

Inferential Analysis

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What is Inferential Analysis

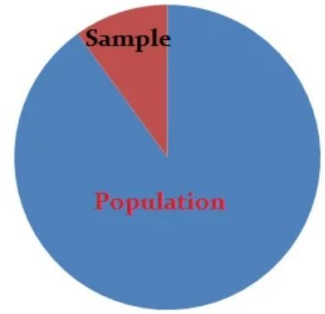
Inferential statistics allows you to make predictions (“inferences”) from that data. With inferential statistics, you take data from samples and make generalizations about a population.

- Inferential statistics enables one to make descriptions of data and draw inferences and conclusions from the respective data.
- Inferential statistics uses sample data because it is more cost-effective and less tedious than collecting data from an entire population.
- It allows one to come to reasonable assumptions about the larger population based on a sample’s characteristics.

There are two main areas of inferential statistics:

- **Estimating parameters.** This means taking a statistic from your sample data (for example the sample mean) and using it to say something about a population parameter (i.e. the population mean).
- **Hypothesis tests.** This is where you can use sample data to answer research questions. For example, you might be interested in knowing if a new cancer drug is effective. Or if breakfast helps children perform better in schools.

Samples and Population



Population:

- A population is any large collection of objects or individuals, such as Americans, students, or trees about which information is desired. Example: Packet of Food grains A group of people suffering from a particular disease, Collection of books,

Sample:

- Sample is the representative unit of the target population, which is worked upon by the researchers • While purchasing food grains, we inspect only a handful of grains and draw conclusions about the quality of the whole lot.

Introduction to Sampling

- Sampling is the method of selecting the number of individuals or objects in such a way that it represents the whole population.
- A sample is used to find out the characteristics of the population.
- The purpose of the sampling is to gather data in order to make inferences and make decisions about the population

Sampling considerations

- Larger sample sizes are more accurate representations of the whole population.
- The sample size chosen is a balance between obtaining a statistically valid representation, and the time, energy, money, labor, equipment and access available
- A sampling strategy made with the minimum of bias is the most statistically valid

Advantages and Disadvantages of sampling

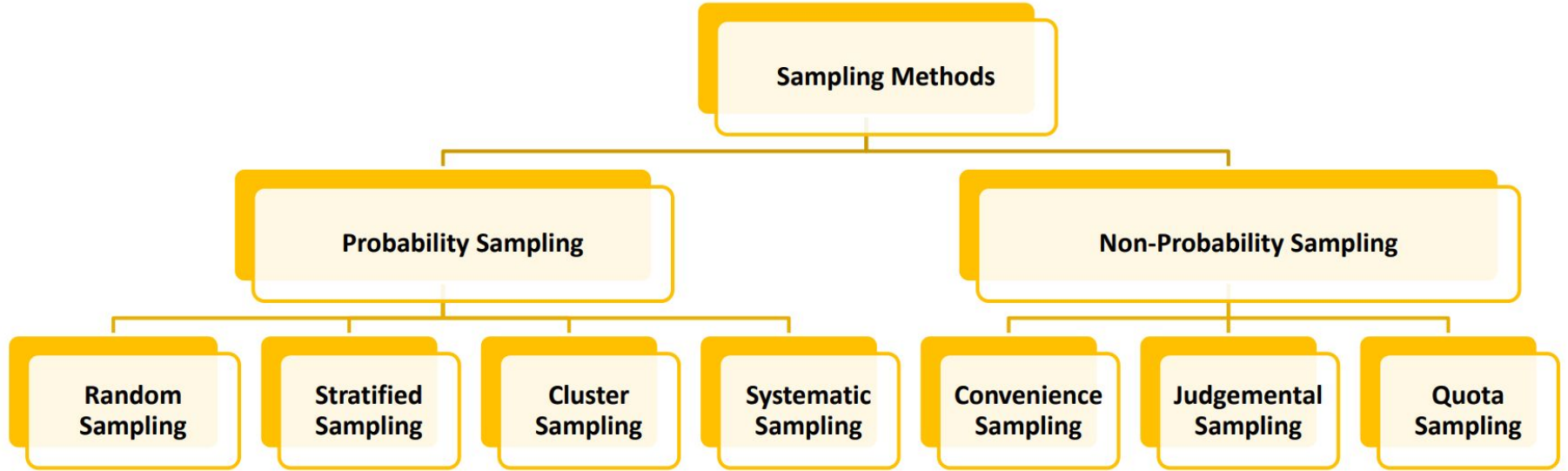
Advantages of Sampling

- Low cost
- Less time consuming
- Suitable in limited resources

Disadvantages of Sampling

- Difficult to select a truly representative sample
- It is important to have subject specific knowledge
- Chances of bias
- Sampling is impossible when population is too small and heterogeneous

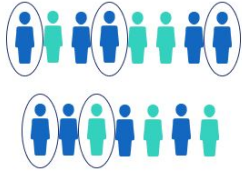
Sampling Method



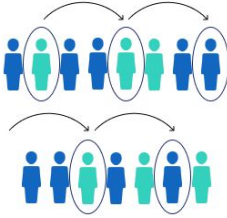
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| Simple Random Sampling | <ul style="list-style-type: none"> • It is applicable when population is small, homogeneous & readily available • All subsets of the frame are given an equal probability. Each element of the frame thus has an equal probability of selection. • It provides for greatest number of possible samples. This is done by assigning a number to each unit in the sampling frame. • A table of random number or lottery system is used to determine which units are to be selected. • The key to random selection is that there is no bias involved in the selection of the sample. • Any variation between the sample characteristics and the population characteristics is only a matter of chance. |
| Stratified Sampling | <ul style="list-style-type: none"> • In stratified sampling, the researcher divides the population into separate groups, called strata for example we can divide the population in two strata: male and female • The population is randomly sampled within each category or stratum. |
| Cluster Sampling | <p>Cluster sampling is a sampling technique used when "natural" but relatively homogeneous groupings are evident in a statistical population.</p> <ul style="list-style-type: none"> • Cluster Sampling is an example of 'two-stage sampling' . 1. A sample of areas is chosen; 2. Sample of respondents within those areas is selected. • Population divided into clusters of homogeneous units, usually based on geographical contiguity. • Sampling units are groups rather than individuals. • A sample of such clusters is then selected. • All units from the selected clusters are studied • It is often used in marketing research. • In this technique, the total population is divided into these groups (or clusters) and a simple random sample of the groups is selected |
| Systematic Sampling | <ul style="list-style-type: none"> • Systematic sampling relies on arranging the target population according to some ordering scheme and then selecting elements at regular intervals through that ordered list. • Systematic sampling involves a random start and then proceeds with the selection of every kth element from then onwards. In this case, $k = (\text{population size} / \text{sample size})$. • It is important that the starting point is not automatically the first in the list, but is instead randomly chosen from within the first to the kth element in the list. • Samples are chosen in a systematic, or regular way. • They are evenly/regularly distributed in a spatial context, for example every two meters along a transect line. • They can be at equal/regular intervals in a temporal context, for example every half hour or at set times of the day. |

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| Quota Sampling | <ul style="list-style-type: none"> • The defining characteristic of a quota sample is that the researcher deliberately sets the proportions of levels or strata within the sample. This is generally done to insure the inclusion of a particular segment of the population. • The proportions may or may not differ dramatically from the actual proportion in the population. The researcher sets a quota, independent of population characteristics. |
| Convenience Sampling | <p>Convenience sampling is a sample taken from a group you have easy access to. The idea is that anything learned from this study will be applicable to the larger population</p> <ul style="list-style-type: none"> • By using a large, convenient size, you are able to more confidently say the sample represents the population. • Furthermore, the convenient group you are testing should not be fundamentally different than if you had taken a sample from another area. If you are trying to say something about women, For example, then your convenient sample cannot be men. • Involves collecting information from members of a population who are conveniently available to provide this information |
| Judgement Sampling | <ul style="list-style-type: none"> • Judgment sample is a type of nonrandom sample that is selected based on the opinion of an expert. • Results obtained from a judgment sample are subject to some degree of bias, due to the frame and population not being identical. • The frame is a list of all the units, items, people, etc., that define the population to be studied. • This is used primarily when there is a limited number of people that have expertise in the area being researched |

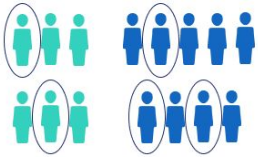
Simple random sample



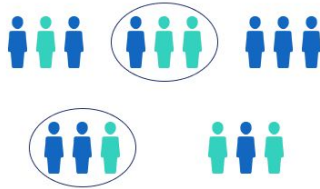
Systematic sample



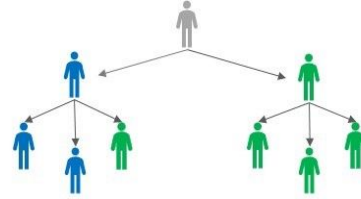
Stratified sample



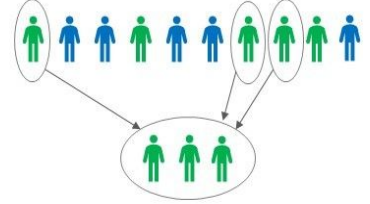
Cluster sample



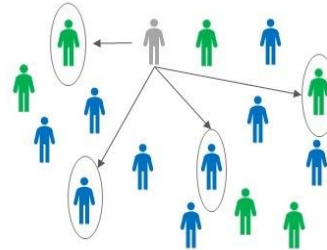
Snowball sample



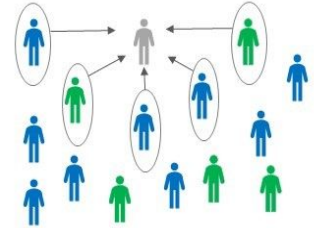
Quota sample



Judgement sample



Convenience sample



Carsten Grube, Statistical Data Analysis, dataZ4s.com



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