AMREF INTERNATIONAL UNIVERSITY

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF COMMUNITY HEALTH

MASTER OF PUBLIC HEALTH

END OF SEMESTER EXAMINATION APRIL 2024

UNIT CODE: MAP 717
UNIT NAME: STATISTICAL METHODS IN EPIDEMIOLOGY
DATE: 3rd May, 2024
TIME: Three Hours   **Start:** 1600 Hours   **Finish** 1900 Hours

INSTRUCTIONS

1. This exam is marked out of 100 marks
2. This Examination comprises TWO Sections
    Section A: Compulsory Question (25 Marks)
    Section B: Long Answer Questions (75 Marks)
3. The question on Section A is compulsory and Answer any THREE questions in Section B
4. This online exam shall take 3 Hours
5. Late submission of the answers will not be accepted
6. Ensure your web-camera is on at all times during the examination period
7. No movement is allowed during the examination
8. Idling of your machine for 5 min or more will lead to lock out from the exam
9. The Virtual Assessment System (VAS) has inbuilt integrity checks to detect cheating
10. Any aspect of cheating detected during and or after the exam administration will lead to nullification of your exam
11. In case you have any questions call the Head of Department on Tel +254720573449
12. For adverse incidences please write an email to: amiu.examinations@amref.ac.ke

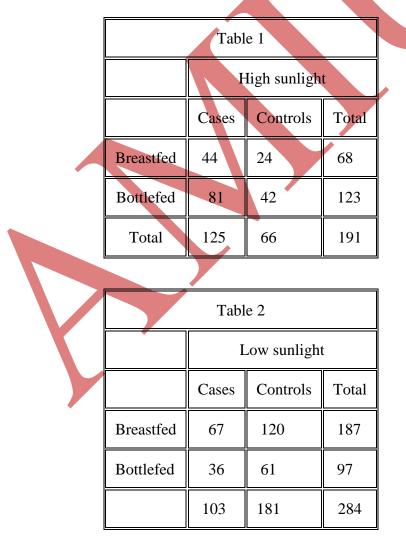**SECTION A: SHORT ANSWER QUESTIONS: COMPULSORY (25 Marks)**

1. Age-related maculopathy is a leading cause of blindness among people 65 and older and is estimated to affect between 16 and 26% of people in this age group. In a recent study, residents aged 43 to 86 years were asked to participate in a study to determine whether cigarette smoking was related to age-related maculopathy. At a baseline examination, participants were asked to report their lifetime smoking habits. After 5 years, participants had an examination to determine whether they had developed age-related maculopathy. The following table presents the number of cases of age-related maculopathy measured at the follow-up examination among the 1232 male participants ages 43-86 who did not have age related maculopathy (ARM) at the baseline examination:

Smoking status	N	Cases of ARM
Never smokers	368	26
Ever smokers	864	79

a. Highlight the epidemiological study design used by in this study? Please provide a brief explanation for your answer. (**5 marks**)

b. Create a 2 x 2 table to summarize the association between the exposure (smoking status) and the outcome (age-related maculopathy). (**5 marks**)

c. Calculate the 5-year cumulative incidence of age-related maculopathy in ever smokers, and in never smokers. Show your work. (**5 marks**)

d. Calculate the cumulative incidence ratio comparing the incidence of age-related maculopathy in ever smokers with that in never smokers. Show your work. (**5 marks**)

e. Assuming causality, what is the proportion of cases of age-related maculopathy in the population that could have been prevented in the population of males ages 43-86 if the smokers had never smoked? Show your work. (**5 marks**)

SECTION B: LONG ANSWER QUESTIONS: ANSWER <u>ANY THREE (3)</u> QUESTIONS (75 Marks)

2. In a case control study, the drinking coffee was associated with colon cancer (odds ratio=3.0). The study investigators had a lengthy discussion on whether this association was causal or not. Briefly discuss factors that you would consider to determine if this association was causal or not. **(25 Marks)**

3. A study explored the association between breastfeeding and skin cancer risk and finds an odds ratio in favor of breastfeeding (odds ratio=0.68). However, there is a concern that this finding maybe confounded by sunlight exposure. Stratification is conducted sunlight exposure variable ('high" or "low") to check if the association is due to confounding. Briefly discuss confounding outlining how it differs from effect modification and how it would be controlled for during data analysis. Use the tables below to calculate the strata specific odds ratios of skin cancer and provide your conclusion as to whether sunlight exposure is a confounder or effect modifier. **(25 marks)**

Table 1			
	High sunlight		
	Cases	Controls	Total
Breastfed	44	24	68
Bottlefed	81	42	123
Total	125	66	191

Table 2			
	Low sunlight		
	Cases	Controls	Total
Breastfed	67	120	187
Bottlefed	36	61	97
	103	181	284

4. Briefly describe the standard normal distribution and how other normal distributions could be converted to the standard normal distribution (standardization). You have attended an HIV/AIDS training where a pre-test and a post-test was given in order to measure knowledge gained. Pre-test scores are included in the table below. Use the table to determine:
   - The z-score of a male who gets a score of 70.
   - The z-score of a female with a score of 35.
   - The for females that is equivalent to a male's score of 78.

   (**25 marks**)

Pre-test Scores: HIV Knowledge

	Females	Males
Mean	60	40
SD	12	10
N	138	97

5. The following table presents data collected from Kisumu County to assess whether the prevalence of asthma symptoms among school age children differs by sex.

	Asthma symptoms		
Sex	Yes	No	
Girl	254	81	335
Boy	237	64	301
	491	145	636

Clearly outline the steps you would take to test your hypothesis that the prevalence of asthma symptoms significantly differs by sex. Perform the test and interpret your findings. (**25 marks**)

6. You have completed your thesis study and your supervisors encourage you to write a manuscript for publication in a peer-reviewed journal. Briefly discuss how you will write the results section to increase chances of being accepted for publication. (**25 marks**)