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Statistics for Agriculturists

Varying Probability Sampling

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Sampling techniques covered



- Simple Random Sampling (Probability Sampling)
- Systematic Sampling
- Stratified Samples
- Cluster Sampling
- Multistage Sampling

Varying Probability Sampling



- Unequal or varying probability sampling: Unequal probabilities provides more efficient estimators than equal probability sampling, and this type of sampling is known as
- Units are selected with probability proportional to a given measure of size.
- This sampling scheme is also termed as ‘probability proportional to size’ sampling, abbreviated as pps sampling.
- The main limitation of this procedure is that it involves writing down the successive cumulative totals.
- It is time-consuming and tedious especially if the number of units in the population is large.

Example



Example: A village has 10 orchards containing 150, 50, 80, 100, 200, 160, 40, 220, 60 and 140 trees respectively. It is desired to select a sample of 4 orchards with replacement and with probability proportional to the number of trees in the orchard.

S.no.	Size X_i	Cumulative Size	Number-associated
1	150	150	1-150
2	50	200	151-200
3	80	280	201-280
4	100	380	281-380
5	200	580	381-580
6	160	740	581-740
7	40	780	741-780
8	220	1000	781-1000
9	60	1060	1001-1060
10	140	1200	1061-1200

PPS

$$150/1200 =$$

Example



Example: A village has 10 holdings consisting 50, 30, 45, 25, 40, 26, 44, 35, 28 and 27 fields respectively. Select a sample of 4 holdings with replacement method and with probability proportional to the number of fields in the holding.

Solution: In this case $N = 10$, $M = 50$. First we have to select a pair of random numbers, e.g. the pair is (10, 20). Hence the 10 –th unit is selected in the sample. Similarly, choosing other pairs, we can have (4, 13), (5, 45), (7, 15). The pair (5, 45) is rejected as 45 is greater than the size value (40) and so another pair is drawn which turns out to be (6, 30). Hence the sample will consist of the holdings with serial numbers 10, 4, 7, and 6.

Thank you

