

## Session Five: Sampling a Population

### Sampling...

- **The process of selecting a number of individuals for a study in such a way that the individuals represent the larger group from which they were selected**

**Sample...**

**...the representatives selected for a study whose characteristics exemplify the larger group from which they were selected**

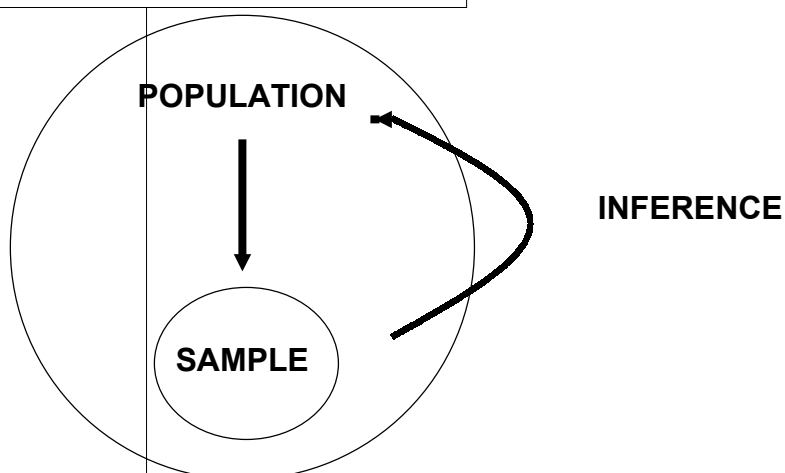
**Population...**

**...the larger group from which individuals are selected to participate in a study**

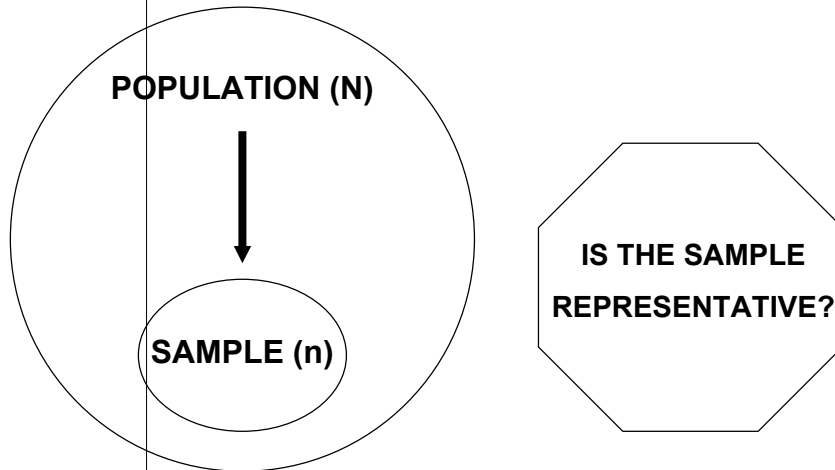
## The purpose for sampling...

- **To gather data about the population in order to make an inference that can be generalized to the population**

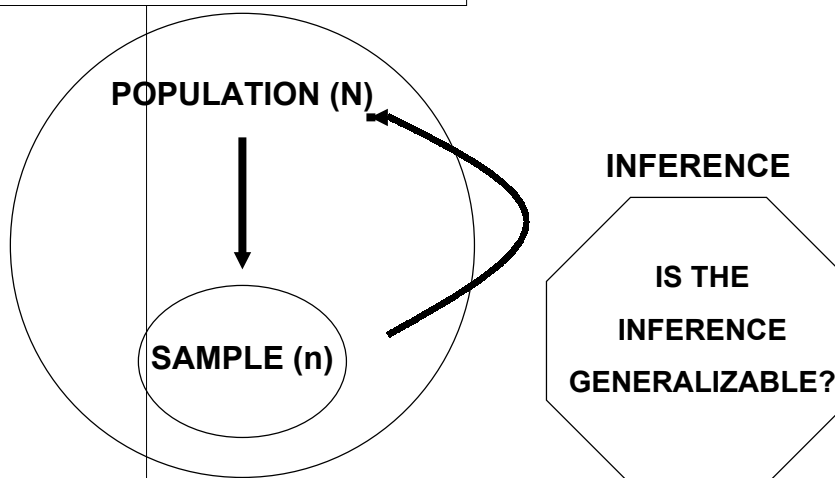
## The sampling process...



## Regarding the sample...



## Regarding the inference...



## Mistakes to be conscious of...

**1. Sampling error**

**2. Sampling bias**

**...which threaten to render a study's findings invalid**

## **Sampling error...**

**...the chance and random variation in variables that occurs when any sample is selected from the population**

**...sampling error is to be expected**

**...to avoid sampling error, a *census* of the entire population must be taken**

**...to control for sampling error, researchers use various sampling methods**

**Sampling bias...**

**...nonrandom differences, generally the fault of the researcher, which cause the sample is over-represent individuals or groups within the population and which lead to invalid findings**

**...sources of sampling bias include the use of volunteers and available groups**

## Steps in sampling...

- 1. Define population (N) to be sampled**
- 2. Determine sample size (n)**
- 3. Control for bias and error**
- 4. Select sample**

## 1. Define population to be sampled...

- **Identify the group of interest and its characteristics to which the findings of the study will be generalized**
  - ...called the “target” population (the ideal selection)
  - ...oftentimes the “accessible” or “available” population must be used (the realistic selection)

## 2. Determine the sample size...

- **The size of the sample influences both the representativeness of the sample and the statistical analysis of the data**
  - ...larger samples are more likely to detect a difference between different groups
  - ...smaller samples are more likely not to be representative

## Rules of thumb for determining the sample size...

- 1. The larger the population size, the smaller the percentage of the population required to get a representative sample**
- 2. For smaller samples ( $N < 100$ ), there is little point in sampling. Survey the entire population.**



- 3. If the population size is around 500 (give or take 100), 50% should be sampled.**
- 4. If the population size is around 1500, 20% should be sampled.**
- 5. Beyond a certain point (N = 5000), the population size is almost irrelevant and a sample size of 400 may be adequate.**

### **3. Control for sampling bias and error...**

- Be aware of the sources of sampling bias and identify how to avoid it**
- Decide whether the bias is so severe that the results of the study will be seriously affected**
- In the final report, document awareness of bias, rationale for proceeding, and potential effects**

#### 4. Select the sample...

- **A process by which the researcher attempts to ensure that the sample is representative of the population from which it is to be selected ...requires identifying the sampling method that will be used**

#### Approaches to quantitative sampling...

- 1. Random: allows a procedure governed by chance to select the sample; controls for sampling bias**
- 2. Nonrandom (“nonprobability”): does not have random sampling at any state of the sample selection; increases probability of sampling bias**

## Random sampling methods...

- 1. Simple random sampling**
- 2. Stratified sampling**
- 3. Cluster sampling**
- 4. Systematic sampling**

- 1. Simple random sampling: the process of selecting a sample that allows individual in the defined population to have an equal and independent chance of being selected for the sample**

## Steps in random sampling...

- 1. Identify and define the population.**
- 2. Determine the desired sample size.**
- 3. List all members of the population.**
- 4. Assign all individuals on the list a consecutive number from zero to the required number. Each individual must have the same number of digits as each other individual.**

- 5. Select an arbitrary number in the table of random numbers.**
- 6. For the selected number, look only at the number of digits assigned to each population member.**

- 7. If the number corresponds to the number assigned to any of the individuals in the population, then that individual is included in the sample.**
- 8. Go to the next number in the column and repeat step #7 until the desired number of individuals has been selected for the sample.**

***advantages...***  
**...easy to conduct**  
**...strategy requires minimum knowledge of the population to be sampled**

***disadvantages...***

**...need names of all population members**

**...may over- represent or under- estimate  
sample members**

**...there is difficulty in reaching all selected  
in the sample**

**2. Stratified sampling: the process of  
selecting a sample that allows  
identified subgroups in the defined  
population to be represented in the  
same proportion that they exist in the  
population**

## Steps in stratified sampling...

- 1. Identify and define the population.**
- 2. Determine the desired sample size.**
- 3. Identify the variable and subgroups (strata) for which you want to guarantee appropriate, equal representation.**

- 4. Classify all members of the population as members of one identified subgroup.**
- 5. Randomly select, using a table of random numbers) an “*appropriate*” number of individuals from each of the subgroups, appropriate meaning *an equal number of individuals***

***advantages...***

**...more precise sample**

**...can be used for both proportions and stratification sampling**

**...sample represents the desired strata**

***disadvantages...***

**...need names of all population members**

**...there is difficulty in reaching all selected in the sample**

**...researcher must have names of all populations**



**3. Cluster sampling: the process of randomly selecting intact groups, not individuals, within the defined population sharing similar characteristics**

### Steps in cluster sampling...

- 1. Identify and define the population.**
- 2. Determine the desired sample size.**
- 3. Identify and define a logical cluster.**
- 4. List all clusters (or obtain a list) that make up the population of clusters.**
- 5. Estimate the average number of population members per cluster.**

- 6. Determine the number of clusters needed by dividing the sample size by the estimated size of a cluster.**
- 7. Randomly select the needed number of clusters by using a table of random numbers.**
- 8. Include in your study all population members in each selected cluster.**

***advantages...***  
**...efficient**  
**...researcher doesn't need names of all population members**  
**...reduces travel to site**  
**...useful for educational research**

***disadvantages...***

**...fewer sampling points make it less like that the sample is representative**

**4. Systematic sampling: the process of selecting individuals within the defined population from a list by taking every *K*th name.**

## Steps in systematic sampling...

- 1. Identify and define the population.**
- 2. Determine the desired sample size.**
- 3. Obtain a list of the population.**
- 4. Determine what  $K$  is equal to by dividing the size of the population by the desired sample size.**

- 5. Start at some random place in the population list. Close your eyes and point your finger to a name.**
- 6. Starting at that point, take every  $K$ th name on the list until the desired sample size is reached.**
- 7. If the end of the list is reached before the desired sample is reached, go back to the top of the list.**

***advantages...***  
**...sample selection is simple**

***disadvantages...***  
**...all members of the population do not  
have an equal chance of being selected**  
**...the  $K$ th person may be related to a  
periodical order in the population list,  
producing unrepresentativeness in the  
sample**

## Nonrandom sampling methods...

- 1. Convenience sampling**
- 2. Purposive sampling**
- 3. Quota sampling**

- 1. Convenience sampling: the process of including whoever happens to be available at the time  
...called “accidental” or “haphazard” sampling**

***disadvantages...***

**...difficulty in determining how much of the effect (dependent variable) results from the cause (independent variable)**

**2. Purposive sampling: the process whereby the researcher selects a sample based on experience or knowledge of the group to be sampled ...called "judgment" sampling**

***disadvantages...***

**...potential for inaccuracy in the researcher's criteria and resulting sample selections**

**3. Quota sampling: the process whereby a researcher gathers data from individuals possessing identified characteristics and quotas**



***disadvantages...***

**...people who are less accessible (more difficult to contact, more reluctant to participate) are under-represented**

**Approaches to qualitative sampling...**

**...qualitative research is characterized by in-depth inquiry, immersion in a setting, emphasis on context, concern with participants' perspectives, and description of a single setting, not generalization to many settings**

**...because samples need to be small and many potential participants are unwilling to undergo the demands of participation, most qualitative research samples are purposive**

**...representativeness is secondary to the quality of the participants' ability to provide the desired information about self and setting**

- 1. Intensity sampling: selecting participants who permit study of different levels of the research topic**
- 2. Homogeneous sampling: selecting participants who are very similar in experience, perspective, or outlook**

- 3. Criterion sampling: selecting all cases that meet some pre-defined characteristic**
- 4. Snowball sampling: selecting a few individuals who can identify other individuals who can identify still other individuals who might be good participants for a study**

**5. Random purposive sampling: with a small sample, selecting by random means participants who were purposively selected and are too numerous to include all in the study**