AMREF INTERNATIONAL UNIVERSITY

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF COMMUNITY HEALTH

MASTERS IN PUBLIC HEALTH

END OF SEPTEMBER-DECEMBER TRIMESTER 2022 EXAMINATIONS

MAP 717: Statistical Methods in Epidemiology

DATE: **16th December 2022**

TIME: Three Hours **Start: 4.00 PM** **Finish** 7.00 **PM**

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 Learning Management System (LMS) 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 invigilator on +254721440462 or Head of Department on Tel +254720573449
12. For adverse incidences please write an email to: amiu.examinations@amref.ac.ke

SECTION A: Compulsory Question

1. The following description is adapted from a published abstract.

   Aoki *et al*. Incidence of injury among adolescent soccer players: a comparative study of artificial and natural grass turfs. Clin J Sport Med 2010; 20: 1-7.

   The objective of this research was to investigate the incidence of acute injuries and soccer-related chronic pain from long-term training and during matches in adolescent players using natural grass turfs and artificial turfs. Study participants were youth soccer players (12-17 years of age) from 6 teams, with a predominant tendency to train on either natural turf or artificial turf. Of 332 players enrolled in this study, 301 remained to completion. Medically diagnosed acute injuries and chronic pain were recorded daily by team health care staff throughout 2005 and this information was provided to the researchers.
   Acute injuries per 1000 player hours on each surface and chronic complaints per 1000 player hours were evaluated according to frequency of surface used most of the time. There was no significant difference in the incidence of acute injuries between the two surfaces during training and competition. However, the artificial turf group showed a significantly higher incidence of low back pain during training (RR = 1.63, 95% confidence interval = 1.06-2.48). Age (early rather than late adolescence) and prolonged training hours were factors associated with an increased incidence of chronic pain in the artificial turf group.

   CONCLUSION: Adolescent players routinely training on AT for prolonged periods should be carefully monitored, even on AT conforming to new standards.

   a. Specify the study design used by Aoki and colleagues? Explain your answer from the extract [4 marks]

   b. In your own words, describe the relationship between turf type used for training and low back pain. Include an explanation and interpretation of the information contained in the brackets. [6 marks]

   c. Complete the 2x2 table and show how the relative risk of 1.63 and its 95% confidence interval was calculated [10 marks]

Turf	Had low back pain	Did not have low back pain	
Artificial	45		135
Natural			
	79		301

   d. A total of 332 players were enrolled and 301 completed the study. Suppose that almost all of the 31 players who did not complete the study came from teams that trained on artificial turf. Thinking as an epidemiologist, explain why you would be concerned about this and how it might affect the results of the study. [5 marks]

SECTION B: ANSWER ANY THREE (3) QUESTIONS

2. Write brief notes on confidence intervals and their interpretation (5mks)

   a. The mean length of hospital stay of 87 critically ill patients was 24days and a standard deviation of 5.9 days. Calculate the 95% and 99% levels of confidence to the mean of the population and interpret the results (8marks)

   b. Ann wishes to compare the circulating levels of estrogen among adolescent girls and adult women who were not following estrogen treatment. They came up with the following figures

      Adolescent girls

      87 63 74 93 62 55 68 74 69

      Adult women

      76 88 92 97 75 76 79 76 79 78 77

   Can we conclude on the basis of this data that the population means are the same? (12marks)

3. Suppose that a study was conducted to compare the rates of automobile collisions in two cities. The researchers were impressed with studies that suggest that the use of cell phones and pagers contribute to auto collisions. They wanted to adjust (standardize) the rates of auto collisions in the two cities for cell phone and pager use. Data on cell phone use and auto collisions in the two cities were collected and are presented in the table below:

Cell phone and pager use	Corona del Mar, California			Boulder, Colorado		
	# persons	# accidents	Rate*	# persons	# accidents	Rate*
Heavy	4479	293		100	2	
Moderate	974	27		300	6	
Never	1106	15		8293	145	
Total	6559	335		8693	153	

* per 1000 persons

a. Calculate the crude total and cell phone/pager use specific rates for Corona del Mar and Boulder. How do these two cities compare in crude prevalence of auto accidents. (5 pts)

b. Using the combined number of persons in both areas as a standard, calculate a standardized rate (standardized for cell phone/pager use) for each of the states. Use the direct standardization method. Briefly describe how these standardized rates compare with each other and with the crude rates. Describe any meaningful differences (20 pts)

4. A) Explain the differences between descriptive and analytical epidemiological study designs (5mks)

B) Critically review the following study designs:

i. Randomized control trials (5mks);
ii. Quasi-experimental study design (5mks);
iii. Ecological studies (5mks);
iv. Retrospective cohort study design (5mks).

5. An epidemiology graduate student finds evidence in the literature that childhood sunlight exposure may affect adult breast cancer risk. To explore this hypothesis, she obtains from the authors the palace of birth for all of the sub jects in the present study and constructs a sunlight exposure variable ('high" or "low") based on geologic and meteorologic data for the years of the subject's childhood. Her data show that 56.2% of the 219 premenopausal women who were not breastfed as infants grew up with "high" sunlight exposure. Based on this fact and the partially-completed tables below,

   a. Calculate the odds ratio of breast cancer with respect to breastmilk exposure within each of the two-sunlight exposure stratum (5mks), and
   b. Briefly describe the relationship of the sunlight exposure variable to the association between breast cancer and breastmilk exposure (i.e., in relation to confounding and effect modification. (20pts)

	High sunlight				Low sunlight		
	Cases	Controls	Total		Cases	Controls	Total
Breastfed		24			67		
Bottlefed	81				36		
Total			191				284

6. Analyze the following key considerations in scientific writing under the following headings:

   a. Authorship (5mks);
   b. Background (5mks);
   c. Literature review (5mks);
   d. Discussion (5mks);
   e. References (5mks);