *Conducted a natural experiment*: Snow compared cholera rates among household served by different water companies,findings higher rates among those served by southward and vauxhall company which drew water from contaminated section of the Thames.
Method use during cholera outbreaks
(I) *Case mapping*:Snow plotted cholera cases on a map to identify patterns and clusters.
(II) *Data Analysis*:He analyzed data on cholera cases, death and water sources to identify correlations
(III) *Intervention*: Snow persuaded authorities to remove the pump handle,effectively ending the outbreak
(7) *Compare and contrast incidence and prevalence. Why is it important to understand bothe when studying of disease like diabetes.*
Incidence and prevalence are two key measures in epidemiology that provide insights into disease patterns
Definitions
* *Incidence*: Is the number of new cases of a disease or condition that occur within a population over a specific periods
* *Prevalence*:The total number of cases of a disease or condition present in a population at a given time including Borge new and existing cases
Key Difference
• *Timeframe*:Incidence focus on new cases over a period,While prevalence reflect the total burden at a point in time
• *Purpose*:Incidence helps understand disease risk and transmission,While prevalence informs resource allocation and healthcare planning
Diabetes Example
• *Incidence*: Increase incidence of diabetes indicates a growing risk,possibly due to lifestyle factors or environmental changes
• *Prevalence*: High prevalence of diabetes highlights the existing burden,emphasizing the need for effective management,treatment and resources allocation
Importance;

(I) *Understand diseases* dynamics:Incidence and prevalence together provide a comprehensive picture of disease patterns
(II) *Inform Intervention*: Understanding incidence helps target prevention effort,While prevalence guides resource allocation and healthcare planning.
(III) *Evaluate Impact*: Tracking changes in incidence and prevalence helps assess the effectiveness of public health interventions
I.e by understanding both incidence and prevalence,healthcare pro and policymaker can develop strategies to address diabetes and other diseases,ultimately improving population health outcomes
(8) *What are the common type of epidemiological study designs and how does a cohort study differ frm a case control study*
Epidemiological study designs help investigate diseases patterns and risk factors.Here are the common types;
• *Cohort Studies*:Follow a group overtime to examine disease development and risk factors
• *Cases-control study*:Comore individuals with a disease(case)to those without(control) to identify potential risk factor
• *Cross-section studies*:Examine a population at a single point in time to assess disease prevalyand association
• *Ecological studies*:Analyze data at the group or population level to identify trends and associations
Cohort study differ from case-control studies
(1)*Direction of inquiry*;
• *Cohort*: Exposure—Outcome(follow participants forward in time)
•*Case control*:Outcome—Exposure (compare case and control retrospectively)
(2) *Study population*;
• *Cohort*: participant are often disease-free at based line
•*Case control*: participants are selected based on disease status(case control)
(3) *Outcome Assessment*;
• *Cohort*: Incidence of disease or outcome
•*Case control*:Odds of exposure among case controls
Key Differences
(I) *Temporal Relationship*:Cohort studies establish temporal relationships between exposure and outcome,While case control studies rely on retrospective data
(II) *Bias and confound*:Cohort studies are less prone to bias,While case control studies are more susceptible to recal and selection biases
*Cohort studies are often considered stronger for establishing causality but case control studies are useful for investigating rare diseases or outcomes
(9) Define and differentiate between relative risk(RR) and Odds ratio(OR) including when each is typically used

Relative Risk(RR) and Odds Ratio(OR) are measures used to qualify the strength of association between an exposure and an outcome

Definitions

• *Relative Risk(RR)*:The ratio of the risk of an outcome in the exposed group to the risk in the unexposed group. RR= Risk exposed/Risk unexposed

• *Odds Ratio(OR)*:The ratio of the odds of an outcome in the exposed group to the odds in the unexposed group. OR= Odds exposed/Odds unexposed

Key Differences

(1) *Interpretation*:

• *RR*:Directly estimate the risk of an outcome

• *OR*:Estimates the odds of an outcome,which approximates risk when the outcome is rare

(2)*Study design*:

• *RR*:Typically used in cohort studies and randomized controlled trials

• *OR*:Commonly used in case control studies and logistic regression analysis

(3)*Outcome frequency*:

• *RR*:Suitabke for commonly outcome

•*OR*:Preferred for rare outcome as it approximate RR

When to use each

• *Cohort Studies*:Use RR to estimate the risk of an outcome

• *Case control studies*:Use OR to estimate the odds of an outcome

• *Rare outcome*:Use OR as it approximate RR

• *Common outcome*:Use RR for direct risk estimation

I.e Both RR and OR provide valuable insights into depend on the study design and outcome frequency

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

Epidemiological Surveillance play a crucial role in managing public health by systematically collecting ting,analyzing and interpreting health data to inform disease prevention and control efforts

Role of Epidemiological Surveillance

• *Disease Monitoring*: Traxk disease trends incidence and prevalence

• *Outbreak Detectuon*: Indentifies unusual patterns or increase in diseases occurrence

• *Risk Factor Indentification*: Analyze data to identify risk factors and potential causes

• *Intervention Evaluation*: Assesses the effectiveness of public health interventions

During an Emerging Epidemic

• *Early Detection*: Surveillance systems detect unusual diseases patterns,triggering rapid response

• *Real Time Monitoring*: Tracks disease spread,severity and impact

• *Data Driven Decision-Making*: Informs public health decisions,resources allocation and policy development
• *Risk Communication*: Probude timely and accurate informations to the public healthcare professionals and policy makers
• *Evaluation and Adjustment*: Continuously assesses response efforts and adjusts strategies as needed

Key Benefits

• *Rapid Response*: Enables swifts action to contain outbreak and prevent further spread
• *Target Interventions*: Informs targeted interventions reducing disease burden and improving outcomes
• *Improved Preparedness*: Enhance preparedness for cuter public health emergencies

Effective epidemiological surveillance is essential for managing public health and responding to emerging epidemics, ultimately saving lives and reducing diseases impact.