Probability sampling techniques

These sampling techniques are used when the researcher wants to make inferences about the population. The sample is selected based on known probability.

Simple random sampling

Sample is selected from population and has **equal chance** of being selected as a sample. The sample is taken randomly from a sampling frame. Some common **sampling frames** include the telephone directory, customer list and student list.

Steps:

1. Researcher needs a sampling frame.
   Example: List of student's name

1	AINNUR KHADIJAH SHAHIRAH BINTI AHMAD
2	AISYAH SOLEHA BINTI HISHAMUDDIN
3	AQILAH SYAHINDAH BINTI SULAIMAN
4	MAI AYU ATHIRAH BINTI MOHAMAD
5	MOHD. DANIAL BIN AZMI
6	MUHAMMAD AMIR MIRZA BIN NORHAN
7	MUHAMMAD EIZZAN AZMIEN BIN MOHD
8	MUHAMMAD HARITZ FALIQ MOHD ZAINUDIN
9	NAJWA BINTI MD GHAZALI
10	NUR DZAFIRA HIDAYAH BINTI MD TAUFIQ
11	NUR SHAZLISA NATASHA BINTI MOHD ZAKI
12	NUR ZAFIRAH MARSYA BINTI MUZAIDEE
13	NURADILA BINTI NORDIN
14	TENGKU YASMIN NASTASHA BINTI TENGKU
15	FAIRUZ UMIRAH BINTI MUSTAFA

2. Generated random number to determine which elements are to be selected as a sample.

   Use a :
   1) Random numbers table

   2) Computer random number generator
      Steps: Type =RANDBETWEEN(1,15) in excel
      It will generated random number between 1 to 15
      Drag the column until you get your desire random numbers

   3) Calculator
      Steps: Press SHIFT →Ran# →=

3. Let's try using random numbers table, researcher needs 5 samples out of 15 students. By using the first two column numbers, list down your 5 selected samples.

TABLE OF RANDOM DIGITS

940	**100**	**857**	**728**
741	**056**	**001**	**147**
628	**324**	**599**	**339**
117	**646**	**871**	**664**
149	**065**	**358**	**013**
660	**871**	**033**	**002**
083	**500**	**358**	**283**
900	**861**	**400**	**395**
088	**958**	**732**	**107**
309	**035**	**287**	**166**

Answer:

11, 14, 8, 10, 5

1	AINNUR KHADIJAH SHAHIRAH BINTI AHMAD
2	AISYAH SOLEHA BINTI HISHAMUDDIN
3	AQILAH SYAHINDAH BINTI SULAIMAN
4	MAI AYU ATHIRAH BINTI MOHAMAD
5	MOHD. DANIAL BIN AZMI
6	MUHAMMAD AMIR MIRZA BIN NORHAN
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Systematic sampling

In systematic sampling, we divide the population size (N) by the sample size (n) to obtain the range (k)

$$k = \frac{N}{n}$$

Steps:

1. Sample of 5 is desired from 15 elements in the population. Thus, $k = \frac{15}{5} = 3$

2. Random number between 1 to 3 is selected. Let say, number 2.

3. Start with number 2 and take every 3rd unit.

1	AINNUR KHADIJAH SHAHIRAH BINTI AHMAD
2	AISYAH SOLEHA BINTI HISHAMUDDIN
3	AQILAH SYAHINDAH BINTI SULAIMAN
4	MAI AYU ATHIRAH BINTI MOHAMAD
5	MOHD. DANIAL BIN AZMI
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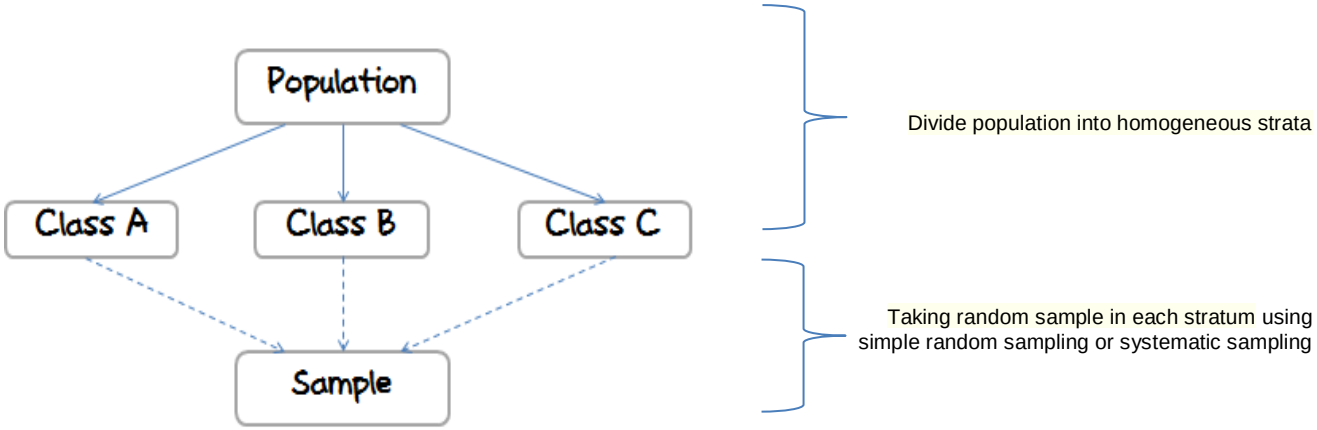
4. Hence, the sample corresponding to 2, 5, 8, 11 and 14 will be a sample of 5 obtained from 1 to 15 elements in the population.

Stratified sampling

Stratified sampling involves dividing population into homogeneous strata and then taking random sample in each stratum.



Example:

A statistician wanted to assess student opinion on the curricular activities at school. They decided to survey only 150 students from Kajang High School. ***To ensure a representative sample of students from all grade levels***, the statistician used a stratified sampling technique.

Grade	Population (N)	Sample (n)
1	100	$\frac{100}{450} \times 150 = 33$
2	200	$\frac{200}{450} \times 150 = 67$
3	150	$\frac{150}{450} \times 150 = 50$
Total	450 students	150 students

In this case, the strata were the three grade levels (grades 1 to 3). The statistician then selected a sample within each stratum. The students selected in this sample were extracted using simple random or systematic sampling.

*Strata – Two or more groups
*Stratum – Each of the groups

Cluster sampling

- Cluster sampling divides the population into groups or clusters.
- A number of clusters are selected randomly to represent the total population.
- No units from non-selected clusters are included in the sample because they are represented by those from selected clusters.
- With stratification, we sample from each of the subgroups but in cluster sampling, we sample from selected subgroups only.
- Cluster sampling is most applicable when sampling frame is incomplete.

Example:

The most common cluster used in research is a geographical cluster. For example, a researcher wants to survey academic performance of high school students in State X.

1. Divide the entire population (population of state X) into different clusters (town).
2. Selects a number of clusters through simple or systematic sampling.
3. Then, from the selected clusters
   i. Include all items as samples or
   ii. Select items from each cluster through simple or systematic random sampling.