W1-2-60-1-6

JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY

UNIVERSITY EXAMINATIONS 2023/2024

SUPPLEMENTARY/SPECIAL EXAMINATION FOR THE DEGREE OF MSC. EPIDEMIOLOGY

PEH 3103: EPIDEMIOLOGIC METHODS I

DATE: MAY/JUNE 2024 TIME: 3 HOURS

INSTRUCTIONS: ANSWER ANY FOUR QUESTIONS

1) For your Master's Degree thesis project, you have come up with the research question: "Does a family history of breast cancer increase the risk of breast cancer?" You plan to use a case-control study design to answer this question. You find out from your Epidemiology Methods unit lecturer that Nyeri County has kept a fairly good cancer registry at the Nyeri County Referral Hospital for the last 4 years and you decide to carry out your study there.

   a) Briefly outline how you would pick your cases. *(2 Marks)*

   b) Briefly outline how you would pick your controls. *(2 Marks)*

   c) What measure of association would you use and what test of statistical significance would you report? *(2 Marks)*

   d) Comment on potential sources of bias in the sampling of cases and controls. *(5 Marks)*

   e) How would you measure "family history of breast cancer" as the predictor variable of interest? Comment on the sources of bias in this measurement. *(7 Marks)*

   f) Do you think a case-control design is an appropriate approach to this research question? Discuss the advantages and disadvantages of the case-control design relative to other possibilities for this research question. *(7 Marks)*

2) You have developed an intervention model to reduce mother-to-child HIV transmission by use of intensified counselling, HIV testing and family planning services for young women between 18 years and 24 years. You have identified ten (10) hospitals and clinics in Thika Sub-County, Kiambu County, to roll-out your study due to the relatively high prevalence of HIV in this sub-county. Your study will be implemented by primary care doctors and nurses working in this health centres. You would like to test your intervention versus "usual care" physician practice in a randomized trial - that is, you will recruit participants in these primary care health centres and randomize them to your new intervention vs. usual physician care. Your outcomes will be the uptake of VCT and family planning services and rates of unintended pregnancies.

a) Describe how you would design this study as a usual randomized trial of individual patients (that is, individual patients would be randomized to your intervention vs. "usual care"). What are some of the difficulties you might encounter in terms of blinding, retention and adherence? *(10 Marks)*

b) Describe how you might design this study using a cluster randomization design. What might be the unit of randomization? What are some of the advantages of this design for this type of intervention? What are some disadvantages? *(15 Marks)*

3) The effect of sedative psychotropic drugs on the risk of hip fractures in post-menopausal women above 55 years was investigated in Nakuru County. All women above 55 years were included in the study when they lived (defined as being listed in the 2009 National Census registry) in the geographic catchment areas of 6 public hospitals including Nakuru County Referral Hospital and 5 other County hospitals in Nakuru County during any part of the study period. During the study period, 489 cases of hip fractures in women who resided in this area were diagnosed. 1012 controls were sampled from 2009 National Census registry for the catchment areas of these hospitals.

a) Is this a primary or secondary study base? Briefly describe the study base. *(5 Marks)*

b) If some women were diagnosed with hip fractures and were found to be residing in the area but were not listed in the 2009 National Census registry for the area, should they be included as cases? Why? *(5 Marks)*

c) If some women residing in the area (and listed in the 2009 National Census registry) became diagnosed with hip fractures at private hospitals and clinics (not the 6 public hospitals), should they be included as cases? Why? *(5 Marks)*

d) Briefly describe selection bias (if any) that may have arisen from the selection of the cases and controls in this study. *(5 Marks)*

e) Outline how you would have selected cases and controls to reduce selection bias. *(5 Marks)*

4) Your epidemiology classmate wants to study the hypothesis that exposure to air pollution from factories (as determined by levels of nitrogen oxides, sulphur dioxide and carbon dioxide in the air) is a risk factor for chronic obstructive pulmonary disease (COPD). She proposes to perform a case-control study comparing residents of Nairobi with newly diagnosed COPD with controls (who do not have COPD) and ask about exposure to air pollution.

(a) You see a serious problem with your classmate's proposed exposure measurement in this study design. What problem is it? *(5Marks)*

(b) You suggest to your classmate to instead use an ecologic study design. Outline how you might carry out such a study. What characteristics make it an ecologic study? *(20 Marks)*

5) A herbal extract, huperzine, has been used in China as a remedy for dementia (severe loss of memory and thinking skills) and preliminary studies in animals and humans have been promising. A large trial of huperzine (>200 participants per arm) is planned here in Kenya. The aim is to test whether this herbal extract decreases clinical diagnosis of dementia in elderly men and women with mild cognitive impairment (slight decline in memory and thinking skills). You have been requested to be one of the investigators.

Describe the steps you will follow to carry out a randomized controlled trial of huperzine in prevention of dementia in elderly persons above 60 years who have mild cognitive impairment. *(25 Marks)*

6) Your colleague has come up with the research question: "What are the factors which cause people to start cigarette smoking?" She decides on a cross-sectional sample of high school students then invites form 4 students in her suburban mixed-day school to participate and studies those who volunteer.

(a) Discuss the suitability of this sample for the target population of interest. *(5 Marks)*

(b) Suppose your classmate decides to avoid bias associated with choosing volunteers and picks a 25% random sample of the entire form 4 class and the actual sample turns out to be 70% female. If there are equal numbers of boys and girls in the class what could be the explanation for this outcome? *(10 Marks)*

(c) Briefly describe how you would yourself carry out a suitable random sampling of this population to answer this research question. *(10 Marks)*