



“Investing in Africa’s future”

COLLEGE OF HEALTH AGRICULTURE & NATURAL SCIENCE (CHANS)

NSPH 540: ADVANCED EPIDEMIOLOGY

END OF SECOND SEMESTER FINAL EXAMINATIONS

APRIL/MAY 2024

LECTURER: DR N. CHIKONZO

DURATION: 3 HRS

INSTRUCTIONS

Answer **ALL** Questions in **Section A** and **ANY 3** questions from **Section B**

The mark allocation for each question is indicated at the end of the question

Credit will be given for logical, systematic and neat presentations.

SECTION A

Question 1

Suppose that a case-control study was conducted in Zimbabwe to find out whether exposure to malaria during pregnancy influenced the risk of pre-eclampsia. Investigators selected 500 cases who were diagnosed with pre-eclampsia and 1,000 controls who had normal blood pressure. They tested the blood samples of each woman for malaria antibodies and classified the exposure as positive or negative. The study found that 200 case women and 100 control women had positive malaria antibodies.

- a. Set up the two-by-two table for these data **[2 marks]**.
- b. Calculate the odds ratio of pre-eclampsia for the women with positive malaria antibodies compared to the women with negative malaria antibodies **[5 marks]**.
- c. Is your result statistically significant? **[10 marks]**.
- d. State in words your interpretation of this odds ratio **[3 marks]**
- e. Suppose that the investigators hire you as an epidemiological consultant to help them design this study. They ask you what type of control group is most appropriate for the study. Briefly describe the control group that you would advise them to select, and justify your choice. **[10 marks]**
- f. The investigators also ask you to describe the purpose of the control group in a case-control study. What would you tell them? **[10 marks]**

SECTION B

Questions 2.

To understand the true relationship between an exposure and an outcome, epidemiologists need to account for the potential influence of confounding and effect modification, which are two distinct phenomena that can distort or modify the observed association.

- a. With the aid of examples to illustrate the differences, distinguish effect measure modification from confounding in epidemiology. **[5 marks]**
- b. Discuss the rationale for assessing effect measure modification in epidemiological research and its implications for public health. **[5marks]**
- c. Evaluate the role of effect measure modification in the development of personalized or tailored interventions for disease prevention and control. **[5 marks]**

- d. Propose strategies to communicate and interpret findings related to effect measure modification in epidemiological studies for diverse stakeholders, including policymakers and the public. **[5 marks]**

Question 3

You conduct a cohort study examining the relationship between high sugar intake and type 2 diabetes. You find that among 5000 who have a high sugar intake, 1500 develop type 2 diabetes, while among the 10000 who have a low sugar intake, 2000 develop type 2 diabetes. a. Draw a 2x2 table and calculate the crude Relative Risk (RR). **[2 marks]**

b. Interpret the RR. **[2 marks]**

c. Now you stratify by physical activity level and find the following: Among physically active individuals, 750 of 2500 who have a high sugar intake develop type 2 diabetes, while among 5000 physically active individuals who have a low sugar intake, 1000 develop type 2 diabetes. Among physically inactive individuals, 750 of the 2500 who have a high sugar intake develop type 2 diabetes, but only 1000 of 5000 physically inactive individuals who have a low sugar intake develop type 2 diabetes. Draw out the stratified 2x2 tables and calculate and interpret their respective RRs. **[10 marks]**

d. Is this an example of effect modification or confounding? **[2 marks]**

e. Explain in lay terms what this conclusion means. **[2 marks]**

f. What do you do now? **[2 marks]**

Question 4

To achieve better health outcomes in populations, epidemiologists need to translate their research findings into effective and feasible public health policies that address the needs and preferences of different stakeholders, such as policymakers, practitioners, and communities.

- a. Discuss how epidemiological evidence can be used to inform public health policies and interventions. **[10 marks]**
- b. Explain the challenges of translating research findings into practice. **[5 marks]**
- c. How can researchers effectively communicate their findings to inform policy decisions? **[5 marks]**

Question 5

Epidemiological methods are essential for understanding the patterns, causes, and effects of health and disease in populations, and for designing and evaluating interventions to improve health outcomes. However, implementing epidemiological methods in low- and middle-income countries (LMICs) poses several challenges.

- a. Discuss the challenges associated with implementing epidemiological methods in LMICs. [5 marks]
- b. Outline the opportunities associated with implementing epidemiological methods in LMICs. [5 marks]
- c. How can researchers adapt methodologies to address the challenges above including resource constraints and cultural differences? [10 marks]

Question 6

The field of epidemiology is constantly evolving and adapting to the changing needs and challenges of the 21st century.

- a. Discuss the main trends and developments that are shaping the field of epidemiology in the 21st century. [5 marks]
- b. Describe and evaluate the potential and the limitations of the emerging and novel sources and methods of epidemiological data and evidence. [5 marks]
- c. Discuss the implications and the opportunities of these trends and developments for epidemiological research, practice, and education. [5 marks]
- d. Suggest ways to address the challenges and the gaps that may arise. [5 marks]

End of Paper