

Introduction to Sampling Theory

Lecture 2

Basic Definitions and Fundamentals



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Slides can be downloaded from

<http://home.iitk.ac.in/~shalab/sp>



Sampling Frame:

List of all the units of the population to be surveyed constitutes the sampling frame.

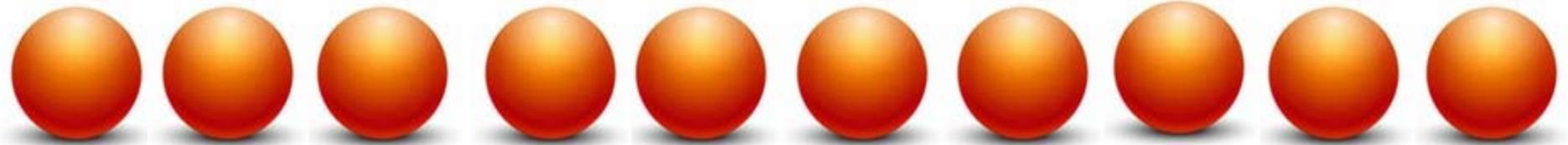
All the sampling units in the sampling frame have identification particulars.

For example, all the students in a particular university listed along with their roll numbers constitutes the sampling frame.

Similarly, the list of households with the name of head of family or house address constitutes the sampling frame.

Simple Random Sampling:

Population of balls of size 10

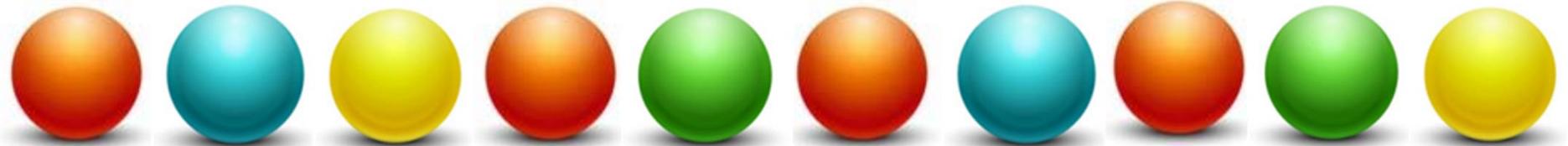


Sampling frame



Simple Random Sampling :

Population of balls of size 10

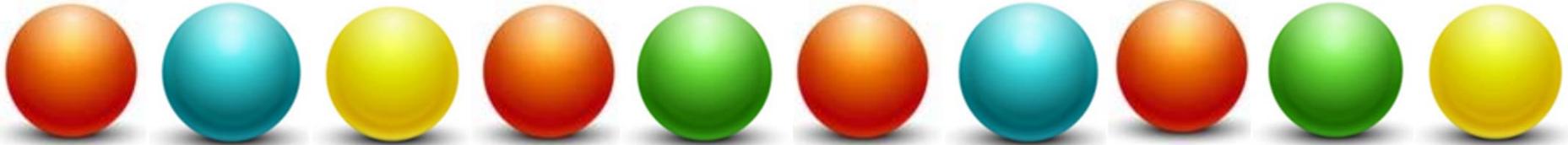


Sampling frame



Representative Sample:

Population:



Sample 1: Is this representative?
(Green and blues balls are missing)



Sample 2: Is this representative?
(Red ball is missing)



Sample 3: Is this representative?
(All balls are proportionally present)

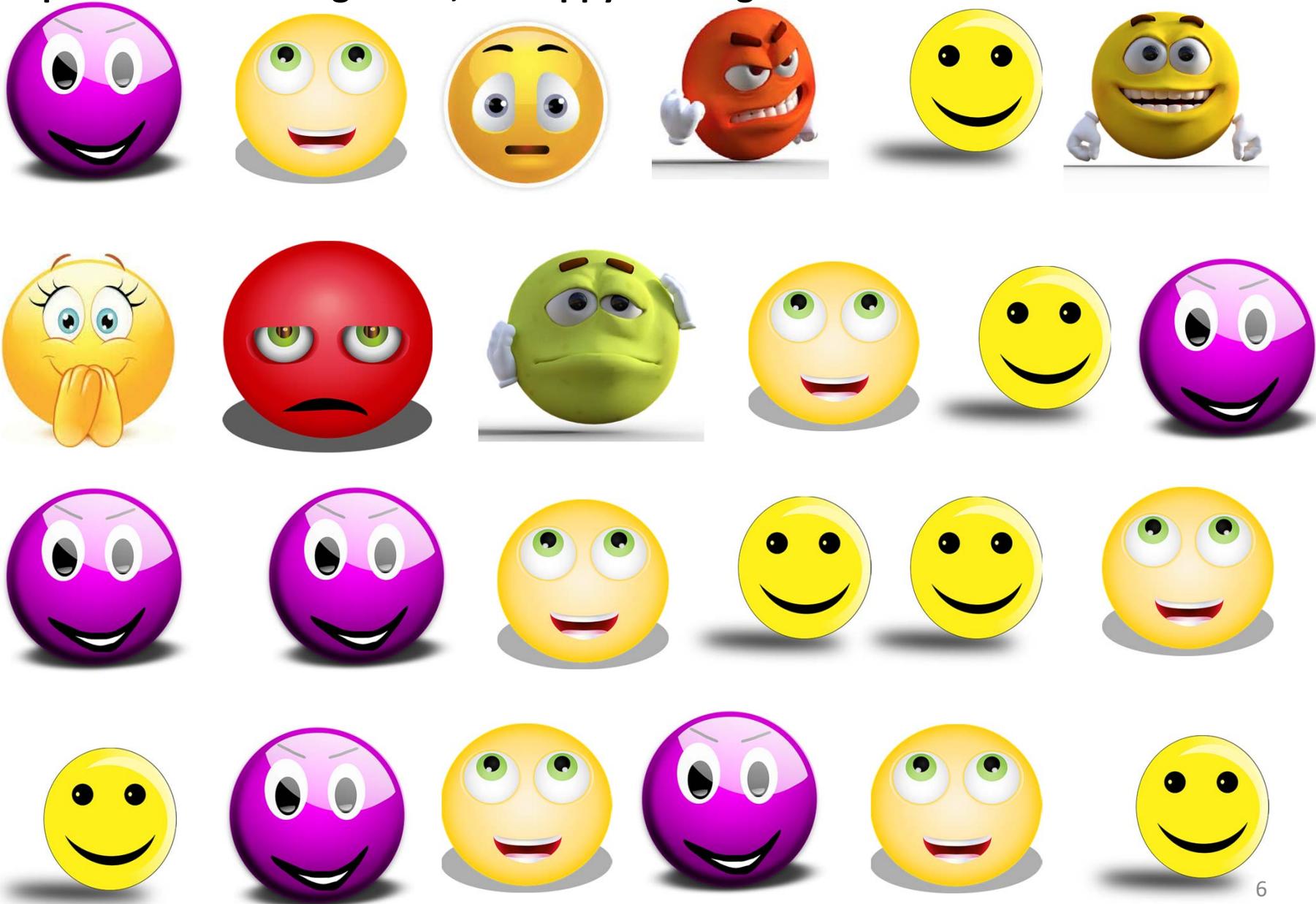


Sample 4: Is this representative?
(Red ball is over represented)



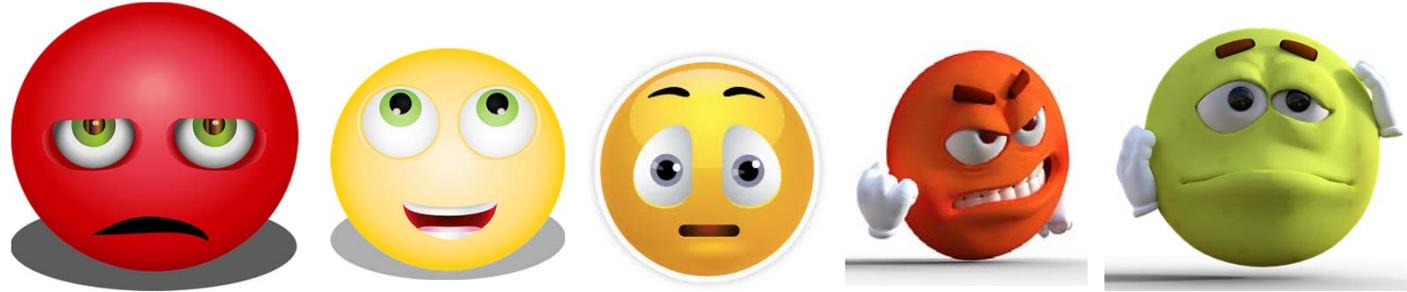
Representative Sample:

Population: Gives in general, a "Happy" feeling

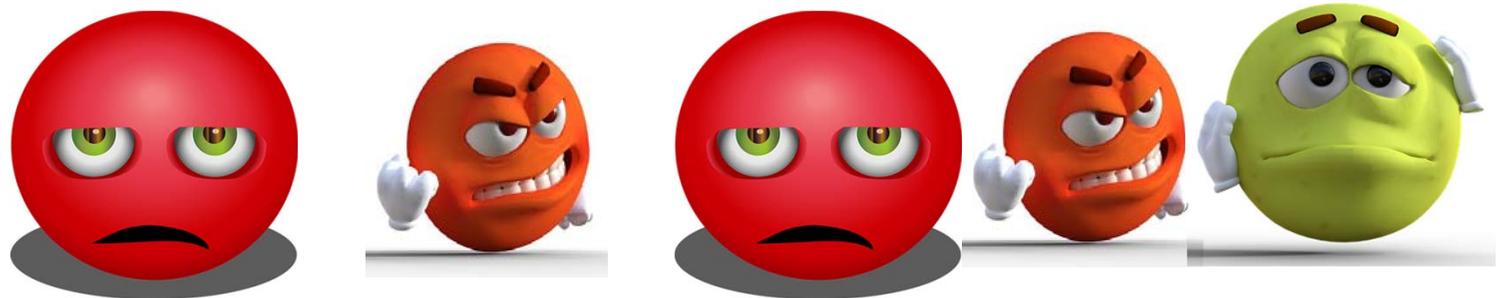


Representative Sample:

Is this representative? Appears as if mostly people are not happy.



Is this representative? Appears as if mostly people are Annoyed.



Is this representative? Appears as if mostly people are Happy.



Ensuring representativeness:

There are two possible ways to ensure that the selected sample is representative.

- 1. Random sample or Probability sample**
- 2. Non-random sample or Purposive sample**
- 3. Quota Sample**

Ensuring representativeness:

1. Random Sample or Probability Sample:

The selection of units in the sample from a population is governed by the laws of chance or probability.

The probability of selection of a unit can be equal as well as unequal.

Ensuring representativeness:

2. Non-Random Sample or Purposive Sample:

The selection of units in the sample from population is not governed by the probability laws.

It is the sample based on non-random laws.

Examples:

- Units are selected on the basis of personal judgment of the surveyor.
- The persons volunteering to take some medical test.
- The persons volunteering to drink a new type of coffee.

Ensuring representativeness:

3. Quota Sample:

The survey in this case is continued until a predetermined number of units with the characteristic under study are picked up.

For example, in order to conduct an experiment for rare type of disease, the survey is continued till the required number of patients with disease are collected.

Advantages of Sampling Over Complete Enumeration

- **Reduced cost and enlarged scope**

Sampling involves the collection of data on smaller number of units in comparison to complete enumeration, so the cost involved in the collection of information is reduced.

Additional information can be obtained at little cost in comparison to conducting another survey.

Advantages of Sampling Over Complete Enumeration

- **Reduced cost and enlarged scope**

For example, when an interviewer is collecting information on health conditions then he/she can also ask some questions on health practices. This will provide additional information on health practices and the cost involved will be much less than conducting an entirely new survey on health practices.

Advantages of Sampling Over Complete Enumeration

- **Organization of work**

It is easier to manage the organization of collection of smaller number of units than all the units in a census.

For example, to draw a representative sample from a state, it is easier to manage to draw small samples from every city than from the whole state. This results in more accuracy in the statistical inferences because better organization provides better data and in turn improved statistical inferences are obtained

Advantages of Sampling Over Complete Enumeration

- **Greater accuracy**

The persons involved in the collection of data are trained and greater accuracy in the data will be achieved if lesser number of units are to be selected.

Advantages of Sampling Over Complete Enumeration

- **Urgent information required**

The data from a sample can be quickly summarized.

For example, the forecasting of the crop production can be done quickly on the basis of a sample of data then collecting first all the observation.

Advantages of Sampling Over Complete Enumeration

- **Feasibility**

Conducting the experiment on smaller number of units, particularly when the units are destroyed, is more feasible.

For example, in determining the life of bulbs, it is more feasible to fuse minimum number of bulbs.

Similarly, in any medical experiment, it is more feasible to use less number of animals.

Type of Surveys:

1. Demographic Surveys

These surveys are conducted to collect the demographic data, e.g., household surveys, family size, number of males in families, etc.

Such surveys are useful in the policy formulation for any city, state or country for the welfare of the people.

Type of Surveys:

2. Educational Surveys

These surveys are conducted to collect the educational data, e.g., how many children go to school, how many persons are graduate, etc.

Such surveys are conducted to examine the educational programs in school and colleges.

Generally, schools are selected first and then the students from each school constitute the sample.

Type of Surveys:

3. Economic Surveys

These surveys are conducted to collect the economic data, e.g., data related to export / import of goods, industrial production, consumer expenditure etc.

Such data is helpful in constructing the indexes indicating the growth in a particular sector of economy or even the overall economic growth of the country.

Type of Surveys:

4. Employment Surveys

These surveys are conducted to collect the employment related data, e.g., employment rate, labour conditions, wages, etc. in a city, state or country.

Such data helps in constructing various indices to know the employment conditions among the people.

Type of Surveys:

5. Health and Nutrition Surveys

These surveys are conducted to collect the data related to health and nutrition issues, e.g., number of visits to doctors, food given to children, nutritional value etc.

Such surveys are conducted in cities, states as well as countries by national and international organizations like UNICEF, WHO etc.

Type of Surveys:

6. Agricultural Surveys

These surveys are conducted to collect the agriculture related data to estimate, e.g., the acreage and production of crops, livestock numbers, use of fertilizers, use of pesticides and other related topics.

The government bases its planning related to the food issues for the people based on such surveys.

Type of Surveys:

7. Marketing Surveys

These surveys are conducted to collect the data related to marketing. They are conducted by major companies, manufacturers or those who provide services to consumer etc.

Such data is used for knowing the satisfaction and opinion of consumers as well as in developing the sales, purchase and, promotional activities etc.

Type of Surveys:

8. Election Surveys

These surveys are conducted to study the outcome of an election or a poll. For example, such polls are conducted in democratic countries to have the opinions of people about any candidate who is contesting the election.

Type of Surveys:

9. Public Polls And Surveys

These surveys are conducted to collect the public opinion on any particular issue. Such surveys are generally conducted by news media and agencies which conduct polls and surveys on current topics of interest to public.

Type of Surveys:

10. Campus Surveys

These surveys are conducted on the students of any educational institution to study about the educational programs, living facilities, dining facilities, sports activities, etc.