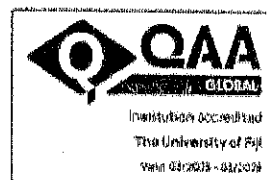




The University of Fiji

(An Entity of Arya Pratinidhi Sabha of Fiji)



Umanand Prasad School of Medicine and Health Sciences

Semester 2, 2025

FINAL EXAMINATION PAPER

BPHC 103: EPIDEMIOLOGY AND BIOSTATISTICS IN PRACTICE

Important Instructions to Students:

1. Read the questions, instructions carefully and answer the questions.
2. You are allowed an **extra 10 minutes reading time** (during this time, you are not allowed to write with pen) and **180 minutes (3 Hours) to complete this paper**.
3. Silent, non-programmable calculators are allowed, but not supplied.
4. Write all your answers in the answer booklet provided. If you need extra sheets, please ask from the supervisor. Write your name, course code and student identification number in the answer booklet and in the attendance sheet.
5. This paper contains four (4) sections A, B, C and D. All questions are compulsory to answer **except** section A and D have choices.
6. Write all your answers legibly. The marker has the right to award zero for answers that are not legible.
7. This is a **Closed Book Examination**. The University views plagiarism, cheating and dishonest practice as serious offences and if found, offenders are penalized.

Examination Paper Content (Format):

Section	Question	Content	Marks	Suggested Time
A	1-50	Multiple Choice	50	75 minutes
B	51-70	Short Answer Questions	20	40 minutes
C	71-80	Long Answer Questions	20	40 minutes
D	81-85	Essays (Choose Any ONE out of Five)	10	25 minutes
		TOTAL	100	180 Minutes

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Registration Certificate Number (RGN0020/11)

Section A: Multiple Choice (Total 50 Marks)

Each question is worth 1 mark. There is no negative marking.

1. What is the primary goal of descriptive epidemiology?
 - a. To identify risk factors
 - b. To test hypotheses
 - c. To describe disease patterns
 - d. To evaluate interventions
2. Which of the following is NOT typically included in descriptive epidemiology?
 - a. Time
 - b. Cause
 - c. Person
 - d. Place
3. What type of study is most commonly used in analytical epidemiology?
 - a. Cross-sectional study
 - b. Ecological study
 - c. Case report
 - d. Cohort study
4. Which measure is used to compare disease occurrence between exposed and unexposed groups?
 - a. Relative risk
 - b. Prevalence
 - c. Incidence rate
 - d. Mortality rate
5. Which study design is best for investigating rare diseases?
 - a. Randomized trial
 - b. Cross-sectional study
 - c. Case-control study
 - d. Cohort study.
6. What does a p-value in analytical epidemiology indicate?
 - a. Prevalence
 - b. Statistical significance
 - c. Strength of association
 - d. Incidence
7. Which of the following is a key feature of analytical epidemiology?
 - a. Generating hypotheses
 - b. Describing health status
 - c. Mapping disease distribution
 - d. Testing hypotheses

8. What is the main purpose of a case-control study?
 - a. Describe disease trends
 - b. Estimate prevalence
 - c. Risk factors
 - d. Measure incidence
9. Which term describes the number of new cases in a population over a specific time?
 - a. Incidence
 - b. Mortality
 - c. Prevalence
 - d. Risk ratio
10. Which study design follows participants over time to observe outcomes?
 - a. Ecological
 - b. Case-control
 - c. Cohort
 - d. Cross-sectional
11. What does 'person' refer to in descriptive epidemiology?
 - a. Time of disease onset
 - b. Disease cause
 - c. Geographic location
 - d. Demographic characteristics
12. Which of the following is a measure of association?
 - a. Odds ratio
 - b. Prevalence
 - c. Incidence
 - d. Mortality rate
13. Which study design is most prone to recall bias?
 - a. Cohort
 - b. Randomized trial
 - c. Cross-sectional
 - d. Case-control
14. What type of epidemiology is used to generate hypotheses?
 - a. Descriptive
 - b. Experimental
 - c. Clinical
 - d. Analytical
15. Which of the following is a temporal factor in descriptive epidemiology?
 - a. Gender
 - b. Season
 - c. Age
 - d. Occupation

16. What does the mean represent in a data set?
- The middle value
 - The most frequent value
 - The average value
 - The range of values
17. Which measure of central tendency is most affected by outliers?
- Mode
 - Median
 - Mean
 - Range
18. What does the standard deviation measure?
- Central tendency
 - Frequency
 - Spread of data
 - Sample size
19. Which of the following is a measure of dispersion?
- Mean
 - Median
 - Mode
 - Range
20. What type of graph is best for showing frequency distribution?
- Pie chart
 - Histogram
 - Line graph
 - Scatter plot
21. Which statistic is used to describe the proportion of a population with a characteristic?
- Mean
 - Prevalence
 - Incidence
 - Standard deviation
22. What does a p-value less than 0.05 typically indicate?
- No association
 - High variability
 - Statistical significance
 - Large sample size
23. Which of the following is NOT a type of descriptive statistic?
- Mean
 - Median
 - Regression coefficient
 - Mode

24. What is the purpose of analytical statistics?
- Describe data
 - Summarize data
 - Test hypotheses
 - Organize data
25. Which graph is best for showing trends over time?
- Pie chart
 - Line graph
 - Bar chart
 - Scatter plot
26. What does the median represent?
- Most frequent value
 - Average value
 - Middle value
 - Lowest value
27. Epidemiologists are interested in learning about
- The causes of disease and how to cure or control them
 - The frequency and geographic distribution of diseases
 - The causal relationships between diseases
 - All of the above
28. Diseases that are always present in a community, usually at a low, more or less constant frequency, are classified as having a _____ pattern.
- Outbreak
 - Epidemic
 - Endemic
 - Pandemic
29. Which of the following statements is true concerning epidemic diseases?
- They are not usually very contagious
 - They usually appear and disappear seasonally
 - At the end of an epidemic, a disease spreads at an increasing rate and then abruptly disappears
 - All of the above
30. A disease vector is a(n) _____.
- Organism that transmits a disease
 - Symptom of a disease
 - Environmental condition associated with a disease
 - Organism which has a toxin
31. Which of the following is NOT one of the three key factors in the epidemiologic triangle?
- Host
 - Time
 - Environment
 - Agent

32. Diseases that are mostly due to environmental changes, increased population densities, and pollution that result from modernisation in third world nations are referred to as:
- Diseases of poverty
 - Diseases of development
 - Disease of pollution
 - Diseases of vectors
33. A study wishes to assess birth characteristics in a population. Which of the following variables describes the appropriate measurement scale or type? a. _____ Birth weight in grams
- Continuous
 - Ordinal
 - Nominal
 - Dichotomous
34. A study wishes to assess birth characteristics in a population. Which of the following variables describes the appropriate measurement scale or type? b. _____ Birth weight classified as low, medium, high
- Continuous
 - Ordinal
 - Nominal
 - Dichotomous
35. A study wishes to assess birth characteristics in a population. Which of the following variables describes the appropriate measurement scale or type? c. _____ Birth weight classified as low, not low
- Continuous
 - Ordinal
 - Nominal
 - Dichotomous
36. A study wishes to assess birth characteristics in a population. Which of the following variables describes the appropriate measurement scale or type? d. _____ Delivery type classified as caesarean, natural, induced
- Continuous
 - Ordinal
 - Nominal
 - Dichotomous

37. An investigator suspects that acetaminophen use during the first trimester of pregnancy can cause neural tube defects. She estimates the risk of neural tube defect in the general population is 1:1,000. Which of the following is the best study design to investigate the hypothesis?
- Cohort study
 - Case-control study
 - Clinical trial
 - Cross-sectional study
38. 500 women aged 40 – 54 who present for routine check-ups are asked about their meat consumption. 20% of the women turn out to be vegetarian. During the ensuing 5 years, 5 vegetarians and 43 non-vegetarians develop colorectal cancer. Which of the following best describes the study design?
- Case series report
 - Cohort study
 - Case-control study
 - Cross-sectional study
39. A group of patients with lung cancer is matched to a group of patients without lung cancer. Their smoking habits over the course of their lives are compared. On the basis of this information, researchers compute the odds of smoking among patients with lung cancer compared to the odds of smoking among those without lung cancer. This is an example of a
- Case-control study
 - Cohort study
 - Cross-sectional study
 - Randomized controlled study
40. In a study, a group of people are exposed to an environmental toxin but are not treated. Instead, they are observed over time on a standard set of measures to ascertain the potential effects of the toxin. This type of study design is called
- Clinical trial
 - Longitudinal
 - Prospective cohort
 - Retrospective cohort
41. A new drug with in vitro activity against HIV is tested on a population of patients with Western-blot confirmed HIV infections. Out of the 200 individuals in the patient population, 100 are chosen by lottery to receive the drug. The drug, which is tasteless, is administered in a cup of orange juice; the other patients receive pure orange juice. Neither the nurses, doctors, nor the patients know which patients receive the drug. At the end of the study period, the number of CD4+ T cells is determined for all of the subjects. This is an example of a
- Case-control study
 - Cohort study

- c. Cross-sectional study
 - d. Double-blind randomized clinical trial
42. There were no new cases of Ebola virus in the United States from January 1, 1997 through January 1, 1998. Which of the following epidemiologic terms does this statement describe?
- a. Incidence
 - b. Point prevalence
 - c. Lifetime prevalence
 - d. Period prevalence
43. A study is performed in which mothers of babies born with neural tube defects are questioned about their acetaminophen consumption during the first trimester of pregnancy. At the same time, mothers of babies born without neural tube defect are also questioned about their consumption of acetaminophen during the first trimester. Which of the following measures of association is most likely to be reported by investigators?
- a. Prevalence
 - b. Hazard ratio
 - c. Relative risk
 - d. Odds ratio
44. What is the difference between incidence and prevalence?
- a. Incidence refers to the proportion of the population with a disease, while prevalence refers to the number of new cases of a disease in a population over a period of time
 - b. Incidence refers to the number of new cases of a disease in a population over a period of time, while prevalence refers to the proportion of the population with a disease
 - c. Incidence and prevalence are the same thing
 - d. Incidence and prevalence are measures of mortality
45. What is the purpose of a case-control study?
- a. To determine the incidence of a disease in a population
 - b. To determine the cause of a disease
 - c. To determine the prevalence of a disease in a population
 - d. To compare the characteristics of individuals with a disease to those without a disease
46. What is the difference between a cohort study and a case-control study?
- a. In a cohort study, participants are selected based on their disease status, while in a case-control study, participants are selected based on their exposure status
 - b. In a cohort study, participants are followed over time to observe outcomes, while in a case-control study, outcomes have already occurred
 - c. Cohort studies are more expensive than case-control studies
 - d. Case-control studies are more rigorous than cohort studies

47. A variable which has some chance or probability of its occurrence is known as
- Random variable
 - Simple variable
 - Quantitative variable
 - Qualitative variable
48. What is a randomised controlled trial (RCT)?
- An observational study that compares the incidence of a disease in a population with different levels of exposure to a risk factor
 - A study that compares the characteristics of individuals with a disease to those without a disease
 - A study that randomly assigns participants to an intervention or control group to evaluate the effectiveness of a treatment or prevention strategy
 - A study that compares the prevalence of a disease in a population with different levels of exposure to a risk factor
49. What is the difference between sensitivity and specificity?
- Sensitivity is the proportion of true negatives, while specificity is the proportion of true positives
 - Sensitivity is the proportion of true positives, while specificity is the proportion of true negatives
 - Sensitivity and specificity are the same thing
 - Sensitivity and specificity are measures of prevalence
50. Which of the following study types is able to lend itself to triple blinding?
- Key informant Interview
 - Nominal group technique
 - Focus group discussion
 - Experimental design

Section B: Short Answer Questions (Total 20 Marks)

For the following questions, indicate whether the statement is 'True' or 'False'. (8 marks)

51.	The epidemiological triad consists of agent, host, and environment	
52.	Prevalence measures the number of new cases in a population over a specific time.	
53.	A population at risk includes individuals who are immune to the disease.	
54.	Incidence is useful for studying the causes of disease.	
55.	The host in the epidemiological triad refers to the physical environment where disease occurs.	
56.	Prevalence is influenced by both incidence and duration of disease	
57.	The agent in the epidemiological triad can be biological, chemical, or physical.	
58.	Incidence is not affected by the size of the population at risk.	

For the following questions, **Fill-in-the-Blanks**

(6 marks)

59. The _____ refers to the number of existing cases of a disease in a population at a given time.
60. The _____ is the component of the epidemiological triad that includes bacteria, viruses, and toxins.
61. A _____ population includes individuals who are susceptible to a particular disease.
62. The _____ rate is calculated by dividing the number of new cases by the population at risk during a specific time period.
63. The _____ in the epidemiological triad includes factors like climate, sanitation, and housing.
64. _____ is the term used to describe the occurrence of disease in a defined population over time.

Match the terms in Column A with the correct definitions in Column B.

(6 marks)

Column A	Answer	Column B
65. Agent		A Affected by re-infection
66. Host		B Group vulnerable to developing disease
67. Environment		C Total number of cases at a point in time
68. Incidence		D Organism susceptible to disease
69. Prevalence		E Cause of disease (e.g., virus, toxin)
70. Population at risk		F External conditions affecting disease

Section C: Long Answer Questions (Total 20 Marks)

71. The following are systolic blood pressure readings (in mmHg) from 5 individuals:

120, 130, 125, 140, 135

a) Calculate the mean.

b) Calculate the range.

(2 marks)

72. Define the following terms and give one example of each:

a) Standard deviation

b) Interquartile range

(2 marks)

73. A line list contains the following data on 4 patients with foodborne illness:

Patient ID	Age	Date of Onset	Symptoms
P001	34	12 Oct	Diarrhea
P002	45	13 Oct	Vomiting
P003	29	12 Oct	Diarrhea
P004	50	14 Oct	Fever

a) How many patients had diarrhea?

b) What is the median age?

(2 marks)

74. Explain the difference between a bar chart and a histogram. Include one example of when each is appropriate in public health.

(2 marks)

75. A dataset shows the number of malaria cases reported monthly in a district.

a) What type of graph would best show the trend over time?

b) Why is this graph appropriate?

(2 marks)

76. The following table shows the number of respiratory infections reported in three age groups:

Age Group	Number of Cases
0–4	45
5–14	30
15–49	25

a) Create a bar chart to represent this data.

b) Which age group has the highest burden?

c) Suggest one public health intervention for the most affected group.

(2 marks)

77. A dataset shows the weekly number of dengue cases over 10 weeks.

a) What measure of spread would help assess variability in weekly case numbers?

b) Why is this measure useful?

(2 marks)

78. You are given the following frequency data on BMI categories among 50 students:

BMI Category Frequency	
Underweight	5
Normal	30
Overweight	10
Obese	5

- Draw a frequency histogram.
 - What percentage of students are overweight or obese?
 - Comment briefly on the distribution and whether it is normally distributed.
- (2 marks)

79. A dataset shows the weekly number of dengue cases over 10 weeks.

- What measure of spread would help assess variability in weekly case numbers?
 - Why is this measure useful?
- (2 marks)

80. A student creates a pie chart to show the proportion of symptoms among 100 patients:

- Fever: 40
- Cough: 30
- Rash: 20
- Vomiting: 10

- Is a pie chart appropriate for this data?
 - Suggest one improvement or alternative.
- (2 Marks)

Section D: Essay Questions (Total 10 Marks)

(You have a **choice** to answer **One** out of the **five** questions [1/5] below. Each essay question is worth 10 marks and should be structured clearly, systematically and coherently to attain full marks).

81. Epidemiology and Public Health Practice

"Discuss the role of epidemiology in identifying and addressing public health problems. In your answer, explain how epidemiological principles guide disease surveillance, prevention strategies, and health policy decisions."

82. Descriptive vs Analytical Statistics in Public Health Research

"Compare and contrast descriptive and analytical statistics in the context of public health research. Illustrate your answer with examples of how each type of statistic contributes to understanding disease patterns and testing hypotheses."

83. Qualitative and Quantitative Data in Health Research

"Evaluate the strengths and limitations of qualitative and quantitative data in public health research. How can combining both approaches enhance understanding of complex health issues?"

84. Sources of Health Data and Their Utility

"Critically examine the main sources of health data used in epidemiological investigations. Discuss the advantages and limitations of at least three sources, and how data quality affects public health decision-making."

85. Epidemiological Study Designs and Collaborative Practice

"Analyse the importance of selecting appropriate epidemiological study designs for investigating disease causation. Discuss how interdisciplinary collaboration enhances the design, implementation, and impact of epidemiological studies."



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UMANAND PRASAD SCHOOL OF MEDICINE AND HEALTH SCIENCES

DEPARTMENT OF PUBLIC HEALTH

SEMESTER 2 - YEAR 2025

BPHC 103: FORMULAE SHEET

$$\text{Rate} = \frac{\text{no. of cases of the studied event}}{\text{population at risk for the studied event}} \times 10^n$$

$$\text{Incidence Proportion} = \frac{\text{No. of onsets}}{\text{No. at risk at beginning of follow-up}}$$

$$\text{Prevalent rate} = \frac{\text{total no. of people with [disease/condition] at a specified time}}{\text{no. of people in the population at risk at a specified time}} \times 10^n$$

$$\text{Incidence Rate} = \frac{\text{No. of onsets}}{\sum \text{person-time}}$$

$$\text{OR} = \frac{A \times D}{B \times C}$$

$$RR = [a/(a+b)] / [c/(c+d)]$$

$$\begin{aligned} \text{SEN} &= (\text{TP}) / (\text{those with disease}) \\ &= (\text{TP}) / (\text{TP} + \text{FN}) \end{aligned}$$

$$\begin{aligned} \text{SPEC} &= (\text{TN}) / (\text{those without disease}) \\ &= (\text{TN}) / (\text{TN} + \text{FP}) \end{aligned}$$