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22/03/2021

POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO

MD (COMMUNITY MEDICINE/COMMUNITY DENTISTRY)
THEORY EXAMINATION – MARCH 2021

Date:- 23rd March 2021 **Time:-** 9.30 a.m. – 11.30 a.m.

PAPER I

Answer **all four (04)** questions.
Answer each question in a separate book.

1. The following data were abstracted from a recently published vaccine trial against SARS-CoV-2. These data were for a period of 45-90 days following administration of the first dose of the vaccine.

	Given vaccine	**Control**
Number of persons detected with infection between 45-90 days of administration of only the 1st dose of the vaccine	30	101
Number of person-days of observation	250,000	250,000

1.1. Calculate the incidence density of SARS-CoV-2 infection between 45-90 days among participants given the vaccine. (15 marks)

1.2. Calculate the efficacy of the first dose of vaccine for this period. (25 marks)

1.3. List two (02) assumptions you made for the calculation of 1.2. (10 marks)

It was initially recommended that 2 doses be given 4 weeks apart. The maximal effect of the vaccine is seen after 2 weeks of the second dose.

If both doses of the vaccine are given, the efficacy is 90% between 45-90 days. The at-risk population is 10 million persons and only 2 million doses of the vaccine are currently available. Assume that the rate of infection during 45-90 days is 5% among the unvaccinated.

1.4. Estimate the additional number of infections that can be prevented during 45-90 days if a single dose of the vaccine is given as compared to giving two doses. Provide details of all calculations.
For the single dose of the vaccine, use the vaccine efficacy you calculated in 1.2 above. (50 marks)

Contd..../2-

2. An investigator wanted to assess the association between levels of regular physical activity and peak oxygen consumption (l/min, VO_{2peak}). She divided a group of 59 adolescents into three groups based on their level of physical activity.

The VO_{2peak} of the three groups is summarized below.

Physical Activity Group	N	Median VO_{2peak}	Mean VO_{2peak}	SD VO_{2peak}
1	19	2.25	2.20	0.31
2	20	2.42	2.39	0.25
3	20	2.62	2.59	0.25

2.1. Comment on the distribution of peak oxygen consumption in this sample. (10 marks)

2.2. State giving reasons the most appropriate graph to display these data. (10 marks)

The output from the one-way analysis of variance of the data is given below.

	SSq	DF	MSq	F	p
Between groups	1.484	2		10.05	0.0002
Within groups	4.134	56	0.0738		
Total					

SSq-Sums of Squares, MSq-Mean Squares

Shapiro-Wilk test
W = 0.973, p-value = 0.202
Levene's Test
$F_{2,56}$ = 0.307, p-value = 0.737

2.3. Calculate the following from the ANOVA table. (15 marks)

2.3.1. Between groups mean squares

2.3.2. Total sums of squares

2.3.3. Total degrees of freedom

2.4. Calculate the R squared value (coefficient of determination) for this model. (10 marks)

2.5. Based on all the results provided explain whether ANOVA is an appropriate method to analyze these data. (30 marks)

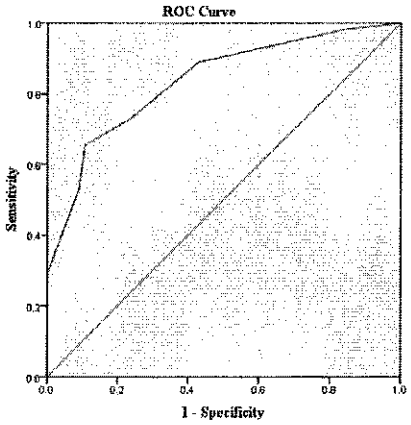
2.6. Outline two (02) alternate analytical strategies for similar situations assuming ANOVA is not appropriate for the data. (25 marks)

Contd..../3-

3. A study was carried out to validate the Sinhala version of a symptom index to screen for ovarian carcinoma against histopathology as the gold standard. A sample of 55 ovarian cancer patients from the National Cancer Institute, Maharagama, and a sample of 56 healthy women from the community, who were free of abnormal ovarian masses, were selected.

3.1. Outline the main steps involved in the validation of this tool. (20 marks)

Figure given below shows the ROC curve generated using the data from this study:



3.2. Explain the significance of the diagonal in a ROC curve. (20 marks)

3.3. The Area Under the Curve (AUC) of the figure given above was 0.836. Explain this statement. (10 marks)

The following table shows selected cut-off points of the symptom index based on the ROC analysis:

Cut-off values of the Sinhala version of the symptom index	**Sensitivity %**	**(1-Specificity) %**	**d**
8.33	98.2	83.9	0.84
25.00	89.1	42.9	0.44
41.67	72.7	23.2	0.36
58.33	65.5	10.7	0.36
75.00	52.7	8.9	0.48
91.67	29.1	0.00	0.71

d = distance to the curve from the point where sensitivity and specificity are 100%

3.4. Based on the table above, select a suitable cut-off value giving reasons. (20 marks)

3.5. Calculate and interpret the likelihood ratio of a positive test based on the cut-off value selected in 3.4. (30 marks)

Contd..../4-

4.

4.1. Compare and contrast the following:

4.1.1. Randomized controlled trials vs. cluster randomized trials.(20 marks)

4.1.2. Type I error vs. Type II error. (20 marks)

4.1.3. Logistic regression vs. Cox regression. (20 marks)

4.2. A panel of experts recommend that dead bodies infected with SARS-Cov-2 should be cremated irrespective of the ethnicity or religion to prevent the spread of the infection.

Discuss the ethics involved in implementing this recommendation.
(40 marks)

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MD (COMMUNITY MEDICINE/COMMUNITY DENTISTRY) THEORY EXAMINATION – MARCH 2021

Date :- 24th March 2021 **Time:-** 9.30 a.m. – 11.30 a.m.

PAPER II

Answer **all four (04)** questions.
Answer each question in a separate book.

1. Risk communication is an important pillar in managing a global pandemic such as SARS-CoV-2. As a Consultant Community Physician working in the Health Promotion Bureau, you have been asked to review the current risk communication measures taken by the Ministry of Health to control SARS-CoV-2 pandemic.

1.1. Outline the key steps of this review process. (30 marks)

1.2. Discuss the role of rumour monitoring and mitigation in a public health emergency. (40 marks)

1.3. Describe how risk communication on SARS-CoV-2 can address vaccine hesitancy. (30 marks)

2.

2.1. Describe briefly the inductive approach in conducting qualitative research. (40 marks)

2.2. Many concerns from the public are expressed in the media that "drugs supplied in state hospitals for treatment of Non Communicable Diseases are substandard".
Discuss **four (04)** different approaches of integrating qualitative and quantitative research methods to study the above concern. (60 marks)

Contd..../2-

3. Sri Lanka has identified Family Planning services as part of the essential service package to achieve Universal Health Coverage.

3.1. Discuss key challenges in the National Family Planning Programme in Sri Lanka in relation to equity and quality of services in achieving Universal Health Coverage. (30 marks)

3.2. Outline the steps in designing a plan for the next 5 years to address the challenges identified in 3.1 as the National Programme Manager. (40 marks)

3.3. Discuss the role of Public Health audit in improving Family Planning services. (30 marks)

4. Urban spaces are undergoing constant changes where unplanned developments can have negative health consequences. As the Consultant Community Physician responsible for the National Programme for Urban Health you have reached consensus to focus on selected areas to improve over the next three years.

The following table outlines the results framework to address selected health concerns.

	A Selected health area	**B Expected Impact**	**C Contributing health outcomes to impact in B**	**D Activities**	**E Inputs**	**F Outputs**
1	Unhealthy eating places	Reduction in outbreaks due to food poisoning	1.1	1.1.1		
				1.1.2		
			1.2	1.2.1		
				1.2.2		
2	Physical inactivity of urban people	Reduction in Cardio Vascular Disease risk	2.1	2.1.1		
				2.1.2		
			2.2	2.2.1		
				2.2.2		
3	Prevention of COVID-19 transmission	Reduction of COVID-19 clusters in urban areas	3.1	3.1.1		
				3.1.2		
			3.2	3.2.1		
				3.2.2		

Contd.../3-

4.1. Using the above framework

4.1.1. For each of the given expected impact (Column B), state **two (02)** outcomes (Column C). (15 marks)

4.1.2. For **any one** selected health area, for the two-health outcome mentioned in 4.1.1, identify **two (02)** activities each (Column D), with the required inputs (Column E) and relevant outputs (Column F). (30 marks)

4.1.3. List the key stakeholders that you will consult and engage with for each of the selected health areas given. (15 marks)

4.2. Describe key steps to monitor and evaluate the above programme focusing on **any one (01)** of the given impacts. (40 marks)