Year 1 Applied Chapter 1 - Exam Questions Data Collection (45mins)

1. (a) Explain what you understand by (i) a population and (ii) a sampling frame.

(2)

(i) A collection of individuals or items
(ii) A list of all sampling units in the population

The population and the sampling frame may not be the same.

(b) Explain why this might be the case.

(1)

Not always possible to keep this list up to date

(c) Give one advantage and one disadvantage of each

(i) a census,

ADV:
Will produce accurate and unbiased results.
Use every member of the population.

DIS:
Can be expensive and time consuming.
Difficult to achieve.
Hard to process large amounts of data.

(ii) a sample.

ADV:
Less time consuming and cheaper than a census
Fewer people need to respond
Less data to process

DIS:
May introduce bias
Sample may not be large enough to have sub groups

(4)
(Total 7 marks)

2. Give one advantage and one disadvantage of each sampling method.

(a) stratified sampling,

Advantage:
More accurate estimate of variance of population mean
Individual estimates for strata available

Disadvantage:
Difficult if strata are large
Definition of strata problematic (may overlap)

(2)

(b) quota sampling.

Advantage:
Representative sample can be achieved with small sample size
Cheap (costs kept to a minimum)
Administration relatively easy

Disadvantage
Not possible to estimate sampling errors due to lack of randomness
Judgment of interviewer can affect choice of sample – bias OK
Non-response not recorded
Difficulties of defining controls e.g. social class

(2)

(c) State two reasons why stratified sampling might be chosen as a method of sampling when carrying out a statistical survey.

Population divides into mutually exclusive/distinct ; strata/groups

(2)
(Total 6 marks)

3. A school has 15 classes and a sixth form. In each class there are 30 students. In the sixth form there are 150 students. There are equal numbers of boys and girls in each class. There are equal numbers of boys and girls in the sixth form. The head teacher wishes to obtain the opinions of the students about school uniforms.

Explain how the head teacher would take a stratified sample of size 40.

(Total 7 marks)

Total in School = (15 × 30) + 150 = 600 B1

random sample of $\frac{30}{600} \times 40$ (Use of $\frac{40}{their 600}$) M1

= 2 from each of the 15 classes A1

random sample of $\frac{150}{600} \times 40$ Either

= 10 from sixth form; A1

Label the boys in each class from 1 – 15 and the girls from 1 – 15. B1

use random numbers to select 1 girl and 1 boy B1

Label the boys in the sixth form from 1 – 75 and the girls from 1 – 75. B1

use random numbers to select 5 different boys and 5 different girls.

4. Describe one advantage and one disadvantage of

(a) opportunity sampling,

It is quick and easy to find the people but it is not representative because you are often choosing people who are like you, can't generalise.

(2)

(b) simple random sampling.

Advantages:

random process so possible to estimate sampling errors

free from bias

Disadvantages:

not suitable when sample size is large

sampling frame required which may not exist

may be difficult to construct for a large population

(2)

(Total 4 marks)

5. A telephone directory contains 50 000 names. A researcher wishes to select a systematic sample of 100 names from the directory.

(a) Explain in detail how the researcher should obtain such a sample.

(2)

Only cleaners – no managers i.e. not all types. OR Not a random sample

1st 50 may be in same shift/group/share same views.

OR Not a random sample

(Allow "not a representative sample" in place of "not a random sample")

(b) Give one advantage and one disadvantage of systematic sampling.

Advantage:

Simple or easy to use not "quick" or "cheap" or "efficient"

It is suitable for large samples (not populations)

Disadvantage

Only random if the ordered list is (truly) random

Requires a list of the population or must assign a number to each member of the pop.

(4)

(Total 6 marks)