Sample and Sampling Technique

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Learning Objectives

01

Define principal concepts about sampling

02

Discuss different techniques used in sampling

03

Explain advantages & disadvantages of sampling techniques

04

Explain & list different software used for sample size estimation

This belongs to you, but everyone else uses it more????

01

PRINCIPAL CONCEPTS ABOUT SAMPLING

- To start with, let’s have a look on some basic terminology
- Population
- Sample
- Sampling
- **Population** is the collection of the elements which has some or the other characteristic in common. Number of elements in the population is the size of the population.

Population

VS

Sample

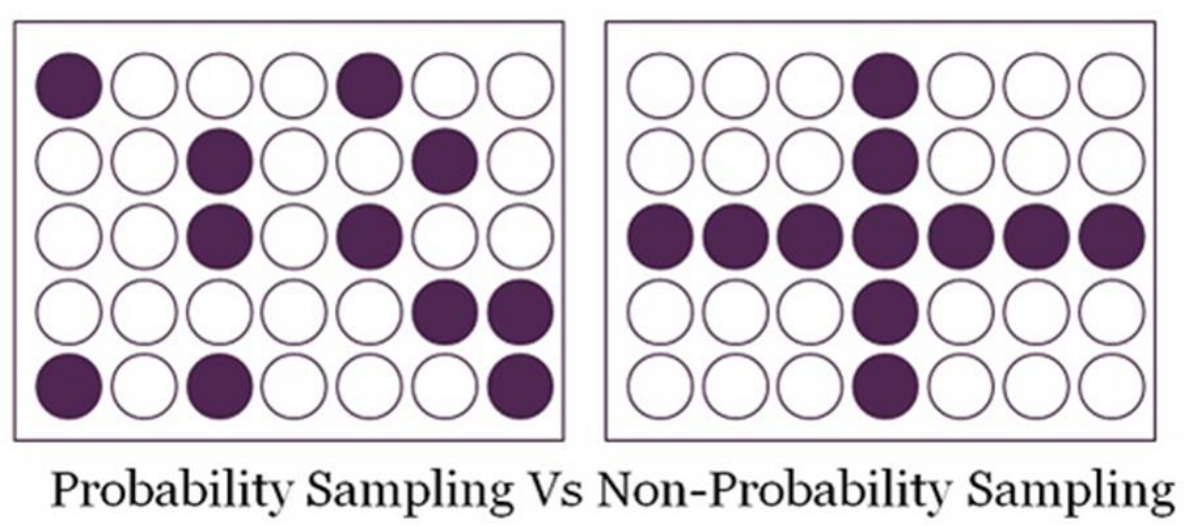
- **Sample** is the subset of the population.

- Number of elements in the sample is the **sample size.**

- The process of selecting a sample is known as **sampling.**


Sampling
Population
Sample

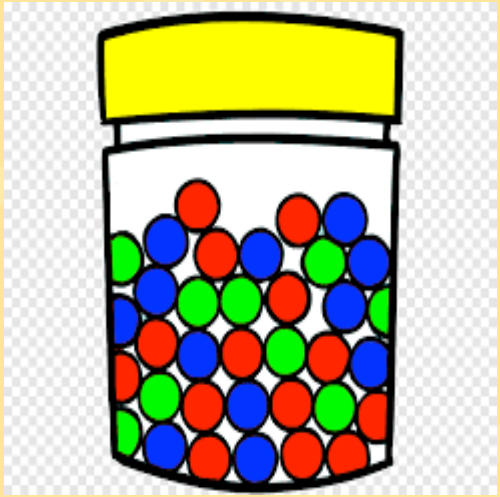
- There are lot of sampling techniques which are grouped into two categories as



Probability Sampling Vs Non-Probability Sampling

The difference lies between the two is whether the sample selection is based on randomization or not. With randomization, every element gets equal chance to be picked up and to be part of sample for study.

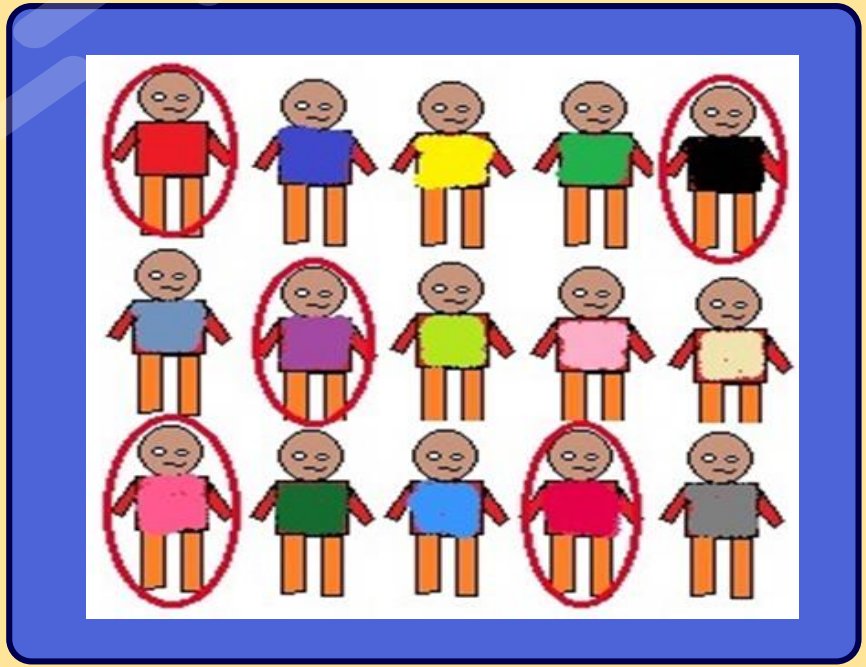
Probability Sampling



- This Sampling technique uses randomization. It’s alternatively known as random sampling.
- Simple Random Sampling
- Stratified sampling
- Systematic sampling
- Cluster Sampling
- Multi stage Sampling

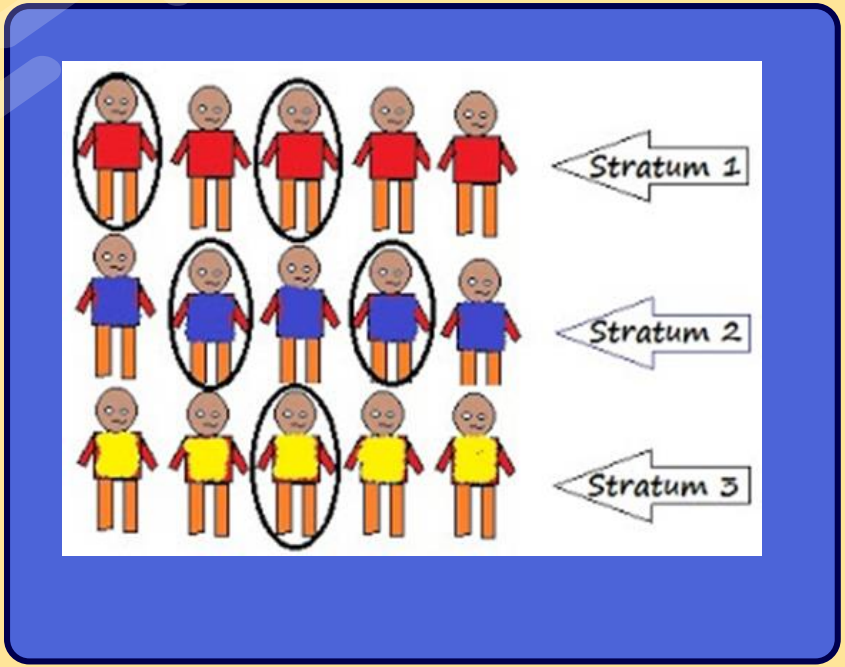
Simple Random Sampling:

- Every element has an equal chance of getting selected to be the part sample.
- **Example—A teachers puts students' names in a hat and chooses without looking to get a sample of students.**



Stratified Sampling

- The population is first split into groups. The overall sample consists of some members from every group. The members from each group are chosen randomly.



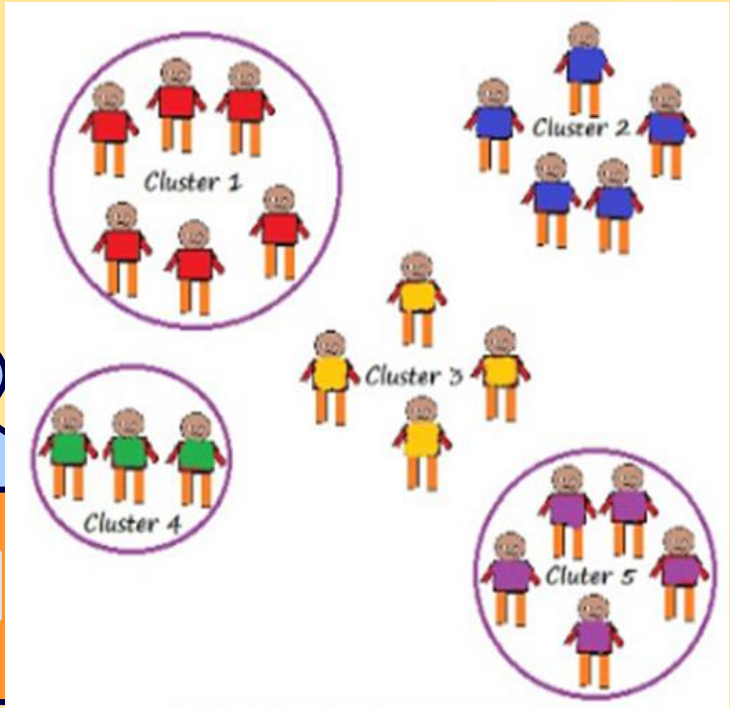
- Example. A student surveys 100 students by getting random samples of 25 from 1st year, 25 from 2nd year, 25 fro 3rd year, and 25 from 4th year.

Systematic Random sampling

- Here the selection of elements is systematic and not random except the first element. Elements of a sample are chosen at regular intervals of population. All the elements are put together in a sequence first where each element has the equal chance of being selected.

Example—A principal takes an alphabetized list of student names and picks a random starting point. Every 20th, student is selected to take a survey.

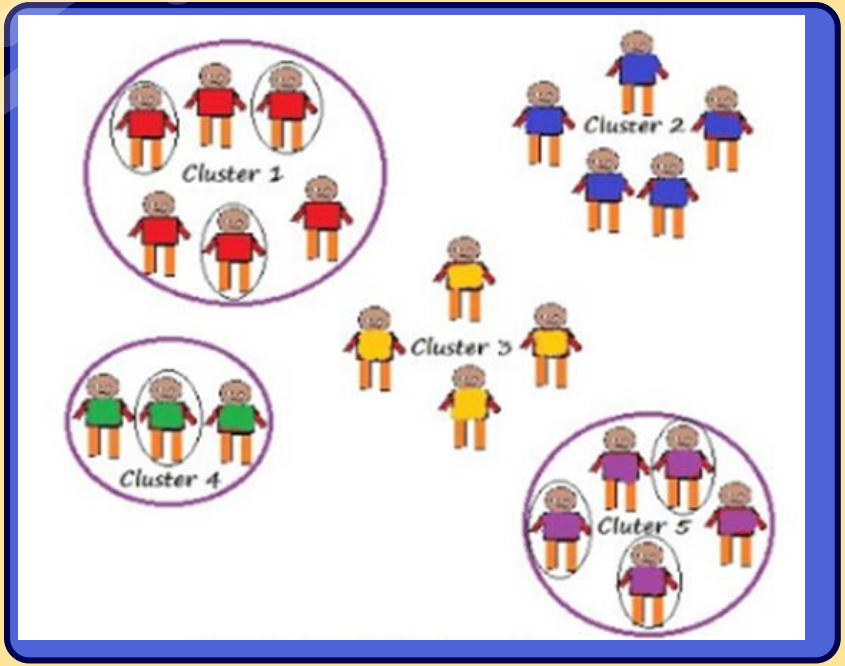
• Cluster Sampling



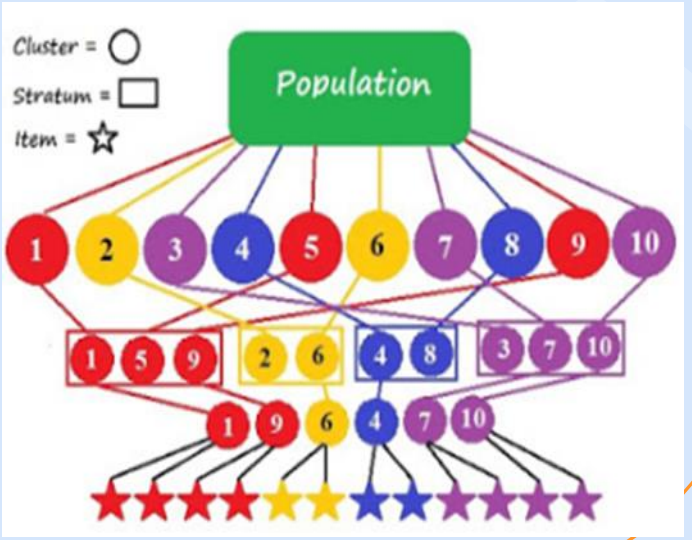
- Our entire population is divided into clusters or sections and then the clusters are randomly selected. All the elements of the cluster are used for sampling. Clusters are identified using details such as age,gender, location etc.
- Cluster sampling can be done in following ways:
- Single Stage Cluster Sampling
- Entire cluster is selected randomly for sampling.

- **Two Stage Cluster Sampling**

Here first we randomly select clusters and then from those selected clusters we randomly select elements for sampling



- **Multi-Stage Sampling**
- It is the combination of one or more methods
- Population is divided into multiple clusters and then these clusters are further divided and grouped into various sub groups (strata) based on similarity. One or more clusters can be randomly selected from each stratum.
- For example country can be divided into states, cities, urban and rural and all the areas with similar characteristics can be merged together to form a strata.



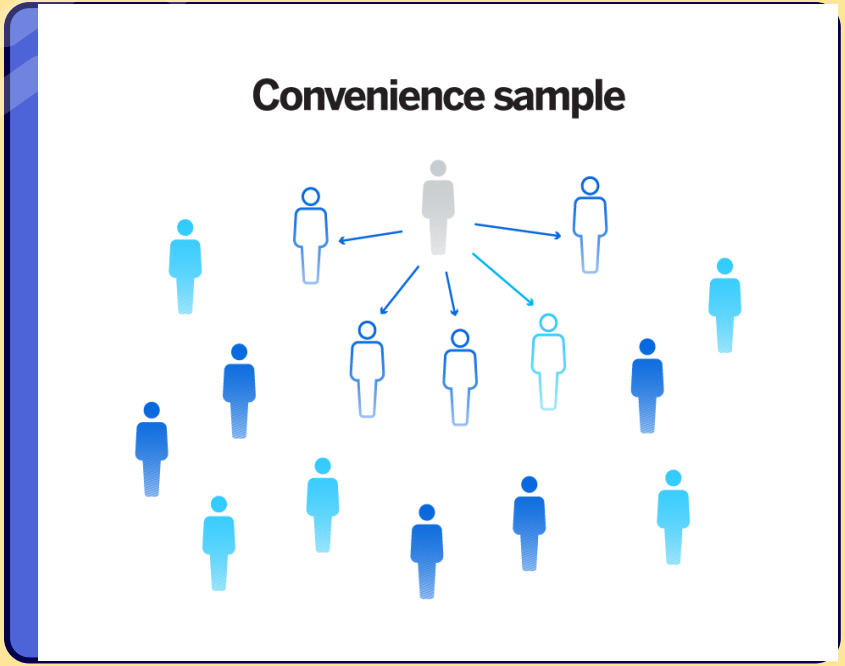
NON-PROBABILITY SAMPLING

- It does not rely on randomization. Outcome of sampling might be biased and makes difficult for all the elements of population to be part of the sample equally. This type of sampling is also known as non-random sampling.
- Convenience Sampling
- Purposive Sampling
- Quota Sampling
- Referral /Snowball Sampling

Convenience Sampling

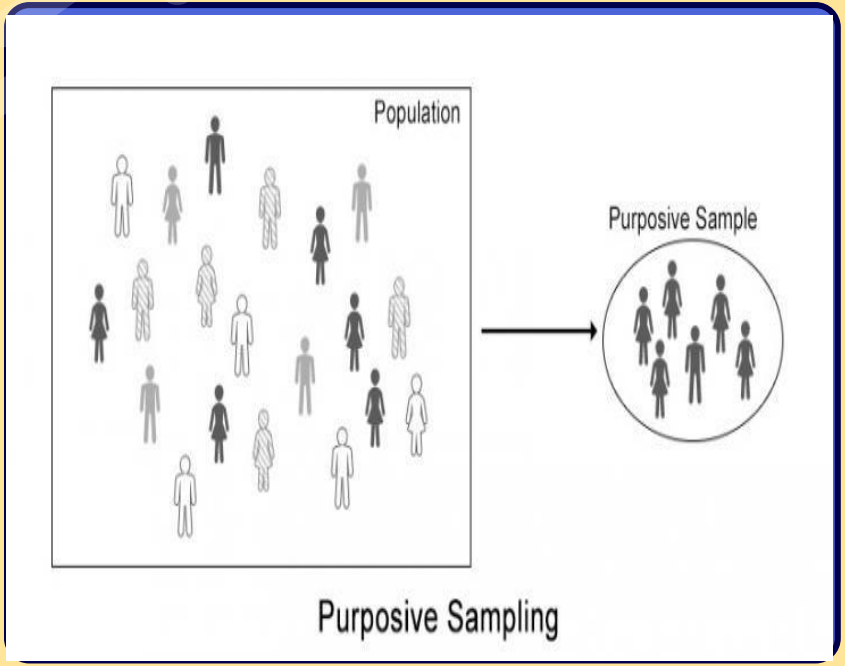
- Here the samples are selected based on the availability. This method is used when the availability of sample is rare and also costly.

- For example: Researchers prefer this during the initial stages of survey research, as it’s quick and easy to deliver results.



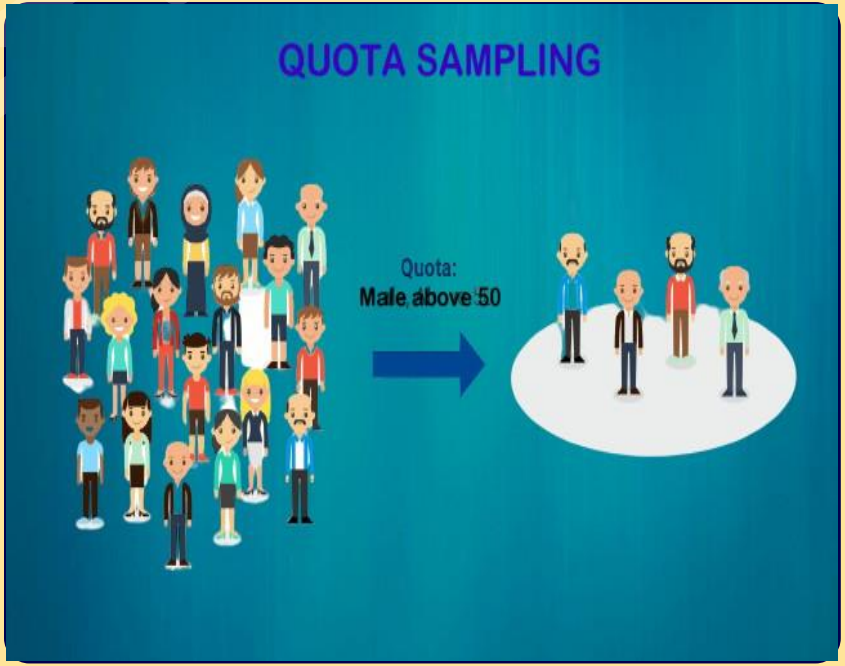
- Purposive Sampling

- Only those elements will be selected from the population which suits the best for the purpose of our study.
- For Example: specific people, cases ,organizations



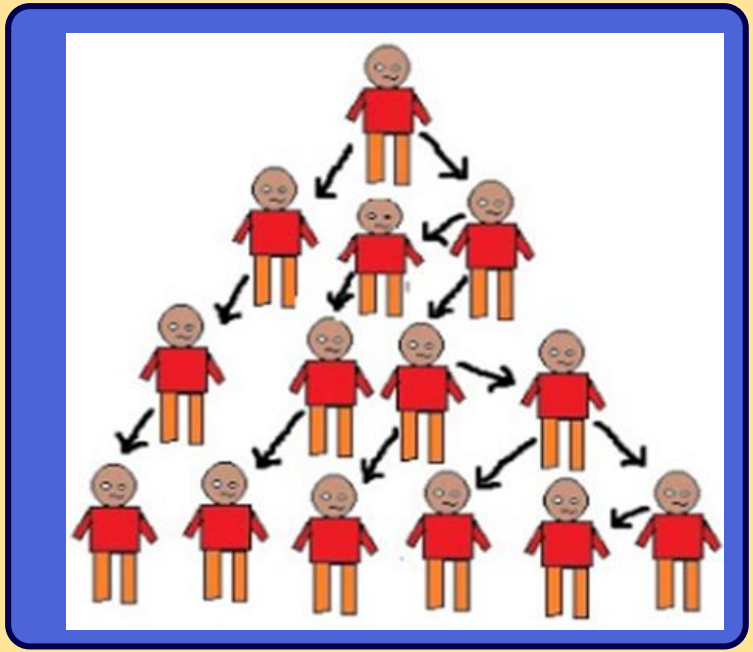
• Quota Sampling

- This type of sampling depends of some pre-set standard.
- It selects the representative sample from the population.
- Proportion of characteristics/ trait in sample should be same as population.



• Referral /Snowball Sampling

- This technique is used in the situations where the population is completely unknown and rare.
- Therefore we will take the help from the first element which we select for the population and ask him to recommend other elements who will fit the description of the sample needed.
- So this referral technique goes on, increasing the size of population like a snowball.



- For example: It's used in situations of highly sensitive topics like HIV Aids where people will not openly discuss and participate in surveys to share information about HIV Aids.
- Not all the victims will respond to the questions asked so researchers can contact people they know or volunteers to get in touch with the victims and collect information
- Helps in situations where we do not have the access to sufficient people with the characteristics we are seeking. It starts with finding people to study.

Probability

Advantages

- Minimal bias
- More authentic

Disadvantages

- Expensive
- Inconvenient
- Time consuming

Non-probability

Advantages

- Convienient
- Economical
- Less time consuming

Disadvantages

- Results cant be generalized.
- Maximum bias
- Authenticity very debatable.

IMPORTANCE

- **Sampling** helps a lot in research.
- It is the most important factor which determines the accuracy of your research/survey result.
- If anything goes wrong with your sample then it will be directly reflected in the final result.
- There are lot of techniques which help us to gather sample depending upon the need and situation.

Sample Size Estimation

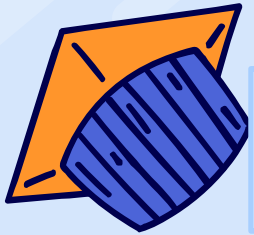
For all study designs there are different formulas for calculating sample size

Type of study

Type of statistical analysis required

Calculating sample size ??

- Most Important: sample size calculation is an educated guess
- It is more appropriate for studies involving hypothesis testing
- There is no magic involved; only statistical and mathematical logic and some algebra
- Researchers need to know something about what they are measuring and how it varies in the population of interest



Estimation Of Sample Size By Three Ways

By using

(1) Formulae (manual calculations)

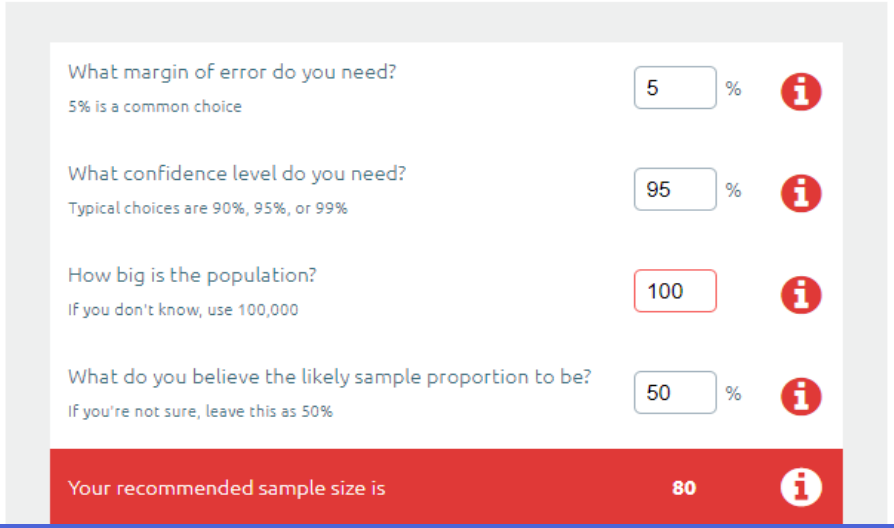
(2) Sample size tables or Nomogram

(3) Softwares

Population Proportion – Sample Size

Use this calculator to determine the appropriate sample size for estimating the proportion of your population that possesses a particular property (eg. they like yo product, they own a car, or they can speak a second language) to within a specified margin of error. If you intend to ask more than one question, then use the large sample size across all questions. Note that if the questions do not all have just two valid answers (eg. yes or no), but include one or more additional responses (e "don't know"), then you will need a different sample size calculator.

Calculator



Cont

Softwares used :

- WHO sample size calculator
- EPI-INFO sample size calculator
- Survey system sample calculator
- Power and sample size(PASS)
- ROASOFT sample calculator

Quiz

1.Each student at a school has a student identification number. Counselors have a computer generate 50 random identification numbers and those students are asked to take a survey.

What type of sampling is this?

A. Simple random sampling
B. Stratified random sampling
C. Cluster sampling
D. Systematic random sampling

A

Quiz

2. While students are lined up for school pictures, a teacher passes out a survey to every 10th student.

What type of sampling is this?

A. Simple random sampling
B. Stratified random sampling
C. Cluster sampling
D. Systematic random sampling

D

Quiz

3. The department of medical education surveys 100 students by getting random samples of 25 from 1st year, 25 from 2nd year, 25 from 3rd year, and 25 from 4th year.

What type of sampling is this?

A. Simple random sampling
B. Stratified random sampling
C. Cluster sampling
D. Systematic random sampling

B

Quiz

4. An airline company wants to survey its customers one day, so they randomly select 5 flights that day and survey every passenger on those flights.

What type of sampling is this?

A. **Simple random sampling**
B. **Stratified random sampling**
C. **Cluster sampling**
D. **Systematic random sampling**

C


Time for
Review

References

1.https://towardsdatascience.com/sampling-techniques-a4e34111d808

2.https://www.khanacademy.org/math/statistics-probability/designing-studies/sampling-methods-stats/a/sampling-methods-review

3. https://select-statistics.co.uk/calculators/sample-size-calculator-population-proportion/

THANKS!