



## HEALTH MEASUREMENT: EPIDEMIOLOGY ASSIGNMENT 1

### Instructions

- Please answer all **5 QUESTIONS**
- \*\*\*\*Please **Number your Answers** according to the questions \*\*\*\*.
- The total marks for the assignment are **70 Marks**
- **Due Date: 26<sup>th</sup> of September, 2025**

\*\*\*\*\***NB: NO LATE SUBMISSIONS**\*\*\*\*\*

# QUESTION 1

**MCQ: Multiple choice questions – choose one best answer**

1. Public health ethics is:
  - a. Patient-centered
  - b. Population-centered
  - c. Subject-centered
  - d. Must respect the rights of individuals
  - e. b. and d. above
2. The primary goal of public health is to:
  - a. Protect the uninfected
  - b. Protect the infected
  - c. Protect the identity of those who have died from an infectious disease
  - d. a. and c. above
  - e. b. and c. above
3. Which of the following are goals of vaccination?
  - a. Prevent infection
  - b. Prevent disease
  - c. Prevent transmission
  - d. All of the above
  - e. a. and c. above
4. The basic code of ethical research (respect for persons, beneficence, and justice) was first established by the:
  - a. Nuremberg Code
  - b. Declaration of Helsinki
  - c. CIOMS
  - d. Belmont Report
5. A study in which children are randomly assigned to receive either a newly formulated vaccine or the currently available vaccine, and are followed to monitor for side effects and effectiveness of each vaccine, is an example of which type of study?
  - a. Experimental
  - b. Observational
  - c. Cohort
  - d. Case-control
  - e. Clinical trial

6. The Women's Health Study, in which researchers enrolled 41,837 women in 1986 and collected exposure and lifestyle information to assess the relationship between these factors and subsequent occurrence of cancer, is an example of which type of study?
  - a. Experimental
  - b. Observational
  - c. Cohort
  - d. Case-control
  - e. Clinical trial
7. US investigators conducted a study to compare measles-mumps-rubella (MMR) vaccine history among 1,294 children with pervasive development disorder (e.g., autism and Asperger's syndrome) and 4,469 children without such disorders. They found no association. This is an example of which type of study?
  - a. Experimental
  - b. Observational
  - c. Cohort
  - d. Case-control
  - e. Clinical trial
8. What is the primary objective of a case-control study?
  - a. To establish causation
  - b. To determine the prevalence of a disease
  - c. To identify factors associated with a disease
  - d. To calculate relative risks
9. In a case-control study, cases are individuals who:
  - a. Have the disease of interest
  - b. Are at risk of developing the disease
  - c. Are healthy controls
  - d. Have a different disease
10. Which of the following is an advantage of using cases and controls in a study?
  - a. Allows for calculation of incidence rates
  - b. Provides a measure of disease prevalence
  - c. Efficient for studying rare diseases
  - d. Provides a direct estimate of risk ratios
11. What is the most common method of selecting controls in a case-control study?
  - a. Random sampling from the general population
  - b. Matching for age and sex
  - c. Using family members of cases
  - d. Convenience sampling

12. In a case-control study, if exposure information is collected after the outcome has occurred, it is susceptible to:
- Recall bias
  - Selection bias
  - Confounding bias
  - Observer bias
13. Avoiding action is always the correct ethical alternative:
- True
  - False
14. That qualified researchers must use appropriate research designs was one of the tenets of the Nuremburg Code:
- True
  - False
15. Respect for persons means that persons intellectually compromised individuals, may not serve as research subjects:
- True
  - False
16. Ethical considerations usually require choosing the least worst alternative rather than the best alternative:
- True
  - False
17. The most important element of ethical research on human subjects is:
- Beneficence
  - Justice
  - A methodologically sound study design
  - Informed consent
18. The single most important key to the success of the Multicenter AIDS Cohort (MACS) is:
- The brilliance of the principal investigator
  - The commitment of the staff
  - The commitment of the participants
  - The quality of the laboratories
  - The quality of data management
19. The MACS investigators have an obligation NOT to pursue the objectives stated in their original proposal:
- True
  - False

20. A key factor facilitating the application of nested case-control studies from the MACS was:

- a. Data collection
- b. Establishment of a repository of biologic specimens
- c. Participant interest
- d. Administration of the questionnaire by staff

**(20 Marks)**

## QUESTION 2

A study from The Kenyatta National Hospital (KNH) examined whether the risk of HIV infection was related to whether people had traditional cuttings. A sample of 600 individuals was randomly selected from the student population. In this sample 113 had traditional cuttings. For individuals with traditional cuttings, 22 were found to have HIV and for individuals without traditional cuttings, 25 were found to have HIV. Researchers want to know if there is evidence from this study of an increased prevalence of HIV for individuals with traditional cuttings amongst the population from which they were sampled.

- a. What study design is being used in this example? [1 mark]
- b. Give formal statements of the Null and Alternative hypotheses. [1 marks]
- c. Construct an appropriately labelled 2x2 table to display these data. [4 marks]
- d. Calculate the sample prevalence (risk) ratio for HIV among individuals with traditional cuttings compared to individuals without traditional cuttings. Interpret it. [4 marks]

**(10 Marks)**

### QUESTION 3

1. Is daily Dose of Warfarin Beneficial? The Surgeons' Health Study was conducted to test the hypothesis that 5 mg of warfarin taken every other day would reduce mortality from ischemic stroke. Male Surgeons 45 to 85 years of age living in the Poland in 2011 were eligible to participate. Surgeons were excluded if they had a personal history of myocardial infarction, transient ischemic attack; cancer; current gout; liver, renal or peptic ulcer disease; contraindication to warfarin consumption; current use of warfarin, platelet-active drugs or non-steroidal anti-inflammatory agents; intolerance to warfarin; or inability to comply with the protocol. Eligible subjects who met the inclusion criteria and who successfully completed a run-in phase were randomly assigned to receive warfarin or a placebo. Eventually 1 360 surgeons were enrolled; 640 were assigned to warfarin, and 720 were assigned to placebo. The agents (warfarin and placebo) were identical in appearance and were mailed to the subjects. Both participants, research assistant and principal investigators were not aware of the treatment allocated to participant. The recipient's treatment was coded, and neither the subject nor the investigators knew which treatment group a given subject was in. About 69 surgeons withdrew/uncomplained from the intervention and 154 from then non-intervention arm (placebo) of the study. Among those who completed the study 41 men died from then intervention arm and 142 men died from the placebo. In the process of the study we then discover that some men died because they didn't not comply with the treatment from both study arms; 9 from intervention and 52 from placebo.
- a) Was the study a Non-Randomized Control Trial or Randomized Control Trial? **(1 marks)**
  - b) If No or IF yes why? **(1 marks)**
  - c) What do you understand about Randomization? **(1 mark)**
  - d) In most clinical trial participants are blinded when entering the study. What do you understand about blinding and which level of blinding was applied in this study? **(2 marks)**
  - e) ***Develop a table to summarize the data and apply the relevant analysis*** according to the study design. What do you understand about the best analysis of this type of study design and why is it applied? **(5 marks)**

2. A COVID-19 Study was done in Mwanza town between 2021 March to 2022 December and it was comprised of several longitudinal components. A comprehensive questionnaire was sent in the first component to all never infected and a control sample of those with a history infection from the over the period of wave 1 and 2. One of the components was clinical trial investigating the efficacy Covid-19 as a preventative vaccine for severe illness or post-COVID conditions . From the study (adjusted results; rate of severe illness in the intervention group was 77.9 per 100,000 per year and in the placebo was 373.4 per 100,000 per year.

a) What do you understand by Efficacy? **(1marks)**

b) **Calculate** and **interpret** the efficacy rate of study **(4marks)**

**( 15Marks)**



## QUESTION 4

Cigarette smoking is the number one risk factor for lung cancer. In the United States, cigarette smoking is linked to about 90% of lung cancers. Using other tobacco products such as cigars or pipes also increases the risk for lung cancer. Tobacco smoke is a toxic mix of more than 7,000 chemicals. Many are poisons. At least 70 are known to cause cancer in people or animals.

People who smoke cigarettes are 15 to 30 times more likely to get lung cancer or die from lung cancer than people who do not smoke. Even smoking a few cigarettes, a day or smoking occasionally increases the risk of lung cancer. The more years a person smokes and the more cigarettes smoked each day, the more risk goes up. People who quit smoking have a lower risk of lung cancer than if they had continued to smoke, but their risk is higher than the risk for people who never smoked. Quitting smoking at any age can lower the risk of lung cancer. Cigarette smoking can cause cancer almost anywhere in the body. Cigarette smoking causes cancers of the lung, mouth, nose, throat, voice box (larynx), esophagus, liver, bladder, kidney, pancreas, colon, rectum, cervix, stomach, blood, and bone marrow (acute myeloid leukemia).

- a) To be causally associated with disease, the etiological factor should fulfill which criteria? **(4 marks)**
- b) Based on the scenario given above , **in one sentence**, what is your understanding of **each epidemiologic criteria of a causality (Bradford Hill's Criteria)** in Assessing the Evidence suggesting *cigarette smoking* as a Causative Agent of Lung cancer will you apply? **(8 marks)**
- c) What are the rules of causality?**(3 marks)**

**(15 Marks)**

## QUESTION 5

Benzene exposure has been causally linked with acute myeloid leukemia (AML), but inconsistently associated with other hematopoietic, lymphoproliferative and related disorders (HLD) or solid tumors in humans. Many neoplasms have been described in experimental animals exposed to benzene. The Study used Poisson regression to estimate association and the likelihood statistical to derive confidence intervals for cause-specific mortality and HLD cases in 73,789 benzene-exposed compared with 34,504 unexposed workers in the study in 12 cities in China. Follow-up and outcome assessment was based on factory, medical and other records. Benzene-exposed workers experienced increased risks for all-cause mortality

- A. What is this study design? *(1)*
- B. What is the comparison group? *(1)*
- C. What is the difference between Retrospective and prospective cohort? *(2)*
- D. What measures of effect are possible with this design? *(2)*
- E. A proportion of parents were worried about living in the area after the accident, and moved to a neighbouring country. How would this affect the study? *(4)*

**(10 Marks)**