Population: Collection of all items (N) and it includes each and every units of our study. It is hard to define and the measure of characteristic such as mean, mode is called parameter.

Sample: Subset of the population (n) and it includes only a handful units of the population. It is selected at random and the measure of the characteristic is called as statistics.

SAMPLING

Sampling is the process of selecting the sample from the population.

Sampling categorized into 2

1. Probability sampling
2. Non-probability "

(1) Probability sampling. — Choosing the sample from the large population by using the theory of probability.

1. SIMPLE RANDOM SAMPLING
2. SYSTEMATIC "
3. STRATIFIED "
4. CLUSTER "

① Simple Random Sampling — In this sampling all the elements have same probability of being selected to form a sample. i.e it is choosing randomly.

ex- from a large set of student choosing 10 students randomly.

Stratified Sampling — In this a sufficient number will be selected from each stratum of the population.

STRATUM: subset of population that having at least one common behavior.

eg: If considering indian teenagers as population one girls is one stratum and boys are another one and selecting 10 elements from each and creates a sample is stratified sampling.

Probability

⊙ Probability is the branch of mathematics concerning numerical descriptions of how likely and event is to occur, or how likely it is that a proposition is true. The probability of an event is a number between 0 and 1, where roughly speaking, 0 indicates impossibility of the event and 1 indicates certainty

⊙ Probability denotes the possibility of the outcome of any random event. The meaning of this term is to check the extent to which any event is likely to happen. For example, when we flip a coin in the air, what is the possibility of getting a head? The answer to this ques— is based on the no. of possible outcomes. Here the possibility is either head or tail will be the outcome. So, the probability of a head to come as a result is 1/2.

⊙ The probability is the measure of the likehood of an event to happen. It measures the certainty of the event. The formula for probability is given by

P(E) = Number of favourable Outcomes / Number of total outcomes.

$$P(E) = \frac{n(E)}{n(S)}$$

Random Experiment

An experiment whose result cannot be predicted, until it is noticed is called a random experiment. For example, when we throw a dice randomly, the result is uncertain to us. We can get any output between 1 to 6. Hence, this experiment is random.

Note
1) Experiment doesn't ~~gives any res~~ Know the result, but for form random experiments one kno what the result can be, but not what will happen exactly.

Sample Space

A sample space is the set of all possible results or outcomes of a random experiment. Suppose, if we have thrown a dice, randomly, then the sample space for this experiment will be all possible outcomes of throwing a dice, such as

⊙ Sample space = {1, 2, 3, 4, 5, 6}

⊙ Event

In probability theory, an event is an outcome or for example, on the roll of a die, getting an even number is an event. This event is a subset containing sample points {2, 4, 6}. The sample space is {1, 2, 3, 4, 5, 6}

Types of events

⊙ Two events are mutually exclusive if they have no sample points in common.

⊙ Two events are independent when the occurrence of one does not affect the probability of the occurrence of the other.

Random Variable

⊙ When the value of a variable is determined by a chance event, that variable is called a random variable.

Example

Head Tail

Simple Test

2 coin ⇒ HH, TT, HT, TH (Sample case of 2 coins)

P (H)	P →
0	$\frac{1}{4}$
1	$\frac{2}{4}$
2	$\frac{1}{4}$

probability distribution of table

$\frac{1}{4} + \frac{2}{4} + \frac{1}{4} = 1$

Note

Sum of probability is always 1

⊙ Discrete – Within a range of numbers, discrete variables can take on only certain values. Suppose, for example, that we flip a coin and count the no. of heads. The number of heads will be a value between zero and plus infinity. Within that range, though, the no. of heads can be only certain values. For example, the number of heads can only be a whole number, not a fraction. Therefore, the number of heads is a discrete variable. And because the number of heads results from a random process – flipping a coin – it is a discrete random variable.

⊙ Continuous – Continuous variables, in contrast, can take on any value within a range of values. For example, suppose we randomly select an individual from a population. Then, we measure the age of that person. In theory, his/her age can take on any value between zero and plus infinity, so age is a continuous variable. In this example, the age of the person selected is determined by a chance event; so in this example, age is a continuous random variable.

⊙ A probability distribution is a table or an equation that links each possible value that a random variable can assume with its probability of occurrence.