

SAMPLING

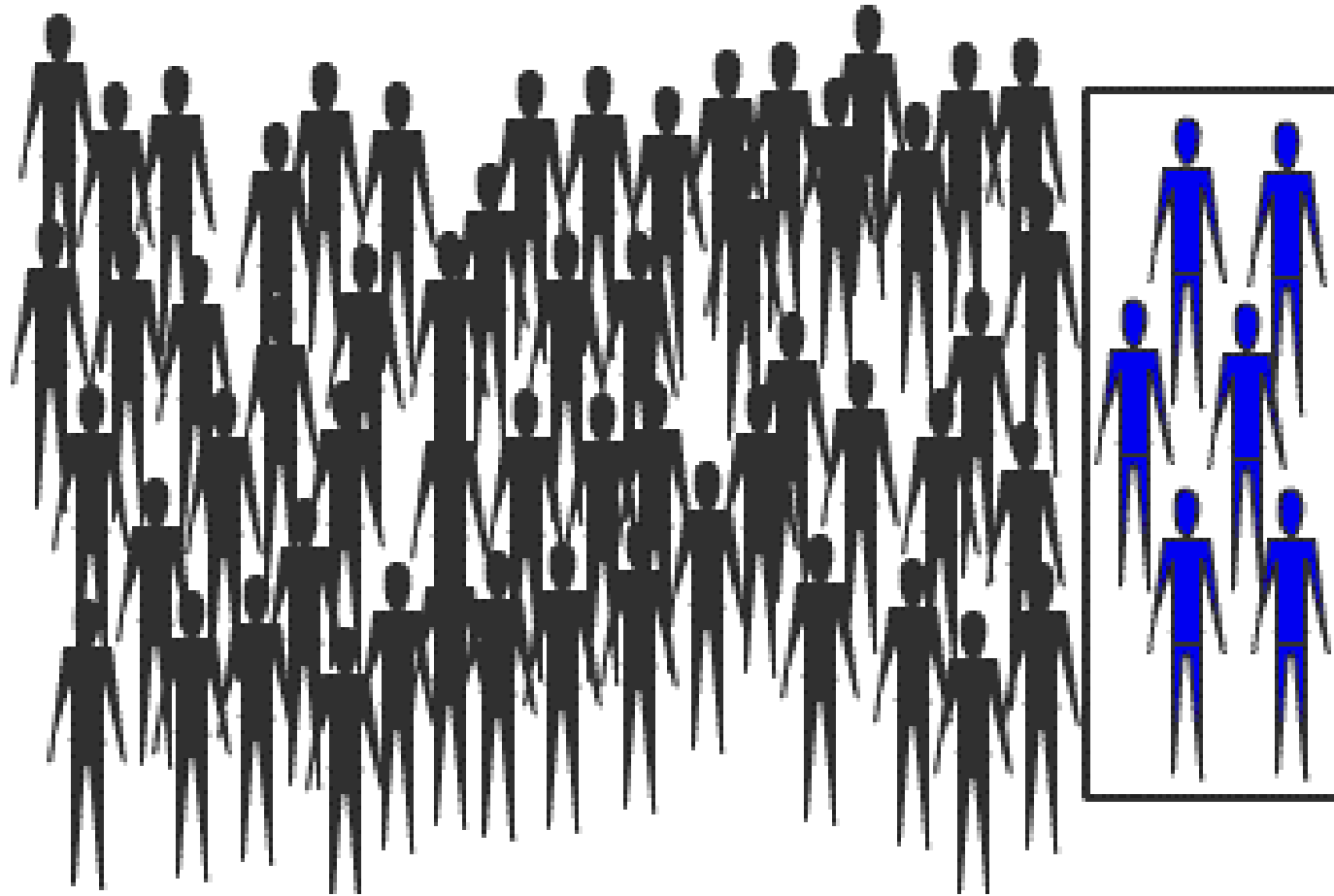
EDU 702

INTRODUCTION

- It might be impossible to investigate everybody in a population
- Thus, you need to select a sample of individuals

INTRODUCTION

- Suppose a Professor A wants to study parents' perception on ETeMS via survey
- It is impossible to distribute the questionnaire to every single parent in Malaysia i.e. the population
- As such, he has to select a sample to represent the population



POPULATION

SAMPLE

SAMPLE & POPULATION

- Sample – the group where the information is obtained
- Population – the group to which the results will be applied
- Thus, you have to identify the population 1st before the sample

SAMPLE & POPULATION

Example of population and sample

- All teachers in Malaysia
 - Sample- 200 teachers from each state
- All math teachers in Malaysia
 - Sample – 50 math teachers from each state
- All science teachers in Selangor
 - Sample – 10 science teachers from each district
- All students in the ED722 program
 - Sample – could be everybody since the population is small
- Etc

SAMPLING

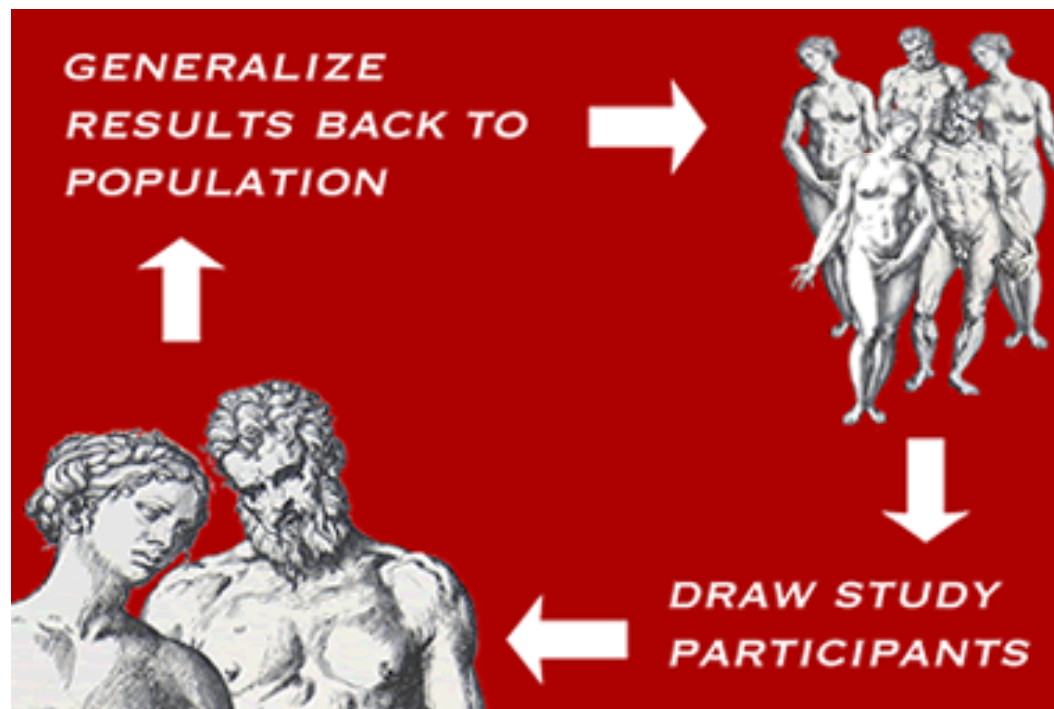
- The process of selecting a number of individuals for a study in such a way that the individuals represent the larger group from which they were selected



A subset of the population.

PURPOSE FOR SAMPLING

- To gather data about the population in order to make an inference that can be generalized to the population

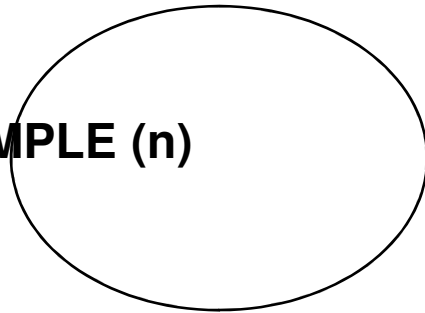


Regarding the sample...

POPULATION (N)



SAMPLE (n)



**IS THE SAMPLE
REPRESENTATIVE?**

RANDOM & NON RANDOM SAMPLING

- Random
 - Every member in the population has equal chance of being selected
 - E.g. The dean of FP wants to investigate how all students (2000) feel about class time table
 - He selects 200 by picking out names from a box
- Non Random
 - Not all have a chance of being selected (also called purposive)
 - The dean decides to select 25 from 10 groups of students
 - Only semester 6 students

RANDOM SAMPLING METHODS

Simple Random Sampling

Stratified Random
Sampling

Cluster Sampling

SIMPLE RANDOM SAMPLING

- Simple random sampling
 - The process of selecting a sample that allows individual in the defined population to have an equal and independent chance of being selected for the sample
- We use this strategy when we believe that the population is relatively homogeneous for the characteristic of interest.

STEPS – cont.

1

- Identify and define the population

2

- Determine the desired sample size.

3

- List all members of the population.

4

- Assign all individuals on the list a consecutive number from zero to the required number.
- Each individual must have the same number of digits as each other individual.

STEPS

5

- Select an arbitrary number in the table of random numbers.

6

- For the selected number, look only at the number of digits assigned to each population member.

7

- If the number corresponds to the number assigned to any of the individuals in the population, then that individual is included in the sample.

8

- Go to the next number in the column and repeat step #7 until the desired number of individuals has been selected for the sample.

SIMPLE RANDOM SAMPLING

- Advantages
 - Easy to conduct
 - Strategy requires minimum knowledge of the population to be sampled
- Disadvantages
 - Need names of all population members
 - May over- represent or under- estimate sample members
 - There is difficulty in reaching all selected in the sample

STRATIFIED SAMPLING

- The process of selecting a sample that allows identified subgroups (strata) in the defined population to be represented in the same proportion that they exist in the population
- In other words, you used this when you want certain groups to be represented

STRATIFIED SAMPLING

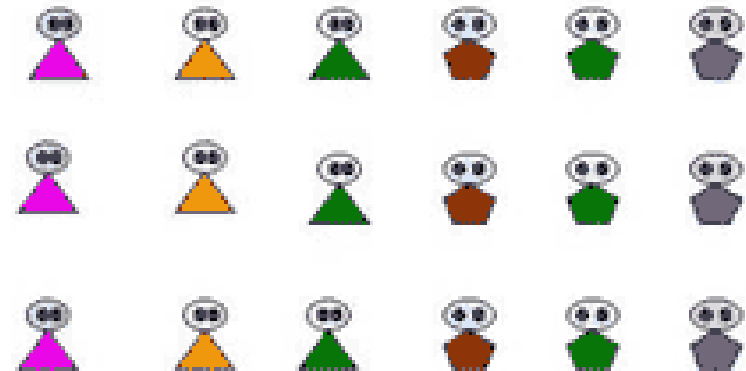
- For example, you are interested in visual-spatial reasoning and previous research suggests that men and women will perform differently on these types of task.
- So, you divide your sample into male and female members and randomly select equal numbers within each subgroup (or "stratum").
- With this technique, you are guaranteed to have enough of each subgroup for meaningful analysis.

STRATIFIED SAMPLING

Stratified Random Sample



Stratified Random Sample



STRATIFIED SAMPLING

Another example

- A researcher wants to investigate the use of technology in the science classroom among teachers in Selangor
- There are 1000 science teachers where 700 are females and 300 males
- To ensure that both genders are represented he will use stratified random sampling

STEPS

1

- Identify and define the population.

2

- Determine the desired sample size.

3

- Identify the variable and subgroups (strata) for which you want to guarantee appropriate, equal representation.

STEPS – cont.

5

- Classify all members of the population as members of one identified subgroup.

4

- Randomly select, using a table of random numbers) an “appropriate” number of individuals from each of the subgroups, appropriate meaning an equal number of individuals

STRATIFIED SAMPLING

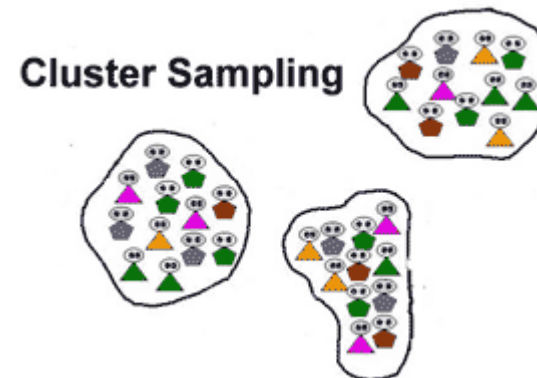
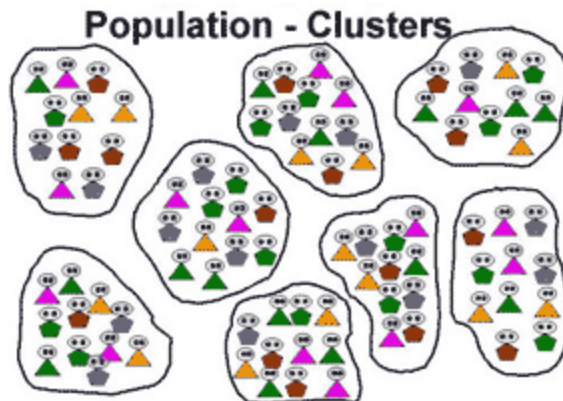
- Back to the research on use of technology in the science classroom
- The researcher decides to take 35% from both gender
- Thus, 245 female and 105 male science teachers will be selected using the simple random sampling procedure

STRATIFIED SAMPLING

- Advantages
 - More precise sampling
 - Sample represent the desired data
- Disadvantages
 - Need names for all population
 - Difficulty in reaching all

CLUSTER SAMPLING

- The process of randomly selecting intact groups, not individuals, within the defined population sharing similar characteristics



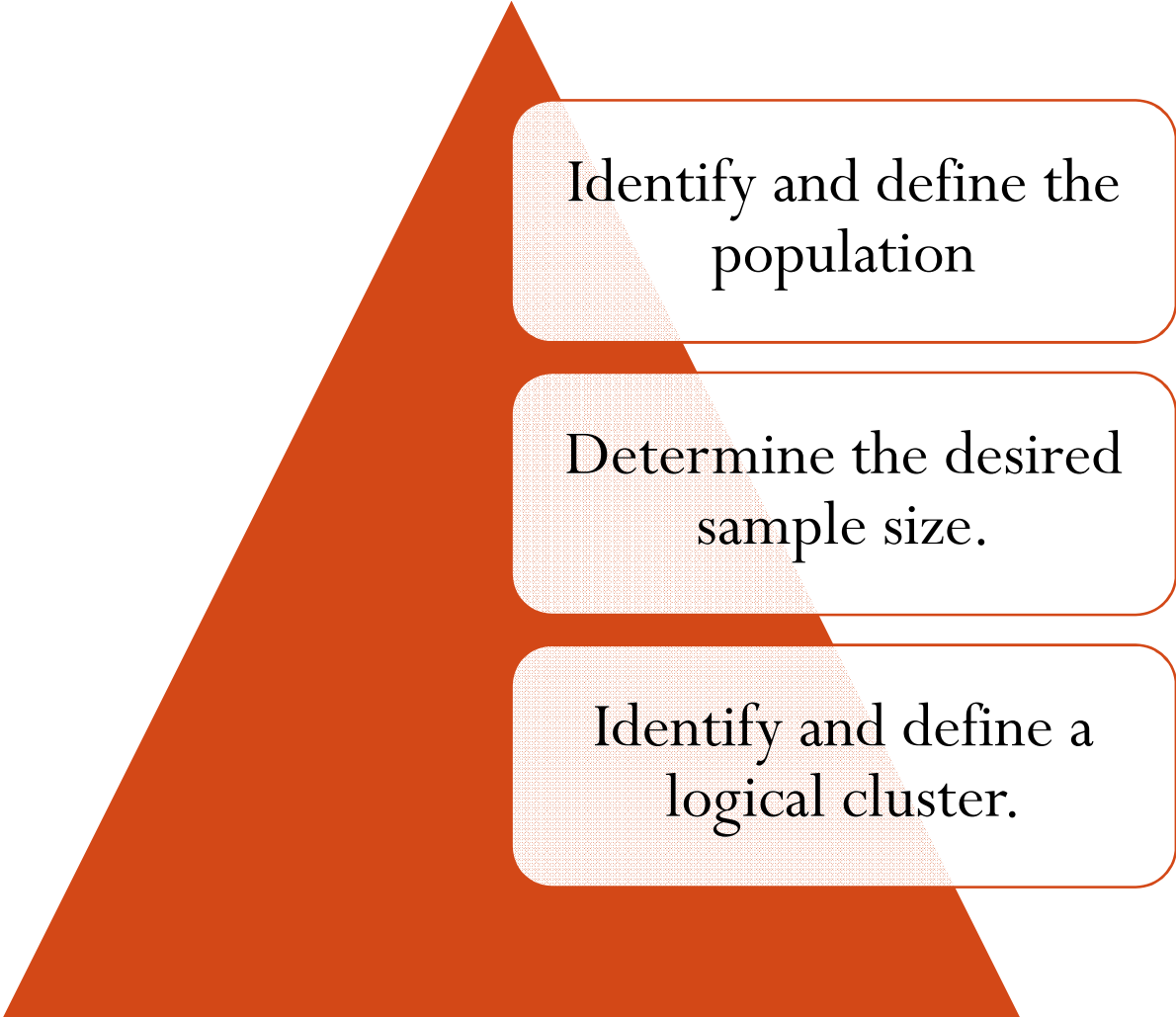
CLUSTER SAMPLING

- Cluster sampling is useful when it would be impossible or impractical to identify every person in the sample.
- Suppose a college does not print a student directory. It would be most practical in this instance to sample students from classes. Rather than randomly sample 10% of students from each class, which would be a difficult task, randomly sampling every student in 10% of the classes would be easier.
- Sampling every student in a class is not a random procedure. However, by randomly selecting the classes, you have a greater probability of capturing a representative sample of the population.

CLUSTER SAMPLING

- This method is used when time and/or cost is a factor
- E.g The use technology in science classroom
- The reseacher decides to select certain schools from each district
- Thus, all the science teachers in the chosen schools will be selected
- Thus, the teachers in the school constituted the cluster

STEPS



Identify and define the population

Determine the desired sample size.

Identify and define a logical cluster.

STEPS – cont.



Determine the number of clusters needed by dividing the sample size by the estimated size of a cluster.

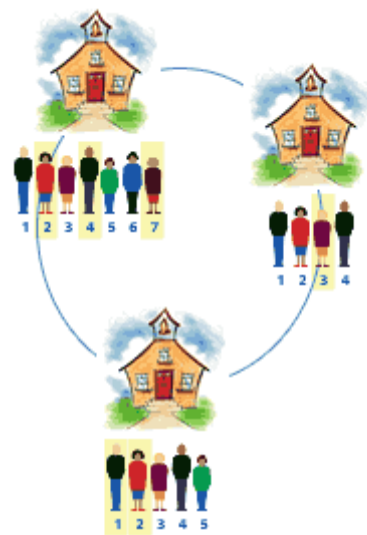
Randomly select the needed number of clusters by using a table of random numbers.

Include in your study all population members in each selected cluster.

CLUSTER SAMPLING

- Advantages
 - Efficient
 - Do not need to get all the names of the population
 - Reduces travel time
 - Useful for educational research
- Disadvantages
 - Less likely to be representative

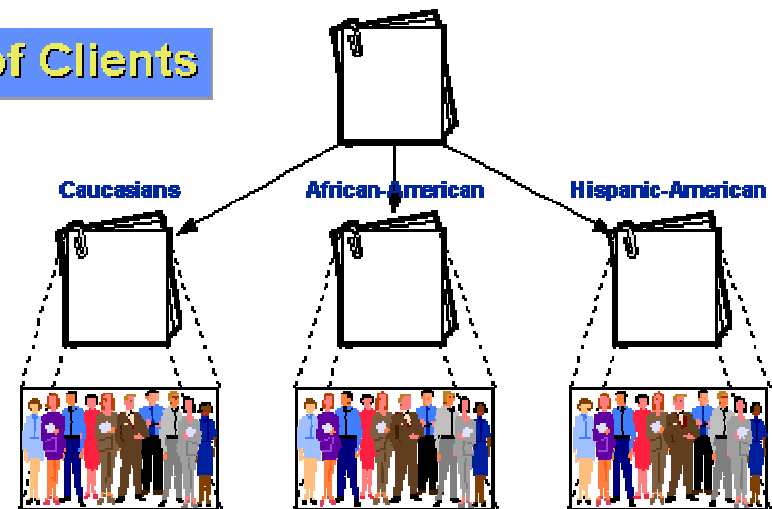
RANDOM SAMPLING



Total Sample = Those Randomly
Selected from Each School

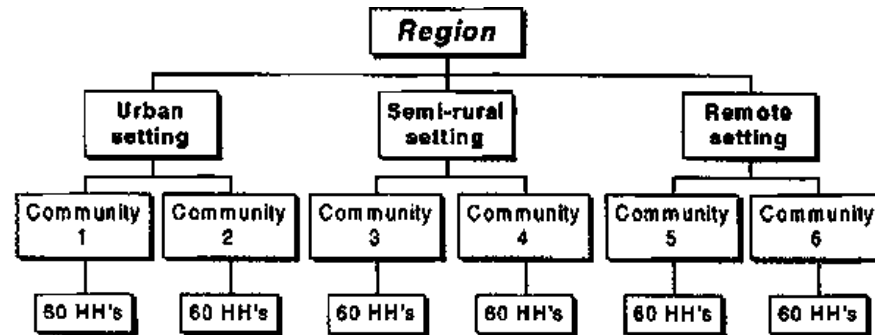
List of Clients

Strata



Random Subsamples of n/N

RANDOM SAMPLING



NON RANDOM SAMPLING METHODS

- Systematic sampling
- Convenience sampling
- Purposive sampling

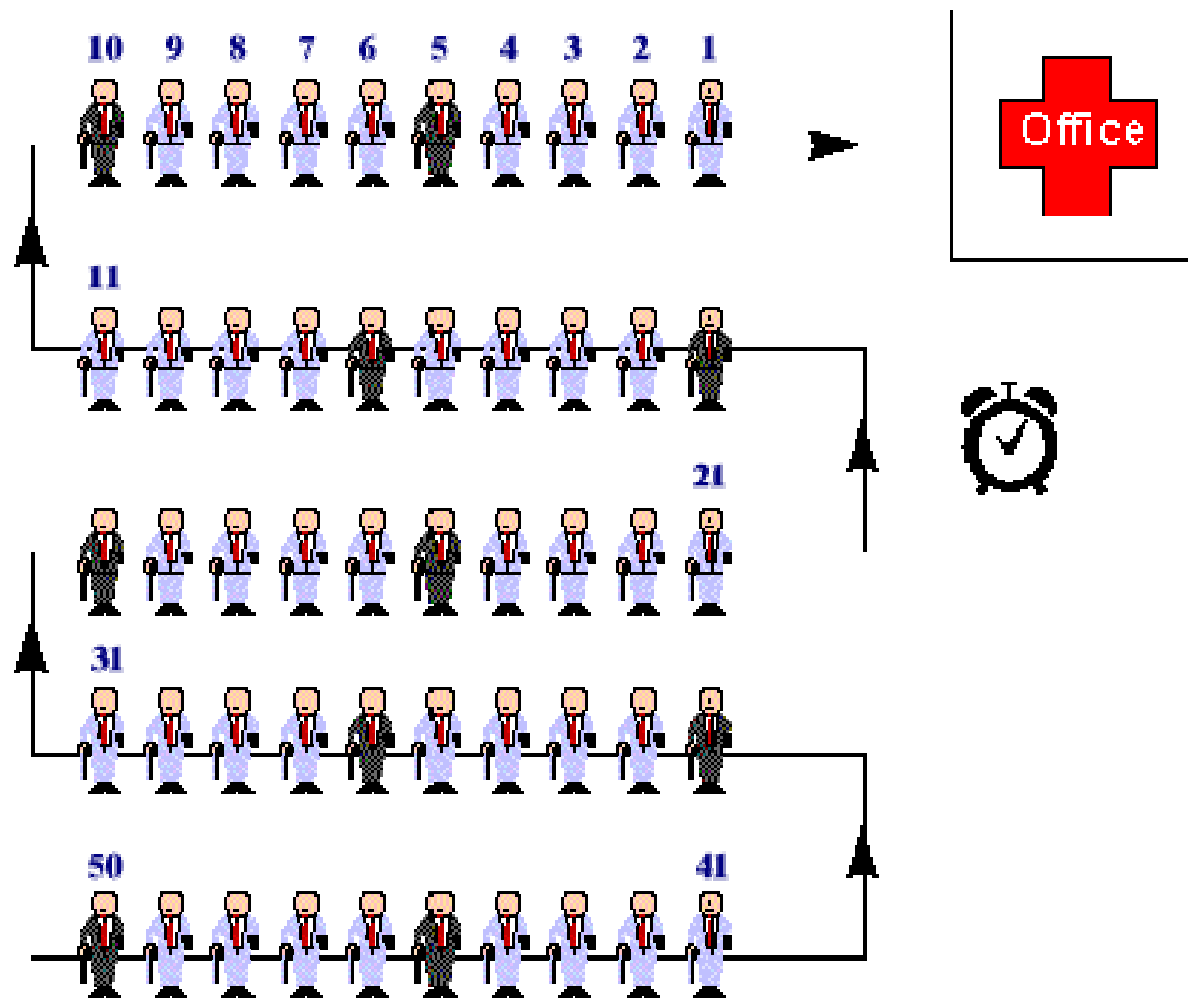
SYSTEMATIC SAMPLING

- The process of selecting individuals within the defined population from a list by taking every Kth name.

SYSTEMATIC SAMPLING

- The researcher needs a sample of 200 from 2000.
- So the tenth person on the list will be selected

SYSTEMATIC SAMPLING



STEPS

1

Identify and
define the
population.

2

Determine
the desired
sample size.

3

Obtain a list
of the
population.

STEPS – cont.

4

Determine what K is equal to by dividing the size of the population by the desired sample size.

5

Start at some random place in the population list. Close you eyes and point your finger to a name.

STEPS – cont.

6

Starting at that point, take every Kth name on the list until the desired sample size is reached.

5

If the end of the list is reached before the desired sample is reached, go back to the top of the list.

SYSTEMATIC SAMPLING

CONVENIENCE SAMPLING

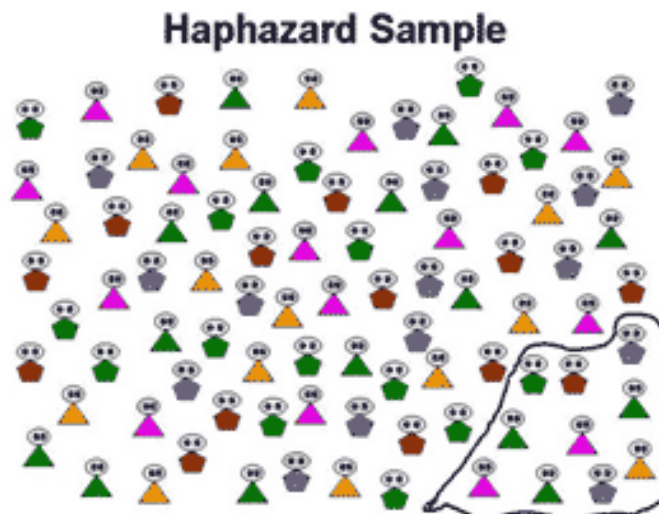
- The process of including whoever happens to be available at the time
- Called “accidental” or “haphazard” sampling

CONVENIENCE SAMPLING

- A researcher wants to investigate how teachers feel about their COLA allowance
- The reseacher waits at the punch machine and distribute the questionnaire to the firts 30 teachers who came to punch in.

CONVENIENCE SAMPLING

- Disadvantage
 - Could be biased – strong opinions
 - Thus, cannot be considered to representative
 - Should be avoided
 - If it is the only optioned, the demographic information must be described well or have the study replicated



PURPOSIVE SAMPLING

- The process whereby the researcher selects a sample based on experience or knowledge of the group to be sampled
- Called “judgment” sampling
- Disadvantage
 - Potential for inaccuracy in the researcher’s criteria and resulting sample selections

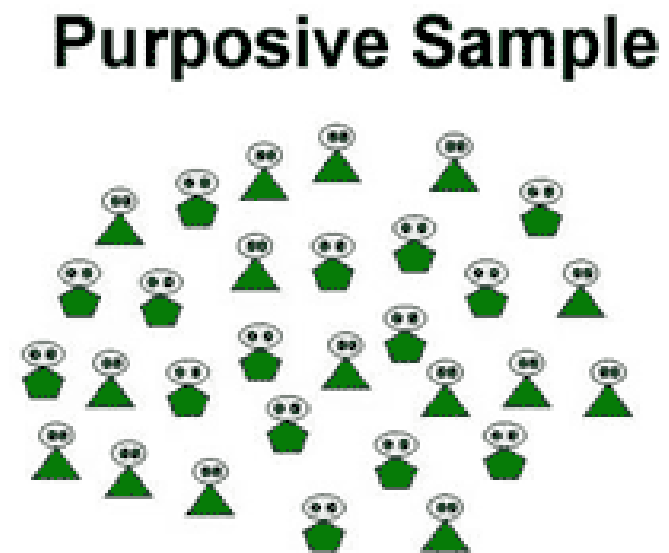
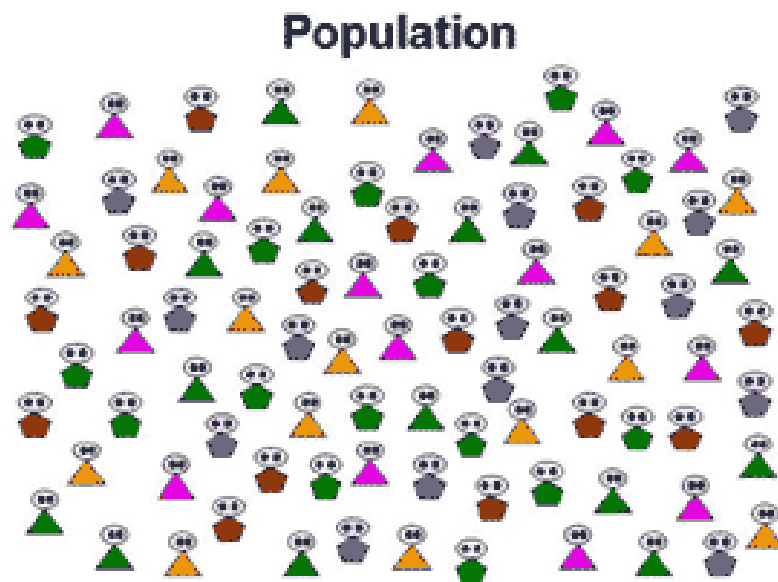
PURPOSIVE SAMPLING

- Purposive sampling targets a particular group of people.
- When the desired population for the study is rare or very difficult to locate and recruit for a study, purposive sampling may be the only option.
- For example, you are interested in studying cognitive processing speed of young adults who have suffered closed head brain injuries in automobile accidents. This would be a difficult population to find.

PURPOSIVE SAMPLING

- Your city has a well-established rehabilitation hospital and you contact the director to ask permission to recruit from this population.
- Purposive is different from convenience the researcher use judgment to select the sample NOT who ever is available

PURPOSIVE SAMPLING



STEPS IN SAMPLING

1. Define population (N) to be sampled
2. Determine sample size (n)
3. Control for bias and error
4. Select sample

DEFINING THE POPULATION

- Identify the group of interest and its characteristics to which the findings of the study will be generalized
 - called the “target” population (the ideal selection)
 - oftentimes the “accessible” or “available” population must be used (the realistic selection)
- Example of target population
 - All primary Tamil school principals in Malaysia (350)
 - All parents in the state of Terengganu (15,675)
- Example or accessible population
 - Primary Tamil school principals in the state of Selangor
 - Parents in the district of Kuala Terengganu

DETERMINE THE SAMPLE SIZE

- The size of the sample influences both the representativeness of the sample and the statistical analysis of the data
 - larger samples are more likely to detect a difference between different groups
 - smaller samples are more likely not to be representative

Rules of thumb for determining the sample size...

- The larger the population size, the smaller the percentage of the population required to get a representative sample
- For smaller samples ($N < 100$), there is little point in sampling. Survey the entire population.
- If the population size is around 500 (give or take 100), 50% should be sampled.
- If the population size is around 1500, 20% should be sampled.
- Beyond a certain point ($N = 5000$), the population size is almost irrelevant and a sample size of 400 may be adequate.

SAMPLING BIAS

- Bias – systematic error
- Sampling bias – consistent error arises from sample selection
- Example:
 - You want to investigate teenagers addiction to drugs
 - You select only students in schools – biased
 - You should not forget teenagers who are not in school, drop outs
- Biased when one group is over or under represented
- Over – example above
- Under – selecting from telephone, does not represent those who do not have land lines or choose not to list

Control for sampling bias

- With bias your data may not be accurate
- Be aware of the sources of sampling bias and identify how to avoid it
- Decide whether the bias is so severe that the results of the study will be seriously affected
- In the final report, document awareness of bias, rationale for proceeding, and potential effects

Select the sample

- A process by which the researcher attempts to ensure that the sample is representative of the population from which it is to be selected
- ...requires identifying the sampling method that will be used

APPROACHES TO QUALITATIVE SAMPLING...

- Qualitative research is characterized by in-depth inquiry, immersion in a setting, emphasis on context, concern with participants' perspectives, and description of a single setting, not generalization to many settings
- Because samples need to be small and many potential participants are unwilling to undergo the demands of participation, most qualitative research samples are purposive
- Representativeness is secondary to the quality of the participants' ability to provide the desired information about self and setting

TYPES

- Intensity sampling: selecting participants who permit study of different levels of the research topic
 - Information rich cases
 - E.g. In depth study of good students, poor students, average, below average
- Homogeneous sampling: selecting participants who are very similar in experience, perspective, or outlook
 - E.g. Indian students only, single parents only
- Criterion sampling: selecting all cases that meet some pre-defined characteristic
 - E.g. All teachers with B.Ed from UPM, all students with iPod

TYPES

- Snowball sampling: selecting a few individuals who can identify other individuals who can identify still other individuals who might be good participants for a study
 - E.g homeless people introducing other homeless people
- Random purposive sampling: with a small sample, selecting by random means participants who were purposively selected and are too numerous to include all in the study

Mini-Quiz...

- True or false...
- ...there is no significant difference between convenience sampling and purposive sampling

false

- True or false...

...both quantitative and qualitative researchers who use samples must provide detailed information about the purposive research participants and how they were chosen

true

- True or false...

...the size of the sample influences both the representativeness of the sample itself and the statistical analysis of study data

true

- True or false...

...sampling error reflects sloppy research

false

- True or false...

**...a good researcher can avoid
sampling bias**

true

- True or false...

...the important difference between convenience sampling and purposive sampling is that, in the latter, clear criteria guide selection of the sample

true

- True or false...

...a “good” sample is one that is representative of the population from which it was selected

true

- True or false...

...a simple stratified random sample guarantees that each subgroup is represented in the same proportion that it exists in the population

false

- True or false...

**...in a systematic sample, the
researcher selects K**

false

- True or false...

...a table of random numbers selects the sample through a purely random, or chance, basis

true

- True or false...

...purposive sampling does not require the researcher to describe in detail the methods used to select a sample

false

- True or false...

...it is possible to defend purposive samples because the researcher uses clear criteria (e.g., experience and prior knowledge) to identify criteria for selecting the sample

true

- True or false...

...qualitative research uses sampling strategies that produce samples which are predominantly small and nonrandom

true

- True or false...

**...a good sample has a composition
precisely identical to that of the
population**

false

- True or false...

...cluster sampling oftentimes is the only feasible method of selecting a sample because the population is very large or spread out over a wide geographic area

true

- Fill in the blank...

**...a group which differs in the
characteristics of its members**

heterogeneous

- Fill in the blank...

...the process of cluster sampling that is completed in stages, involving the selection of clusters within clusters

multistage

- Fill in the blank...

...the mental process by which findings from a smaller group are generalized to a larger group

inference

- Fill in the blank...

**...the characteristics or variables of
the sample**

demographics

- Fill in the blank...

...a group that shares similar characteristics

homogeneous

- Fill in the blank...

**...the group to which research findings
are generalizable**

population

- Fill in the blank...

...any location within which a researcher finds an intact group of similar characteristics (i.e., population members)

cluster

- Fill in the blank...

...the extent to which the results of one study can be applied to other populations or situations

generalizability

- Which type of sample...

...identified subgroups in the population are represented in the same proportion that they exist in the population

stratified

- Which type of sample...

...selecting a few individuals who can identify other individuals who can identify still other individuals who might be good participants for a study

snowball

- Which type of sample...

**...selecting participants who permit
study of different levels of the
research topic**

intensity

- Which type of sample...

**...selects intact groups, not individuals
having similar characteristics**

cluster

- Which type of sample...

...selecting by random means participants who are selected upon defined criteria and not who are too numerous to include all participants in the study

random purposive

- Which type of sample...

...selecting participants who are very similar in experience, perspective, or outlook

homogeneous

- Which type of sample...

...all individuals in the defined population have an equal and independent chance of being selected for the sample

random

- Which type of sample...

**...a sampling process in which
individuals are selected from a
list by taking every *K*th name**

systematic

- Which type of sample...

...selecting all cases that meet some specific characteristic

criterion

This module has focused on...

sampling a population

**...which describes the procedures
researchers use to select individuals
to participate in a study**

The next module will focus on...

instruments

**...the tools researchers use to gather
data for a study**