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ONLINE EXAM COVER SHEET

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A. STUDENT/S TO COMPLETE

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Date Submitted: 5 th March 2026	Lecturer Name:
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Declaration

I declare that this assessment item is my own work, neither was I assisted by anyone or any other foreign material in answering this Examination, and acknowledge that the assessor of this item may, for the purpose of assessing this item:

Communicate a copy of this assessment item to the University for Marking

I certify that I have read and understood the University Rules in respect of Student Academic Misconduct.

Student Signature:

Date: 5th march 2026

QUESTION 1

A population-based case-control analysis was conducted to evaluate whether dietary patterns influence the risk of a rare disorder, classic Hodgkin lymphoma (cHL), in younger or older adults. Cases of incident cHL were recruited from the greater Boston metropolitan area of Massachusetts and the state of Connecticut from August 1, 1997, to December 31, 2000. Eligible patients were aged 15 to 79 years, living within the target geographic area, and without human immunodeficiency virus (HIV) infection at diagnosis. Cases were identified by using the rapid case ascertainment systems of Harvard and Yale universities with additional support from the Massachusetts and Connecticut state tumor registries. Six hundred seventy-seven eligible cases were invited to participate in the study, and 84% (n = 567) consented. Certain data used in this study were obtained from Connecticut.

Tumor Registry in the Connecticut Department of Public Health. Population-based controls without a history of cHL were frequency matched to cases by age (within 5 years), sex, and state of residence (Massachusetts or Connecticut). In greater Boston, controls were identified through the “Town Books,” annual records documenting all citizens aged ≥ 17 years, which are 90% complete. Of 720 invited controls in Massachusetts, 51% (n = 367) consented. In Connecticut, 450 eligible controls aged 18 to 65 years were identified by random-digit dialing, and 61% (n = 276) consented. Of 69 eligible controls in Connecticut aged 66 to 79 years identified through the Health Care Financing Administration (Medicare), 52% (n = 36) consented to participate. Discuss in detail using the following question.

Define epidemiology and explain its role in disease prevention and control. (10 marks)

Identify the type of study design here? Compare cohort and case-control studies using examples relevant to public health, taking into consideration the case presented here. (40 marks)

What is a common indication for using this type of design? (10 marks)

Describe the steps of outbreak investigation. (20 marks)

A. Define epidemiology and explain its role in disease prevention and control. (10 marks)

Definition

When we talk about epidemiology it refers to the study of how often disease occurs in different groups of people and why. In short it is the study of distribution and determinants of health-related states or events.

Epidemiology can be broken down into three key parts namely as follows: Distribution which refers to descriptive epidemiology is essential for counting cases and figuring out who is getting sick, where they are getting sick and when this is happening. Determinants: is analytical epidemiology this moves beyond counting cases to asking the difficult questions of why and how people are getting sick. It involves testing the hypothesis about what causes disease. The last one is application how will the results found be used to learn and improve health.

Roles of Epidemiology

Epidemiology helps us identify risk factors and causes of disease. Without epidemiology studies, we would not know that smoking causes lung cancer or that a lack of clean water leads to cholera. This information is the bedrock of primary prevention, which aims to stop disease before it even starts. Epidemiology allows us to describe health status or populations. By calculating measures like incidence and prevalence. This information is important for planning health services and deciding where to allocate limited resources. For example if we know that malaria prevalence is highest in children under five in a particular district, we can target our mosquito net distribution there.

Epidemiology is important for evaluating the effectiveness of interventions. Once we implement a program mosquito net distribution campaign, or a health education initiative, we need to know if it is actually working. Epidemiology provides the tools to compare disease rates before and after interventions and to measure the true impact.

Epidemiology informs public health policy. The evidence generated from research forms the scientific basis for important decisions.

B. Identify the type of study design here? Compare cohort and case-control studies using examples relevant to public health, taking into consideration the case presented here. (40 marks)

i. Identification of the study

The study described in the question is a population based case control study. My justification for this identification is that the researcher first started by identifying individuals who already had the disease of interest, which in this case was the incident cases of classic Hodgkin lymphoma (cHL). They then selected a separate group of individuals who did not have the disease, known as control. The next step was to collect information on past exposures, specifically dietary patterns and compare the frequency of these exposures between two groups. The approach, moving from the outcome back to the exposure, is the defining characteristic of a case control study. It is describe as population based because both case and control were drawn from well-defined geography population.

ii. Comparison of cohort and case control study

Cohort and case control studies are both analytical designs in a study

Cohort Study	Case control Study
In this study a group of health people are identified and followed for a period of time	In this study it compares cases, diseased individuals and control
In the cHL study, if the research had chosen a cohort study to answer the same question, they would have needed to identify a larger group of health people, collect detailed dietary information from them at the start and then follow them for a few years to see who eventually developed cHL	In the cHL study, the research began by identifying 567 people with cHL (the case) and 679 people without cHL (control). They then asked both groups to recall their past dietary habits to see if any patterns such as low vegetable intake were more common among the cases.
This design is well suited for studying occupational hazards. A researcher could follow a group of miners exposed to dust and a comparison group of teachers with no such exposure for 6 years to compare the	Case control study is suitable for investigating a disease outbreak. For instance during a cholera outbreak in Lusaka, investigator would interview people who are sick and their healthy neighbors to compare what they ate or drank in the days before becoming ill.

incidence of chronic lung disease.	
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C. What is a common indication for using this type of design? (10 marks)

The most common and convincing indication for choosing a case control study design is when the disease under investigation is rare. To explain as to why this is the case. A rare disease, by its very nature, occurs infrequently in the population. If a researcher wanted to study a rare condition like classic Hodgkin lymphoma using a cohort study, they would face a significant practical problem. They would need to enroll and follow an extremely large number of healthy people for many years just to observe enough cases of cHL to be able to draw any meaningful conclusions. This would be a huge undertaking, requiring vast amounts of time, money, and logistical effort, making it often unfeasible. The case control design offers an elegant and efficient solution. Instead of waiting for cases to appear, the researcher starts by identifying all the available cases of the rare disease that have already occurred. In this study, they successfully identified 567 cases of cHL. They then select a sample of the healthy population, the controls, for comparison. This approach completely bypasses the need for long-term follow-up of a massive cohort. It is therefore the most practical and efficient way to investigate the causes of uncommon conditions.

Other situations where this design is commonly used include investigating disease outbreaks, where a quick answer is needed, and conducting preliminary or exploratory studies to generate new hypotheses for future research.

D. Describe the steps of outbreak investigation. (20 marks)

Investigating a disease outbreak is a bit like being a detective. It requires a systematic and logical approach to find the thief and stop the spread. The steps, which are used by public health officials are as follows:

- a. Before heading out, the investigation team needs to get organized. This involves getting the right people, defining everyone's roles, gathering all necessary equipment and supplies, and notifying the relevant local and national authorities. Good preparation prevents problems later on.
- b. The first step is to confirm that an outbreak is actually happening. This is done by comparing the current number of reported cases with the number that would normally be expected, based on routine surveillance data from previous weeks or years. An outbreak is confirmed when the observed number is clearly higher than the expected number.
- c. It is essential to make sure that the reported cases have been correctly diagnosed. This means reviewing their clinical symptoms and laboratory results. If the diagnosis is wrong, the entire

investigation could be led in the wrong direction, wasting precious time and resources chasing a false culprit.

- d. A clear and practical case definition must be developed. This definition acts as a standard rule for who should be counted as a case. It typically includes four components: the clinical symptoms, and restrictions on person, place, and time. For example, a case definition might be (acute watery diarrhoea in a person living in Kanyama compound with onset of symptoms between 1 and 10 December 2025). Once this definition is agreed upon, an active search for cases begins.
- e. The next step involves characterizing the identified cases according to the classic epidemiological variables of time, place, and person. An epidemic curve is plotted to show the number of cases over time, which can reveal whether the outbreak was from a single point source or from person-to-person spread. A spot map shows the geographic distribution of cases, which can point towards a common source. Analyzing the data by age, sex, and other personal characteristics helps to define the population at risk.
- f. Based on the patterns observed in the descriptive data, the team develops hypotheses about the source of the outbreak and how it is being transmitted. For example, a spot map showing cases clustered around a particular market might lead to the hypothesis that contaminated food from that market is the cause.
- g. The hypotheses must now be formally tested. This is done using analytical studies, most commonly a case-control study where the exposures of a group of cases are compared with a group of well controls. This is the crucial step that proves the association and identifies the specific source, such as a particular food item or water source.
- h. Based on the findings, control measures are put into place immediately. This is the action step, and it might involve removing a contaminated food product from sale, closing a contaminated well, providing medication to those at risk, or starting a vaccination campaign. Ideally, control measures are implemented as soon as a probable source is identified, even before the analytical study is completely finished.
- i. The final step is to write a comprehensive report for local health authorities and other stakeholders. The findings should also be shared through scientific channels to contribute to the global knowledge base and help prevent similar outbreaks in the future. The report should document the entire investigation, the key findings, the control measures taken, and clear recommendations for the future.