Ch 1.2 Part 2 Sampling Method

Types of sample:

1) Simple Random sample.
Any group of *n* individuals is equally likely to be chosen as any other group of *n* individuals if the simple random sampling technique is used.

2) Random sample:

Any subject has equal chance of being selected.

3) Non-random sample:

Not all subjects have an equal chance of being selected.

Note: A good sample should have the same characteristic as the population it is representing. Random sample or Simple Random sample can achieve this goal.

Sampling methods:

1) Simple Random sampling:

Sample are selected one by one using random procedures such as selecting names from a hat or generated by random number generator.

2) Stratified sampling:

divide the population into groups called strata and then take a proportionate number from each stratum.

3) Cluster sampling:

divide the population area into groups or clusters. The randomly select some of those clusters and choose all members from those selected clusters.

4) Systematic sampling: Select some starting point and then select very kth (such as 50^{th}) element in the population.

5) multistage sampling – use some combination of the preceding sampling methods.

6) Convenience sampling:. Use data that are very easy to get. This will produce a non-random sample Voluntary response sample (self-selected sample) is a convenience sample.

Sampling without replacement: You do not replace the subject you select before selecting the next subject.

Sampling with replacement: Once a member is picked, that member goes back into the population and thus may be chosen more than once. This guarantee that all subjects has the same chance of being selected.

In practice, simple random sampling is done without replacement and survey are typically done without replacement. If the population is small, sampling without replacement becomes an issue.

Ex. Classify the following method of sampling:

a) Select 4 students by selecting first 4 who arrive first. ____ convenience sampling

b) Select 100 customers by selecting every 50^{th} in a customer database. _____ systematic sampling

c) Select 10 students randomly from each grade in a high school._____stratified sampling

d) Select a sample of restaurants by randomly 10 streets and select all restaurants in the 10 streets. _____cluster sampling

e) Select 100 voters' response by posting a survey online.____convenience sampling and voluntary sampling

Sampling error, non-sampling error, sampling bias.

Due to randomness of sampling, sample variation will occur, and the difference are known as sampling error. When sample size increase, sampling error will decrease. Sampling error can be analyzed.

Non sampling error occurs when the process of sampling is not random. Non sampling error cannot be analyzed.

Sampling bias occurs when some subjects in the population are not likely to be selected as others. There can be incorrect conclusion drawn from these sample.

Guideline for evaluating a statistical study:

1) Problems with samples: Bias sample is not representative of the population.

2) Self-selected sample (voluntary response sample): response only by subject who choose to participate. This usually only include subjects with strong opinion of the matter. Internet survey and call-in survey are examples of voluntary response sample.

3) Sample size issues: Small samples are unreliable but are unavoidable such as car test and medical test.

4) undue influence: Questions in survey are worded to influence response.

5) Non-response: high non-response rate make it a voluntary response sample.

6) Self-funded or self-interest study: A study performed by a person or organization in order to support their claim.

7) Causality: Correlation does not imply causation. It may be due to a confounding variable.

8) Misleading use of data: exaggerate difference by using non-zero axis.
