3. In a community-based study, 200 asthmatic persons were interviewed to determine the proportion of persons who were affected **at a given point** in time (interview time) and those who were affected **during a given period of** time (previous one year). Of the 200 persons, 14 were in an asthma attack at the time of the interview while 30 had experienced an asthma attack during the previous one year

   a) Briefly discuss the three (3) elements of prevalence **[5 marks]**

   b) Calculate:
      i. The **point prevalence** of asthma in this community **[5 marks]**
      ii. The **period prevalence** of asthma in this community **[5 marks]**

   c) Briefly discuss the limitations of prevalence as a measure of risk **[5 marks]**

4. As a researcher, you aim to compare plasma glucose levels in diabetics and non-diabetic (control) individuals. You hypothesize that; *there is be a difference in plasma glucose levels between the two groups*. Your fasting plasma glucose (mmol/L) measurement data are as given.

   Diabetic group: 10.0, 19.0, 23.0, 25.0, and 12.0.

   Non-diabetic group: 5.8, 6.2, 5.2, 4.6, and 5.2

   First level data check shows that glucose levels for both groups are normally distributed, as assessed by Shapiro-Wilk's test ($p > 0.05$) and there were no outliers in the data, as assessed by inspection of the boxplot. Thus, you correctly decide to implement the independent sample *t*-test.

   a) Calculate the standard deviations and means for the comparison groups? **[6 marks]**

   b) Calculate the value of the independent sample *t*-test, by using the *t* test? **[4 marks]**

   c) Calculate the degree of freedom **[2 marks]**

   d) Make a statistical decision, i.e. whether the two sample means are different and write a report of your findings in *dissertation style format* accordingly. **[8 marks]**

The *t*-test formula and *t*-distribution table may be placed at the end of the paper.

4

Section A: Answer all questions. Each question weighs 10 marks

1. What statistical test would you use to analyse the following?
   a) To determine an **association** between two **categorical variables** [2 marks]   Chi square test
   b) To determine an association between two independent **categorical data** sets when counts are less than 5 [2 marks]   fishers exact (
   c) To compare two independent (unrelated) observations of **continuous data** sets that are **not** normally distributed [2 marks]   8 peac man ,
   d) To determine whether there are any statistically significant differences between the means of two or more independent groups [2 marks] 1 way
   e) To **predict a value** from **several** measured variables [2 marks]   regression analysis

2. Briefly discuss the two common measures of disease incidence [10 marks].

3. What is meant by herd immunity? Briefly describe the three epidemiological concepts of disease [10 marks].

4. The Director for Laboratory Services at the Ministry of Health would like to set up an interview survey of a sample of Chief Biomedical Scientists in-charge of different hospital laboratories in Zambia. The hospitals are located in the 10 provinces of the country, and are classified into three types according to size of hospital. A sample of hospitals is to be taken, and samples of Chief Biomedical Scientists will be drawn from these hospitals.
   a) Suggest **how** cluster sampling could be used to choose the sample of hospitals. Discuss any potential advantages and disadvantages of this method for the proposed survey. [5 marks]
   b) Suggest how stratified sampling could be used to choose the sample of hospitals. Discuss any potential advantages and disadvantages of this method for the proposed survey. [5 marks]

(a) Cluster Sampling
  = Per district, in one province
  = Select from few clusters
  —

(b) Stratified Sampling
  - into levels
  - clinics, level 1, genera
  - specific
  - used - proportion
  - no need of list of

University of Zambia
School of Medicine

2015/16 Deferred and Supplementary Examinations

BSc Biomedical Sciences

Fourth Year

Epidemiology and Biostatistics - BMS 4415

Date: Tuesday, 27th September, 2016   Time: 09:00 to 12:00 hours

Venue: Pharmacy Hall

Instructions

1. The paper consists of eight (8) questions. You should answer all the four (4) questions from Section A and three (3) questions from Section B. This paper weighs 60% of the final examination score for those seating for Deferred and 100% for those seating for Supplementary Examinations.

2. Each question must be answered in a SEPARATE answer booklet. Ask for additional booklets, if required. All Questions in Section A carry 10 marks each and all Questions from Section B carry 20 marks each.

3. It is ESSENTIAL that you indicate your Student Number, the section and number of each question you have attempted on the cover of every booklet.

4. Complete answer booklets should be handed in, all tied together, and will be collected BEFORE you leave your seat.

5. Time allowed: 3 hours.