E-CONTENT

EDU-C-301: Methodology of Educational Research-I

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Unit-IV: Sampling for Data Collection

- **Concept of Population and Sample**
- **Methods/ Strategies of Sampling: probability and Non-probability**
- **Various techniques of Probability and Non-Probability Sampling**
- **Sampling Distribution and Sampling Error**
- **Characteristics of a good Sample**

UNIVERSE OR POPULATION

Population, compilation, or set of things, items, or quantities (grouped together on the basis of common or defining descriptions or characteristics) from which a representative sample is drawn for relationship, comparison or measurement. The population or universe embodies the entire group of units which is the centre of the study. Thus, the population could consist of all the persons in the country, or those in a particular topographical position, or a special cultural or economic group, depending on the rationale and exposure of the study.

Thus, it is a total set of elements (persons or objects) that share some common features defined by the sampling criterion established by the researcher. Population is Comprised of two groups - target population & accessible population.

TARGET POPULATION

Target population is the total group of population units from which the sample is to be drawn. A sample is the group of units who took part in research. Generalisability refers to the degree to which we can correlate the findings of our research to the target population we are concerned.

ACCESSIBLE POPULATION

Accessible population is the population in research to which the researchers can correlate their conclusions. This population is a split or subset of the target population and is also known as the study population. It is from the accessible population that researchers draw their samples. *Sample Group* or *Sampling*.

SAMPLE

Sample is a subset of population containing same characteristics of a larger population. Samples are used in statistical testing when population size is too big for the test to include all members for observation. Sample should stand for the whole population and not reflect prejudice toward a precise feature.

In the research methodology, realistic formulation of the research is important and should be done very cautiously with proper attentiveness and in the occurrence of a very good supervision.

But during the formulation of the research on the sensible grounds, one likely to go through a large number of problems. These problems are normally related to the perceptive of the descriptions of the universe or the population on the basis of studying the characteristics of the exact part or some portion, generally called as the sample.

Thus, sampling is defined as the method or the practice consisting of selection for the study of the part or the piece or the sample, with a view to describe conclusions or the solutions about the universe or the population.

According to Mildred Parton, "Sampling method is the process or the method of drawing a definite number of the individuals, cases or the observations from a particular universe, selecting part of a total group for investigation."

BASIC PRINCIPLES OF SAMPLING

Generally sampling is based on the following two laws:

Law of Statistical Regularity: The law is drawn from the mathematical theory of probability. According to King, "Law of Statistical Regularity says that a moderately large number of the items chosen at random from the large group are almost sure on the average to possess the features of the large group." According to this law the units of the sample must be selected at random and all should represent the entire population.

Law of Inertia of Large Numbers: According to this law, the other thing is being equal: the larger the size of the sample; the more accurate the results are likely to be.

CHARACTERISTICS OF THE SAMPLING TECHNIQUE

1. Much cheaper.
2. Much reliable.
3. Saves time.
4. Scientific in nature.
5. Very suitable for carrying out different surveys.

ADVANTAGES OF SAMPLING

1. Economical in nature.
2. High suitability ratio towards the different surveys.

3. In cases, when the population/universe is very large, then sampling method is the only practical method for collecting the data.
4. Takes less time.
5. Very accurate.
6. Very reliable.

DISADVANTAGES OF SAMPLING

1. Untrained manpower.
2. Absence of informants.
3. Chances for bias.
4. Chances of committing errors in sampling.
5. Difficulty of getting representative sample.
6. Inadequacy of samples.
7. Problems of accuracy.

SAMPLE DESIGN

The sample design is prepared up of the following two elements:

- **Sampling method**. Sampling method refers to the set of laws and measures by which some elements of the population are included in the sample. Some common sampling methods are simple random sampling , stratified sampling , and cluster sampling, quota or judgment.

- **Estimator**. The estimation procedure for calculating sample statistics is called the estimator. Different sampling methods may use different estimators. For example, the formula for computing a mean score with a simple random sample is different from the formula for computing a mean score with a stratified sample. Similarly, the formula for the standard error may vary from one sampling method to the next.

The best sample design is dependent upon survey objectives and on survey resources. For example, a researcher might select the most economical design that gives a required level of accuracy. Or, if the resources are limited, a researcher might select the design that gives the greatest accuracy without going over financial plan.

CHARACTERISTICS OF A GOOD SAMPLE DESIGN

In a field study due to time constraint and finance involved, generally, only a section of the population is considered. These respondents are identified as the sample and are representative of the general population or universe. A sample design is a predetermined plan for getting a sample from a population. It refers to the method or the process for attaining a sample from a given population.

Following are some of the basic characteristics of good sample design:

Sample design should be a representative sample: A researcher relatively selects a small number for a sample from an entire population. This sample is required to match all the features of the entire population. If the sample selected in an experiment is a representative one then it will assist to generalize the results from a small group to large one.

Sample design should possess small sampling error: Sampling error is an error caused by taking a small sample instead of the entire population for the study. Sampling error refers to the difference that may result from judging all on the basis of a small number. Sampling error is condensed by selecting a large sample and by using proficient sample design and inference approaches.

Sample design should be cost-effectively: Most of the research studies have a limited budget known as research budget. The sampling should be done in a way that it is within the research budget and should not be too expensive to be replicated.

Sample design should have no methodical bias: Methodical prejudice results from errors in the sampling procedures which is very difficult to reduce or eliminate by increasing the sample size. The best bet for researchers is to sense the causes and correct them.

Results attained from the sample should have the capacity to be generalized and applicable to the whole population: The sampling design should be shaped keeping in view that samples should cover the whole population of the study and is not limited to a part only.

PROBABILITY SAMPLING

A probability sampling is any method of sampling that makes use of some form of chance selection. In order to have a random selection method, a researcher must set up a few process or procedure that guarantees the diverse units in your population have equal chance of being selected. Researchers have long used various types of random selection, like picking a name out of a box, or choosing the short straw. These days, we use computers as the instrument for generating random numbers as the basis for random selection.

Before various probability methods are discussed, some basic terms used are given here. These are:

N:	number of cases in the sampling frame
n:	number of cases in the sample
NCn:	number of combinations (subsets) of n from N
f = n/N:	sampling fraction

With those terms defined we can begin to define the different probability sampling methods.

Simple Random Sampling

One of the simple form of random sampling is known as simple random sampling. Here is the quick description of simple random sampling:

The objective is to select *n* units out of *N* such that each *NCn* has an equal chance of being selected.

The procedure is: Use a table of random numbers, a computer random number generator,

or a mechanical device will be used to select the sample.

A somewhat pretentious, if precise, description. We should make it a little more real. How do we select a simple random sample? For the sake of the example, say you want to select 100 students to survey and that there were 1000 students in a school. Then, the sampling fraction is f = n/N = 100/1000 = .10 or 10%. Now, to actually draw the sample, you have several options. You could print off the list of 1000 students, tear then into separate strips, put the strips in a box, mix them up real good, close your eyes and pull out the first 100. But this mechanical procedure would be boring and the quality of the sample would depend on how methodically you mixed them up and how randomly you reached in. Perhaps a better procedure would be to use the kind of ball machine that is popular with many of the state lotteries. You would need three sets of balls numbered 0 to 9, one set for each of the digits from 000 to 999 (if we select 000 we will call that 1000). Number the list of names from 1 to 1000 and then use the ball machine to select the three digits that selects each person. The obvious disadvantage here is that you need to get the ball machines.

Neither of these mechanical measures is very practicable and with the development of low-cost computers there is a much easier way. Here is a simple practice that is particularly useful if you have the names of the clients already on the computer. Many computer programmes can create a series of random numbers. Suppose you can copy and paste the list of client names into a column in an EXCEL spreadsheet. Then, in the column right next to it paste the function =RAND() which is EXCEL's way of putting a random number between 0 and 1 in the cells. Then, sort both columns: the list of names and the random number- by the random numbers. This rearranges the list in random order from the lowest to the highest random number. Then, all you have to do is take the first hundred names in this sorted list. pretty simple. You could probably accomplish the whole thing in shorter period of time.

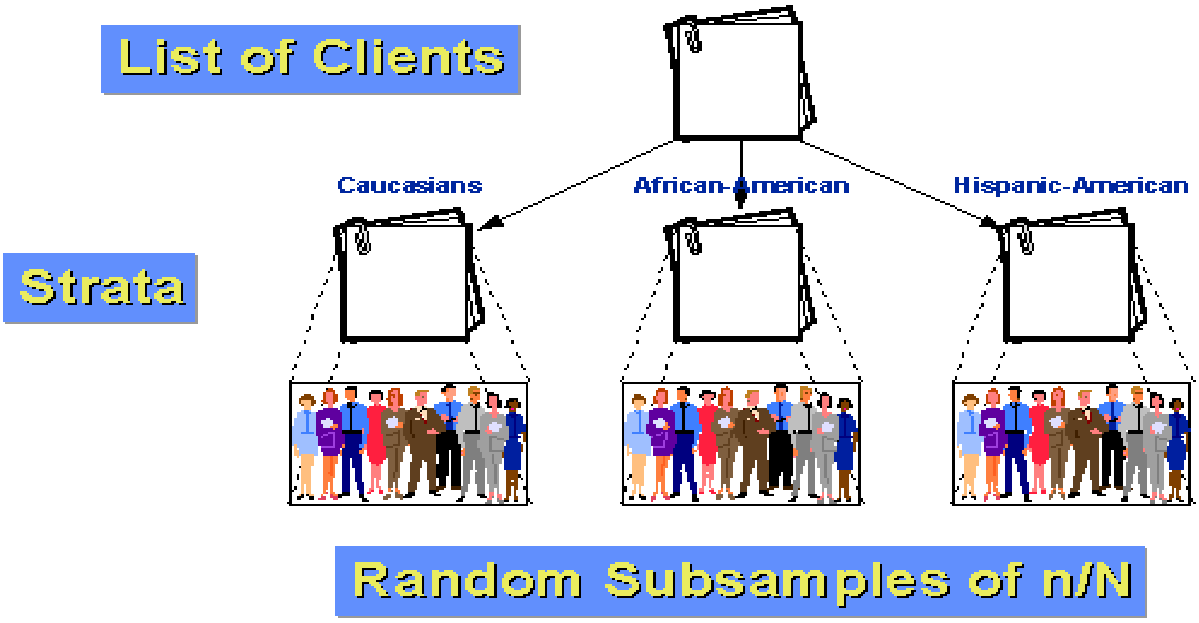
Simple random sampling is simple to achieve and is simple to describe to others. Because simple random sampling is a good way to select a sample, it is rational to generalize the results from the sample back to the population. Simple random sampling is not the most statistically well-organized method of sampling, just because of the luck of the draw, not get good representation of subgroups in a population. To deal with these problems, we have to turn to other sampling methods.

Stratified Random Sampling

Stratified Random Sampling, also at times known as proportional or quota random sampling, involves separating population into uniform subgroups and then taking a simple random sample in each subgroup. In more proper terms, it is illustrated as below:

Objective: Divide the population into non-overlapping groups (i.e., strata) N1, N2, N3, ... Ni, such that N1 + N2 + N3 + ... + Ni = N. Then do a simple random sample of f = n/N in each strata.

There are various key reasons why you should favour stratified sampling over simple random sampling. First, it promises that you will be in a position to signify not only the entire population, but also key subgroups of the population, particularly small marginal groups. If you want to be in a position to talk about subgroups, this may be the only way to assure efficiently you will be able to. If the subgroup is enormously small, you can use diverse sampling fractions (f) within the different strata to randomly over-sample the small group (although you will then have to ponder the within-group estimates using the sampling division at any time you want on the whole population estimates). When we use the same sampling fraction within strata we are conducting balanced stratified random sampling. When we employ different sampling fractions in the strata, we call this unequal stratified random sampling. Second, stratified random sampling will usually have additional statistical accuracy than simple random sampling. This will only be accurate if the strata or groups are uniform. If they are, we anticipate that the inconsistency within-groups is lower than the unevenness for the population as a whole. Stratified sampling take advantages on that fact.

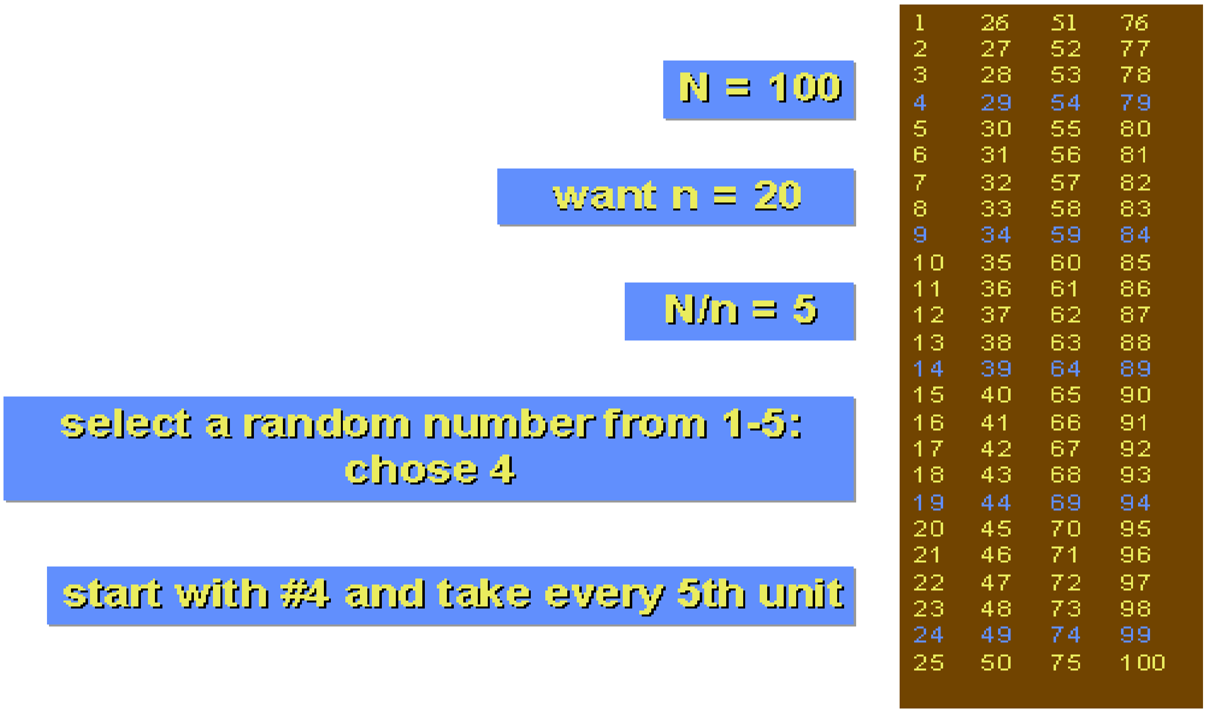


For example, suppose the population of teachers for our area can be divided into three groups: Kashmiri, tribal and pandith and if we assume that both the tribal and pandith are relatively small minorities of the clientele (10% and 5% respectively). If we just did a simple random sample of n=100 with a sampling fraction of 10%, we would expect by chance single-handedly that we would only get 10 and 5 persons from each of our two smaller groups. And, by chance, we could get fewer than that. If we stratify, we can do better. First, we should decide how many people we want to have in each group. Say for example we still want to take a sample of 100 from the population of 1000 teachers. But we think that in order to say something about subgroups we need at least 25 cases in each group. So, say sample 50 Kashmiri, 25 Tribals, and 25 Pandiths. We know that 10% of the population, or 100 teachers, are Kashmiri. If we randomly sample 25 of these, we have a within-stratum sampling fraction of 25/100 = 25%. Similarly, we know that 5% or 50 teachers are Tribals. So our within-stratum sampling fraction will be 25/50 = 50%. Finally, by subtraction we know that there are 850 Kashmiri teachers. Our within-stratum sampling fraction for them is 50/850 = about 5.88%. Because the groups are more uniform within-group than from the population as a whole, we anticipate greater statistical accuracy. And, because we have stratified population, we know we will have sufficient cases from each group to make meaningful subgroup deductions.

Systematic Random Sampling

Here are the steps you require to go after in order to attain a systematic random sample:

number the units in the population from 1 to N
decide on the n (sample size) that you want or need
k = N/n = the interval size
randomly select an integer between 1 to k
then take every kth unit



All of this will be much vivid with an example. assume that we have a population that only has N=100 people in it and that you desire to take a sample of n=20. To use systematic sampling, the population must be listed in a random order. The sampling fraction would be f = 20/100 = 20%. in this case, the interval size, k, is equal to N/n = 100/20 = 5. Now, select a random integer from 1 to 5. In our example, envisage that you chose 4. Now, to select the sample, start with the 4th unit in the list and take every k-th unit (every 5th, because k=5). You would be sampling units 4, 9, 14, 19, and so on to 100 and you would wind up with 20 units in your sample.

For this to work, it is necessary that the units in the population are by chance ordered, at least with respect to the features you are measuring. Why would you still want to use systematic random sampling? For one thing, it is quite easy to do. You only have to choose a single random number to start things off. It may also be more accurate than simple random sampling. Finally, in some cases there is simply no easier way to do random sampling. For instance, a study that involved sampling from all the books in a library. Once selected, would have to go to the shelf, set the book, and record when it is last distributed. I knew that I had a reasonably good sampling frame in the shape of the shelf list (which is a card catalogue where the entries are made in the order they happen on the shelf). To do a simple random sample, I could have estimated the total number of books and generated random numbers to draw the sample; but how would I find book A easily if that is the number I selected? I could not very well calculate the cards until I came to A. Stratifying would not resolve that problem either. For instance, I could have stratified by card catalogue drawer and drawn a simple random sample within each drawer. But I would still be caught counting cards. Instead, I did a systematic random sample. I estimated the number of books in the entire compilation. Imagine it was 100,000. I decided that I required to take a sample of 1000 for a sampling fraction of 1000/100,000 = 1%. To get the sampling interval k, I divided N/n = 100,000/1000 = 100. Then I selected a random integer between 1 and 100. Say for instance, I got 57. Next I did a little side study to decide how thick a thousand cards are in the card catalogue (taking into account the varying ages of the cards). Say that on average I found that two cards that were separated by 100 cards were about 0.75 inches apart in the catalogue drawer. That information gave me the whole thing I needed to draw the sample. I counted to the 57th by hand and recorded the book information. Then, I took a range. Then I set the compass at .75", stuck the pin end in at the 57th card and sharp with the pencil end to the next card (approximately 100 books away). In this way, I approximated selecting the 157th, 257th, 357th, and so on. I was able to achieve the whole selection process in very modest time using this systematic random sampling approach. I would most likely still be there counting cards if I would have tried another random sampling method.

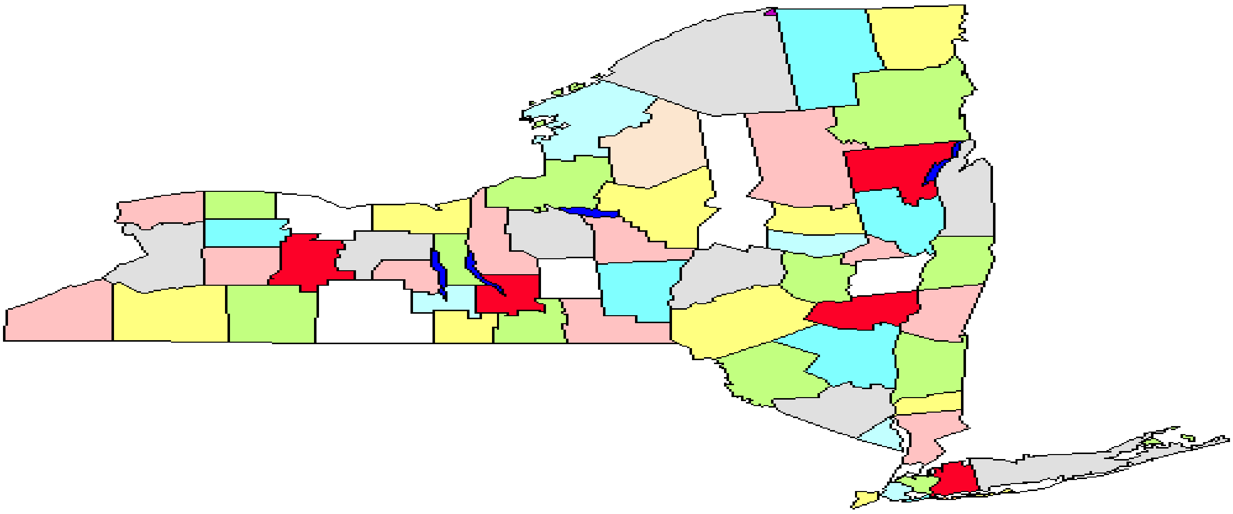
Cluster Random Sampling

This is also known as area sampling. The problem with random sampling methods when we have to sample a population that is disbursed from corner to corner a wide area is that you will have to cover a lot of ground geographically in order to get to each of the units you sampled. Visualize taking a simple random sample of all the residents of Kashmir in order to have personal interviews. By the chance of the draw you will wind up with respondents who come from all over the valley. Your interviewers are going to have a lot of travelling to do. It is for accurately this problem that cluster or area random sampling was invented.

In cluster sampling, we follow these steps:

divide population into clusters (usually along geographic boundaries)
randomly sample clusters

measure all units within sampled clusters



For instance, in the figure we see a map of Kashmir valley. Suppose say that we have to do a survey of town governments that will require us going to the towns personally. If we do a simple random sample state-wide we will have to cover the whole state geographically. Instead, we make a decision to do a cluster sampling of five districts. Once these are selected, we go to every town government in the five areas. Clearly this approach will help us to cut down our mileage. Cluster or area sampling, then, is helpful in situations like this, and is done mainly for effectiveness of management. Note also, that we probably do not have to be anxious about using this approach if we are conducting a mail or telephone survey because it does not matter as much where we call or send letters to.

Multi-Stage Sampling

The four methods we have deliberated upon so far, simple, stratified, systematic and cluster are the simplest random sampling approaches. In most authentic applied social research, we would use sampling methods that are significantly more composite than these simple variations. The most important principle here is that we can unite the simple methods explained previously in a variety of useful ways that help us to address our sampling requirements in the most proficient and successful manner possible. When we combine sampling methods, we call this multi-stage sampling.

For example, consider the idea of sampling Kashmiri residents for face-to-face interviews. Clearly we would want to do some type of cluster sampling as the first stage of the course. We might sample townships or census areas all over the valley. But in cluster sampling we would then go on to determine everyone in the clusters we select. Even if we have sampling census tracts we may not be able to assess everyone who is in the census tract. So, we might set up a stratified sampling procedure within the clusters. In this case, we would have a two-stage sampling method with stratified samples within cluster samples. Or, consider the problem of sampling students in grade schools. We might begin with a state sample of school districts stratified by economics and educational level. Within selected districts, we might do a simple random sample of schools. Within schools, we might do a simple random sample of classes or grades. And, within classes, we might even do a simple random sample of students. In this case, we have three or four stages in the sampling practice and we employ both stratified and simple random sampling. By mixing various sampling methods we are able to attain a rich array of probabilistic sampling methods that can be used in a wide range of social research situations.

NON-PROBABILITY SAMPLING

The difference between non-probability and probability sampling is that non-probability sampling does not engage random selection and probability sampling does. Does that mean that non-probability samples are not representative of the population? Not necessarily. But it does signify that non-probability samples cannot depend upon the justification of probability premise. At least with a probabilistic sample, we know the odds or probability that we have represented the population well. We are able to approximate confidence intervals for the statistic. With non-probability samples, we may or may not represent the population well, and it will often be tough for us to know how well we have done so. In general, researchers prefer probabilistic or random sampling methods over non-probabilistic ones, and consider them to be more perfect and meticulous. However, in applied social research there may be situations where it is not practicable, realistic or theoretically sagacious to do random sampling. Here, we consider a wide range of non-probabilistic alternatives.

We can divide non-probability sampling methods into two broad types: accidental or purposive. Most sampling methods here have purposive nature because we usually advance the sampling problem with a precise plan in mind. The most important differences among these types of sampling methods are the ones among the various types of purposive sampling techniques.

Accidental, Convenience or Haphazard Sampling

The most general methods of non-probability sampling goes under the various names. In this category the traditional *man on the street* or *person on the street*. interviews conducted frequently by television news programmes to get a quick (although non-representative) reading of public opinion. I would also disagree that the classic exercise of college students in much psychological research is mainly a matter of convenience. In medical practice, we might employ clients who are accessible to us as our sample. In many research background, we sample merely by asking for volunteers. Clearly, the problem with all these types of samples is that we have no proof that they are the real representatives of the populations we are concerned in generalizing the results and in many cases we would clearly suspect that they are not.

Purposive Sampling

Here more precise predefined groups we are looking for. For example, have you ever run into people on the street who carry a clipboard and who stop various people and ask if they could interview them? Most likely they are conducting a purposive sample (and most probably they are occupied in market research). They might be looking for Kashmiri males between 30-40 years old. They appraise the people passing by and anybody who looks to be in that category they stop him to ask if he will take part. One of the first things they are likely to do is authenticate that the respondent does meet the criterion for being in the sample. Purposive sampling can be very helpful for circumstances where you need to accomplish a targeted sample swiftly and where sampling for proportionality is not the main concern. With a purposive sample, you are likely to get the judgments of your target population, but you are also likely to overweight subgroups in your population that are more willingly reachable.

All of the techniques that follow can be considered subcategories of purposive sampling methods. We might sample for definite groups or types of people as in modal instance, expert, or quota sampling. We might sample for multiplicity as in heterogeneity sampling. Or, we might take advantage of on casual social networks to recognize precise respondents who are tough to get contacted otherwise, as in snowball sampling. In all of these techniques we know what we desire to we are sampling with a rationale.

Modal Instance Sampling

In statistics, the mode is the most commonly happening value in a distribution. In sampling, when we do a modal instance sample, we are sampling the most common case, or the *typical* case. In a lot of casual public opinion polls, for instance, they interview a *typical* voter. There are a number of problems with this sampling technique. First, how do we know what the *typical* or *modal* case? We could say that the modal voter is a person who is of average age, educational level, and income in the population. But, it is not apparent that using the averages of these is the reasonable (consider the skewed distribution of income, for instance). And, how do you know that those three variables- age, education, income are the solitary or even the most pertinent for categorizing the *distinctive* voter? What if religion or ethnicity is an important discriminator? Clearly, modal illustration sampling is only rational for casual sampling situations.

Expert Sampling

Expert sampling involves the collecting of a sample of persons with recognized or verifiable knowledge and know-how in some area. Often, we organize such a sample under the patronage of a *panel of experts.* There are in fact two reasons for having expert sampling. First, because it would be the excellent way to obtain the views of persons who have particular expertise. In this case, expert sampling is fundamentally just a exact sub case of purposive sampling. But the other reason you might use expert sampling is to offer proof for the legitimacy of another sampling technique you have selected. For instance, say you do modal instance sampling and are worried that the criterion you have used for defining the modal instance are subject to disapproval. You might arrange an specialist board consisting of persons with recognized experience and insight into that area or topic and ask them to scrutinize your modal definitions and remark on their suitability and strength. The benefit of doing this is that you are not out on your own trying to shield your conclusions you have some accredited experts to back you. The weakness is that even the experts can be wrong.

Quota Sampling

In quota sampling, the researcher selects people non-randomly according to some predetermined quota. There are two types of quota sampling: proportional and non proportional. In proportional quota sampling the researcher wants to represent the main characteristics of the population by sampling a proportional quantity of each. For instance, if the researcher knows the population has 40% women and 60% men, and that he wants a total sample size of 100, he will continue sampling until he gets those percentages and then will stop. So, if he has already got the 40 women for his sample, but not the sixty men, he will continue to sample men but even if genuine women respondents come along, he will not sample them because he has already *met his quota.* The problem here (as in much purposive sampling) is that he has to decide the specific features on which he will stand the quota. Will it be by gender, age, education race, religion, etc.

Non-proportional quota sampling is a bit unrestricted. In this technique, the researcher specifies the minimum number of sampled units he wants in each category. here, he is not worried about having numbers that match the magnitude in the population. Instead, he simply wants to have sufficient to guarantee that ge will be able to talk about even small groups in the population. This method is the non-probabilistic analogue of stratified random sampling in that it is characteristically used to reassure that smaller groups are sufficiently represented in his sample.

Heterogeneity Sampling

We sample for heterogeneity when we want to incorporate all opinions or views, and we are not concerned about representing these views proportionately. Another term for this is sampling for variety. In many brainstorming or small group processes (including concept mapping), we would employ some form of heterogeneity sampling because our main concern is in getting broad range of information, not identifying the *average* or *modal instance* ones. In consequence, what we would like to be sampling is not people, but ideas. We imagine that there is a cosmos of all probable information pertinent to some theme and that we want to sample this population, not the population of people who have the ideas. Obviously, in order to get all of the ideas, and especially the *outlier* or strange ones, we have to include a broad and varied range of participants. *Heterogeneity sampling* is, in this sense, approximately the contradictory of *modal instance sampling*.

Snowball Sampling

In snowball sampling, the researcher begins by identifying someone who meets the criterion to be included in his study. He then asks them to propose others who they may know who also meet the criterion. Although this technique would barely guide to representative samples, there are periods when it may be the most excellent technique accessible. Snowball sampling is particularly helpful when the researcher is trying to attain populations that are unreachable or tough to find. For instance, if he is studying the homeless, you are not likely to be able to find good lists of homeless people within a specific geographical area. Or if the research is about drug addicts, the sample for the same is very difficult to find. However, if the researcher goes to that area and identifies one or two, he may find that they know very well who the other homeless or drug addict people in their vicinity are and how you can be contacted.

SAMPLING DISTRIBUTION

In statistics, a sampling distribution or finite-sample distribution is the probability distribution of a given statistic based on a random sample. Sampling distributions are important in statistics because they supply a main generalizations on the way to statistical deduction. More purposely, they permit logical contemplations to be based on the sampling distribution of a statistic, rather than on the combined probability distribution of all the individual sample standards.

Suppose that we draw all possible samples of size n from a given population. Suppose further that we compute a statistic (e.g., a mean, proportion, standard deviation) for each sample. The probability distribution of this statistic is called a sampling distribution.

The sampling distribution of a statistic is the distribution of that statistic, measured as a random variable, when derived from a random sample of size *n.* It may be considered as the distribution of the statistic for all possible samples from the same population of a given size. The sampling distribution depends on the fundamental distribution of the population, the statistic being considered, the sampling method used, and the sample size employed. There is often considerable curiosity in whether the sampling distribution can be approximated by an asymptotic distribution, which matches up to the restrictive case either as the number of random samples of limited size, taken from an unlimited population and used to generate the distribution, tends to infinity, or when just one equally-infinite-size *sample* is taken of that same population.

SAMPLING ERROR

In statistics, sampling error consigns to the amount of inaccuracy that is estimated to exist within a sample population of the attribute being measured. More simply put, since psychological and social science experiments employ samples of people or animals during experiments (since we clearly cannot use the whole human population), it is conventional that a sample population does not totally reproduce the exact actuality of the population as a whole. Therefore, a sampling error is calculated to reveal how true the results of a study basically are.

STANDARD ERROR

A standard error is the standard deviation of the sampling distribution of a statistic. Standard error is a statistical name that measures the correctness with which a sample represents a population. In statistics, a sample mean deviates from the real mean of a population, this deviation is the standard error.

Breaking Down Standard Error

The term *standard error* is used to denote to the standard deviation of a variety of sample statistics such as the mean or median. For example, the standard error of the mean refers to the standard deviation of the distribution of sample means taken from a population. The smaller the standard error the more representative the sample will be of the whole population.

The standard error is also contrariwise proportional to the sample size; the larger the sample size, the smaller the standard error because the statistic will advance the real value.

The standard error is considered part of descriptive statistics. It represents the standard deviation of the mean within a dataset. This provides as a measure of variation for random variables, providing a measurement for the spread. The smaller the spread, the more true the dataset is said to be.

Standard Error and Population Sampling

When a population is sampled, the mean, or average, is generally calculated. The standard error may include the difference between the calculated mean of the population and the actual mean of the population. This helps reimburse for any minor inaccuracies related the gathering of the data from the sample. In cases where multiple samples are collected, the mean of each sample may vary a little from the others, creating a stretch among the variables. This stretch is most often measured as the standard error, accounting for the differences between the means across the datasets. The more data points involved in the calculations of the mean, the smaller the standard error tends to be. When the standard error is small, the data is said to be more representative of the true mean. In cases where the standard error is big, the data may have some noteworthy abnormalities.

Standard Deviation and Standard Error

The standard deviation is a depiction of the spread of each of the data points. The standard deviation is used to help determine authenticity of the data based the number of data points displayed within each level of standard deviation. Standard error functions more as a way to determine the correctness of the sample or the exactness of multiple samples by analyzing deviation within the means.

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