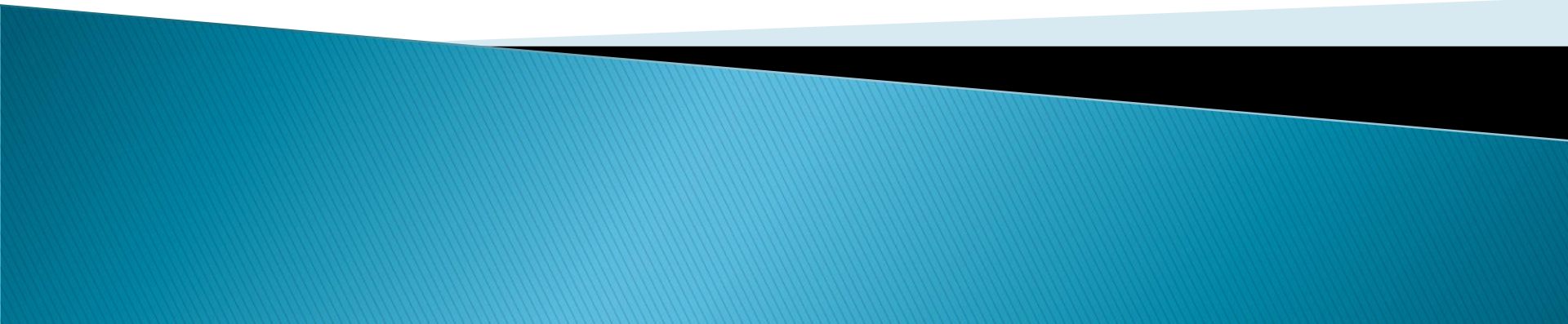
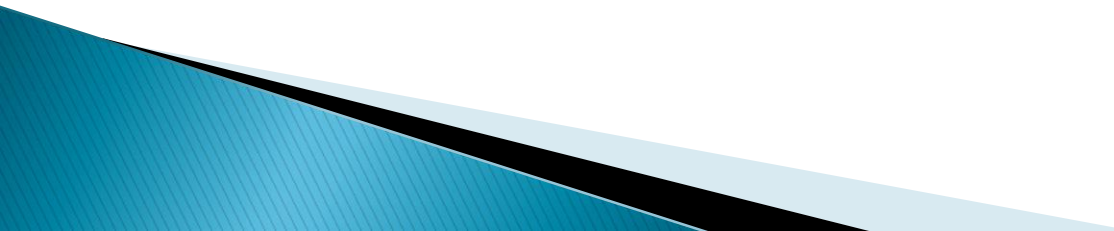


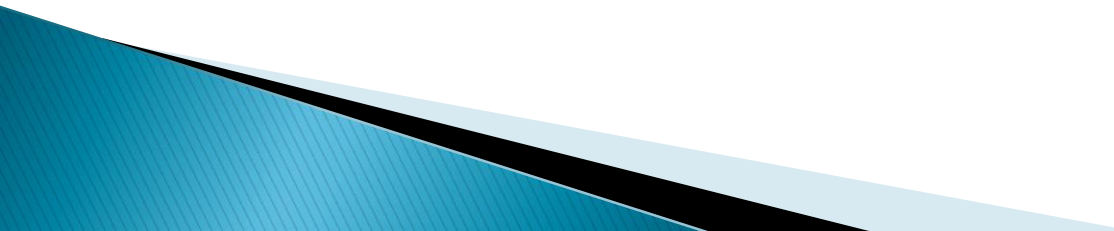
Sampling Methods



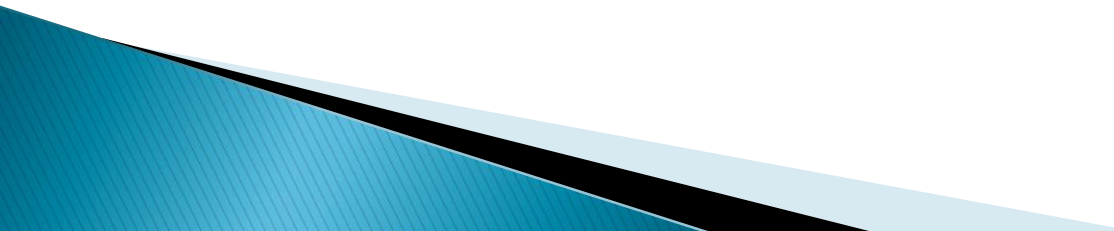
Defining the Target Population

- ▶ It is critical to the success of the research project to clearly define the target population.
 - ▶ Rely on logic and judgment.
 - ▶ The population should be defined in connection with the objectives of the study.
- 

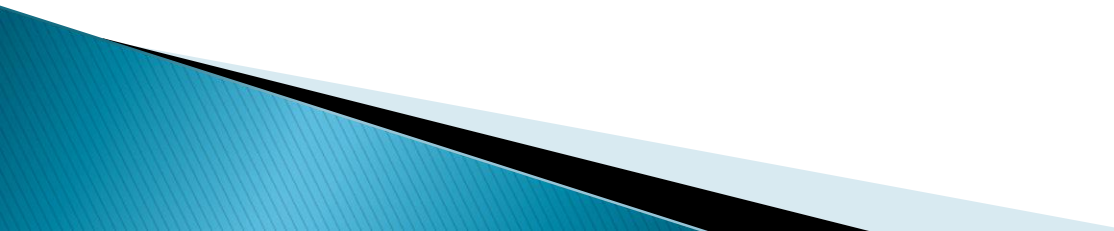
Technical Terminology

- ▶ An element is an object on which a measurement is taken.
 - ▶ A population is a collection of elements about which we wish to make an inference.
 - ▶ Sampling units are nonoverlapping collections of elements from the population that cover the entire population.
- 

Technical Terms

- ▶ A sampling frame is a list of sampling units.
 - ▶ A sample is a collection of sampling units drawn from a sampling frame.
 - ▶ Parameter: numerical characteristic of a population
 - ▶ Statistic: numerical characteristic of a sample
- 

Errors of nonobservation

- ▶ The deviation between an estimate from an ideal sample and the true population value is the sampling error.
 - ▶ Almost always, the sampling frame does not match up perfectly with the target population, leading to errors of coverage.
- 

Errors of nonobservation

- ▶ Nonresponse is probably the most serious of these errors.
 - Arises in three ways:
 - Inability of the person responding to come up with the answer
 - Refusal to answer
 - Inability to contact the sampled elements

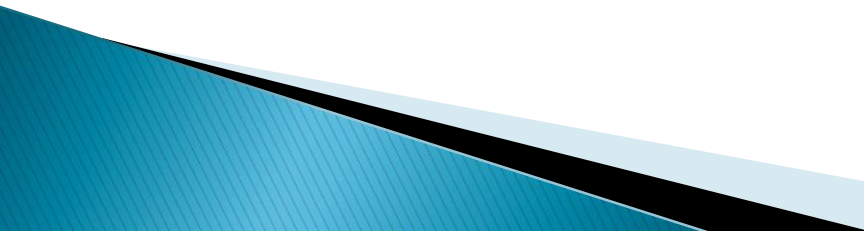
Errors of observation

- ▶ These errors can be classified as due to the interviewer, respondent, instrument, or method of data collection.

Interviewers

- ▶ Interviewers have a direct and dramatic effect on the way a person responds to a question.
 - Most people tend to side with the view apparently favored by the interviewer, especially if they are neutral.
 - Friendly interviewers are more successful.
 - In general, interviewers of the same gender, racial, and ethnic groups as those being interviewed are slightly more successful.

Respondents

- ▶ Respondents differ greatly in motivation to answer correctly and in ability to do so.
 - ▶ Obtaining an honest response to sensitive questions is difficult.
 - ▶ Basic errors
 - Recall bias: simply does not remember
 - Prestige bias: exaggerates to 'look' better
 - Intentional deception: lying
 - Incorrect measurement: does not understand the units or definition
- 

Census Sample

- ▶ A census study occurs if the entire population is very small or it is reasonable to include the entire population (for other reasons).
- ▶ It is called a census sample because data is gathered on every member of the population.



Why sample?

- ▶ The population of interest is usually too large to attempt to survey all of its members.
- ▶ A carefully chosen sample can be used to represent the population.
 - The sample reflects the characteristics of the population from which it is drawn.

Probability versus Nonprobability

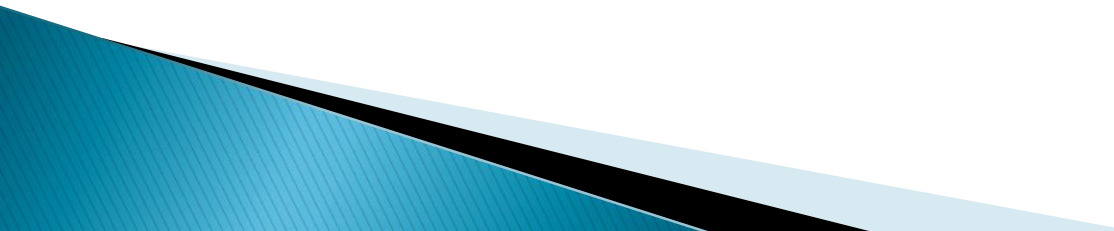
- ▶ **Probability Samples:** each member of the population has a known non-zero probability of being selected
 - Methods include random sampling, systematic sampling, and stratified sampling.
- ▶ **Nonprobability Samples:** members are selected from the population in some nonrandom manner
 - Methods include convenience sampling, judgment sampling, quota sampling, and snowball sampling

Random Sampling

Random sampling is the purest form of probability sampling.

- ▶ Each member of the population has an equal and known chance of being selected.
- ▶ When there are very large populations, it is often 'difficult' to identify every member of the population, so the pool of available subjects becomes biased.
 - You can use software, such as minitab to generate random numbers or to draw directly from the columns

Systematic Sampling

- ▶ **Systematic sampling** is often used instead of random sampling. It is also called an Nth name selection technique.
 - ▶ After the required sample size has been calculated, every Nth record is selected from a list of population members.
 - ▶ As long as the list does not contain any hidden order, this sampling method is as good as the random sampling method.
 - ▶ Its only advantage over the random sampling technique is simplicity (and possibly cost effectiveness).
- 

Stratified Sampling

- ▶ **Stratified sampling** is commonly used probability method that is superior to random sampling because it reduces sampling error.
- ▶ A stratum is a subset of the population that share at least one common characteristic; such as males and females.
 - Identify relevant strata and their actual representation in the population.
 - Random sampling is then used to select a *sufficient* number of subjects from each stratum.
 - Stratified sampling is often used when one or more of the strata in the population have a low incidence relative to the other strata.

Cluster Sampling

- ▶ Cluster Sample: a probability sample in which each sampling unit is a collection of elements.
- ▶ Effective under the following conditions:
 - A good sampling frame is not available or costly, while a frame listing clusters is easily obtained
 - The cost of obtaining observations increases as the distance separating the elements increases
- ▶ Examples of clusters:
 - City blocks – political or geographical
 - Housing units – college students
 - Hospitals – illnesses
 - Automobile – set of four tires

Convenience Sampling

- ▶ **Convenience sampling** is used in exploratory research where the researcher is interested in getting an inexpensive approximation.
- ▶ The sample is selected because they are convenient.
- ▶ It is a nonprobability method.
 - Often used during preliminary research efforts to get an estimate without incurring the cost or time required to select a random sample

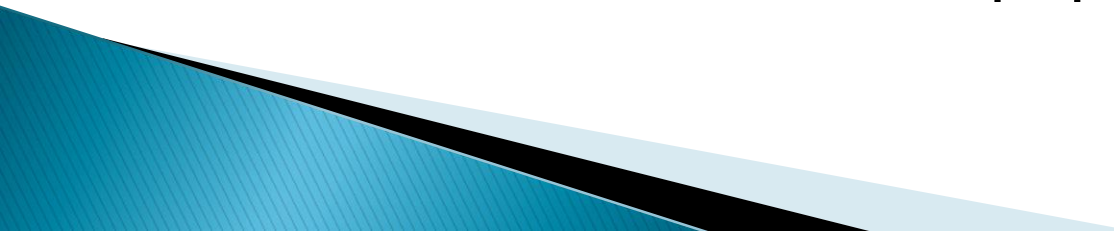
Judgment Sampling

- ▶ Judgment sampling is a common nonprobability method.
- ▶ The sample is selected based upon judgment.
 - an extension of convenience sampling
- ▶ When using this method, the researcher must be confident that the chosen sample is truly representative of the entire population.

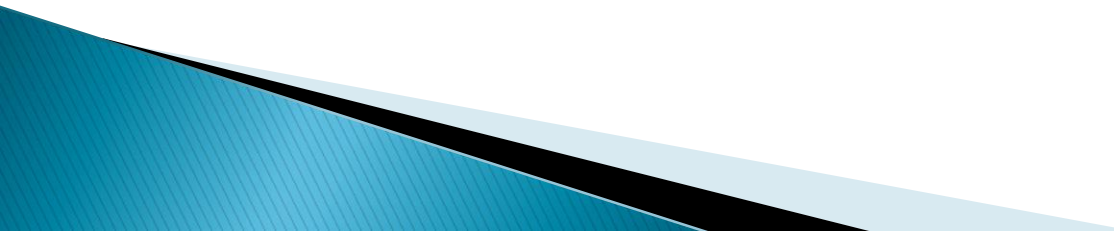
Quota Sampling

- ▶ **Quota sampling** is the nonprobability equivalent of stratified sampling.
 - First identify the strata and their proportions as they are represented in the population
 - Then convenience or judgment sampling is used to select the required number of subjects from each stratum.

Snowball Sampling

- ▶ **Snowball sampling** is a special nonprobability method used when the desired sample characteristic is rare.
 - ▶ It may be extremely difficult or cost prohibitive to locate respondents in these situations.
 - ▶ This technique relies on referrals from initial subjects to generate additional subjects.
 - ▶ It lowers search costs; however, it introduces bias because the technique itself reduces the likelihood that the sample will represent a good cross section from the population.
- 

Sample Size?

- ▶ The more heterogeneous a population is, the larger the sample needs to be.
 - ▶ Depends on topic – frequently it occurs?
 - ▶ For probability sampling, the larger the sample size, the better.
 - ▶ With nonprobability samples, not generalizable regardless – still consider stability of results
- 

Response Rates

- ▶ About 20 – 30% usually return a questionnaire
 - ▶ Follow up techniques could bring it up to about 50%
 - ▶ Still, response rates under 60 – 70% challenge the integrity of the random sample
 - ▶ How the survey is distributed can affect the quality of sampling
- 