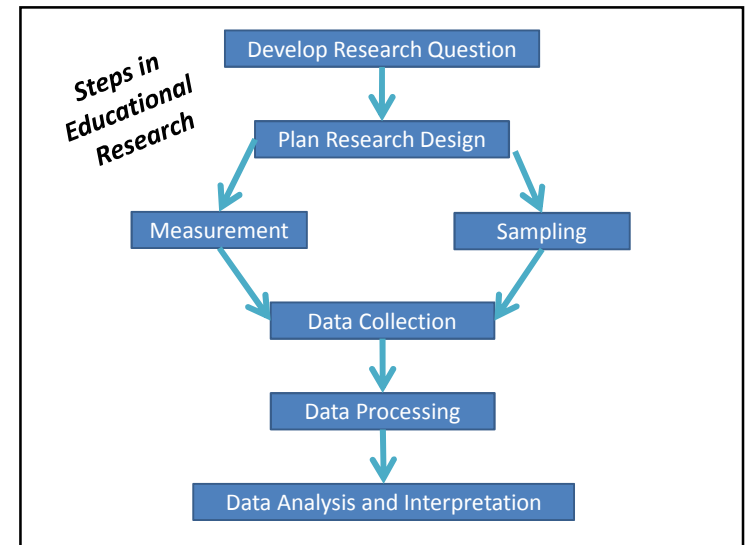


Research Tools

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Overview

- **Research Design:** Overall plan in a scientific study
 - Provides the structure on how the major parts of the research study (Participants, Instruments, Procedures, Data Analysis) work together to address the research question
 - Guides how the Research Question/Hypothesis should be written

Survey Design

- **Survey Design:** Quantitative research that identifies trends in attitudes, opinions, behaviors, or characteristics of a large group of people
- **Key Characteristics of Survey Designs**
 - Large number of respondents chosen through probability sampling to represent the population of interest
 - Systematic questionnaires or interviews used to gather information from respondents
 - Answers on the questionnaire/interview are numerically coded and analysed

Descriptive Design

- **Descriptive design:** Describe the current state of specific variables of interest
- Key Characteristics of Descriptive Design
 - Includes one group of participants
 - Variables are precisely assessed and reported
 - Data is analysed according to Research Questions using descriptive statistics

Research Questions for Survey or Descriptive Designs

- Include only one variable.
 - What is the rate of examination malpractice amongst university students?
 - What is the rate of class attendance by children living in IDP Camps (Internally Displaced Persons)?
 - What is the level of job satisfaction of teachers?
 - What is the level of motivation among students?
- *Note that the format of Research Questions vs. Hypotheses is not standardized throughout the field of Education. The advice here about Research Questions vs. Research Hypotheses is one perspective only, and applies only to completing a project at UniJos.*

Correlational Design

- **Correlational Design:** Quantitative research that measures the degree of relationship between two or more variables using the correlation statistic
- Key Characteristics of Correlational Design:
 - Includes only one group of participants
 - Two (or more) variables of interest are precisely measured
 - Generally, both variables are continuous variables
 - Two (or more) scores are obtained for each participant in the study
 - Correlation statistic is used

Research Hypotheses in Correlational Designs

- There is no significant relationship between VARIABLE 1 and VARIABLE 2.
 - There is no significant relationship between academic achievement and intrinsic motivation.
 - There is no significant relationship between number of traumatic events experienced and the degree of PTSD avoidance symptoms.
 - There is no significant relationship between salary and job satisfaction.
 - There is no significant relationship between intelligence and academic performance.
- *Note that writing research hypotheses is NOT a creative writing exercise. Use this format exactly.*

Correlation, NOT Causation

- A significant relationship means there is a **relationship between the variables only**.
- Correlation does **NOT** mean that one variable causes another variable
 - Issue of directionality: which variable caused which variable?
 - Issue of a potential third variable in the causal chain
- Correlational designs generally do not have independent and dependent variables

Causal Comparative Design

- **Causal Comparative Design:** Examine effect of one variable that cannot be manipulated on other variables
 - Also called *ex post facto* design (“after the fact” in Latin)
- Key Characteristic of a Causal Comparative Design
 - Compare two or more groups (independent variable) on one or more dependent variable(s).

Research Hypotheses in Causal Comparative Designs

- There is no significant difference between GROUP 1 and GROUP 2 on DEPENDENT VARIABLE
 - There is no significant difference between males and females on the frequency of engaging in academic malpractice.
 - There is no significant difference between private and government university lecturers in amount of time spent giving lecture.
 - There is no significant difference between Chelsea and Manchester fans in their degree of loyalty to the team.
- There is no significant effect of INDEPENDENT VARIABLE ON DEPENDENT VARIABLE.
 - There is no significant effect of socio-economic status on class attendance.
 - Socio-economic status was divided into three groups: low, medium, and high.

Experimental Design

- **Experimental Design:** Determine if one variable causes another variable
- Key Characteristics of an Experimental Design
 - Independent Variable (IV) is manipulated by the researcher
 - Presence of a **Treatment Group**
 - A **Control Group** is treated *exactly like* the treatment group except they do not receive the treatment
 - Measurement of the Dependent Variable (DV) after the manipulation of the Independent Variable
 - Participants are randomly assigned to the treatment and control groups
 - Designs without random assignment are called **quasi-experimental designs**

Research Process

- After developing the research questions/hypotheses and selecting the research design, the next step is to identify:
 - WHO will participate in the study (Sample)
 - HOW you will collect data (Measurement)
- **Sampling:** Who will participate in the study?
- **Measurement:** How will data be collected to get an accurate understanding of the key variables?

Steps in Sampling

1. Identify the Unit of Analysis
2. Identify the Target Population
3. Select a Sampling Technique
4. Implement the Sampling Technique following the key principles

Sampling

- **Unit of analysis:** Entity under study, or who is being described or analyzed.
 - May include: individual people (e.g., pupils), groups of people (e.g., schools), organizations (e.g., denomination), etc.

Identify the Unit of Analysis

1. Determine the frequency that university students engage in examination malpractice.
2. Identify differences between teachers with and without educational training in their teaching methods.
3. Identify the number of schools that have a trained guidance counselor.
4. Determine the teaching methods used to teach literacy in government schools.
5. Examine the effect of a trauma healing workshop on depression amongst children affected by crisis.
6. The effect of training on discipline on *zaman mata* members' child discipline practices

Population

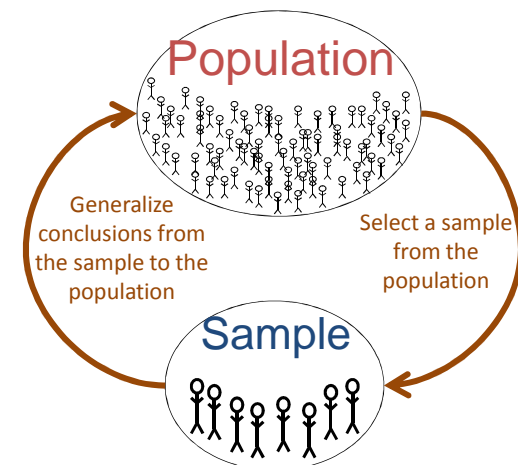
- **Target population:** Group of people that the researcher wants to draw a conclusion about once the research study is finished.
 - Typically more specific than the Unit of Analysis
- Identifying the target population requires stating the criteria that determines who is included and who is not included for participation in the study
 - Geographical region
 - Occupation
 - Qualifications

Population

- Collecting information from every entity in the target population has the following problems:
 - Cost millions of naira to print and distribute questionnaires.
 - Difficulty finding every entity.
 - Unqualified research assistants would be used, reducing the quality of data received.
 - Take years to distribute and collect the questionnaires.

Sampling

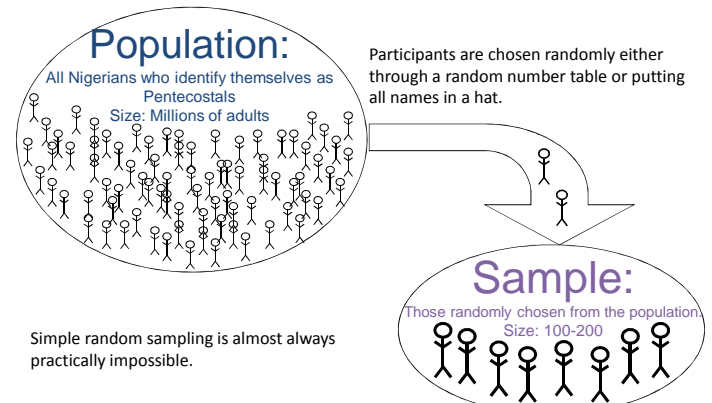
- Scholars have developed procedures to identify a sample that is **representative** of the population
 - **Representative Sample:** The sample closely resembles the target population on relevant characteristics
- Theory of sampling:
 - Want to gather information about a whole group of people (Target population).
 - Can only observe a part of the population (Sample)
 - Findings from the sample are **generalized**, or extended, back to the population.
- Key question in sampling is: *How representative is the sample of the target population?*



Sampling Techniques

- **Simple Random Sampling:** All individuals in the target population have an equal chance of being part of the sample.
- Steps:
 1. Obtain a complete list of the population
 2. Randomly select those cases for the sample

Simple Random Sampling Example

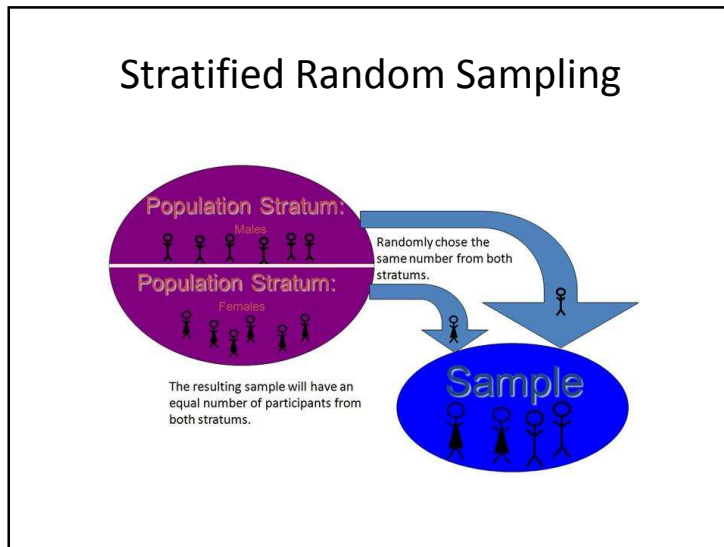


“Random”

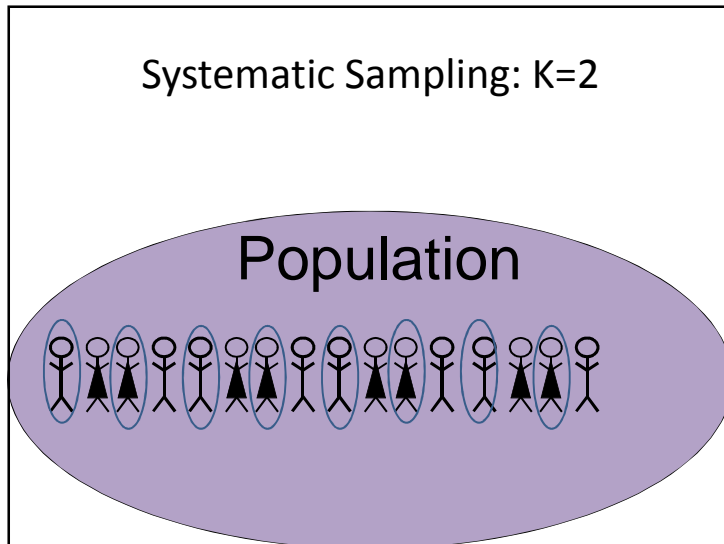
- **Random:** Technical term that means that every case has an equal and independent chance of being selected
 - **Random Selection:** EVERY individual in the target population has an equal and independent chance of being selected to be in the sample
- “RANDOM” *cannot be used haphazardly, but can only be used to describe specific procedures that ensure that every case had an equal and independent chance of being selected.*

Sampling Techniques

- **Stratified random sampling:** Divide the population into groups based on a relevant characteristic and then selects participants within those groups.
 - The purpose is to ensure that subgroups are adequately represented in the sample.



- ### Sampling Techniques
- **Systematic Sampling:** Selecting every K^{th} case from a complete list of the population
 - **Steps in Systematic Sampling:**
 1. Obtain a complete list of the population
 2. Identify K
 - Possibly divide the size of the population by the desired sample size
 3. Include every K^{th} person on the population list

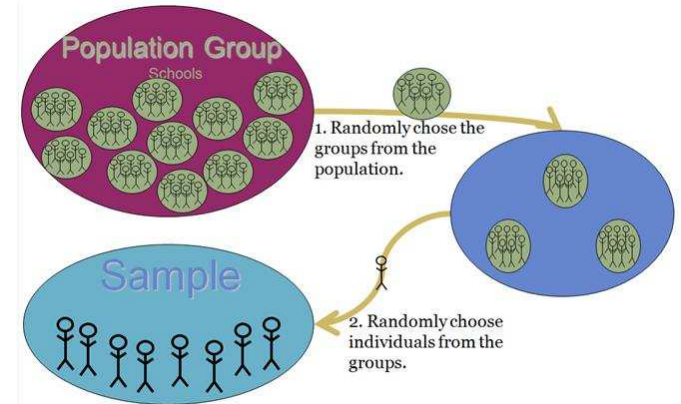


- ### Sampling Techniques
- **Multi-Stage Sampling:** Sample is selected in multiple steps, or stages.
 - If the unit of analysis is not selected in the first step, then the sampling procedure is multi-stage sampling.
 - Various sampling techniques may be used at the different stages
 - An alternate name for multi-stage sampling is *Cluster Sampling*

Multi-Stage Sampling

- Steps in Multi-Stage Sampling:
 1. Organize the sampling process into stages where the unit of analysis is systematically grouped.
 2. Select a sampling technique for each stage
 3. Systematically apply the sampling technique to each stage until the unit of analysis has been selected

Multi-Stage Sampling



Sampling Techniques

- **Purposive Sampling:** Researcher uses their expert judgment to select participants that they judge are representative of the population.
- Steps in Purposive Sampling
 1. Consider factors that might influence the outcomes of the study
 2. Purposefully select a sample that adequately represents the target population on these variables

Sampling Techniques

- **Convenience Sampling:** Select a requisite number of cases that are conveniently available

Sampling Conclusion

- *How representative is the sample of the target population?*
 - The researcher has to demonstrate in their report that their sample, regardless of how it was chosen, represents the target population.
 - Simple random sampling, stratified sampling, systematic sampling, or multi-stage sampling typically answers this question the best.
 - However, as long as the researcher makes a convincing argument that the sample adequately represents the target population, the researcher can use any available sampling procedure.

Measurement

- **Measurement:** Assigning numbers or labels to the units of analysis that accurately represent their position on the variables under study

Importance of Good Measurement

- The conclusions in a study are only as good as the data that is collected.
- The data that is collected is only as good as the instrument that collects the data.
- A poorly designed instrument will lead to bad data, which will lead to bad conclusions.
- **Therefore, developing a good instrument is a key part of conducting a high quality research study.**

Measurement

- **Developing a good instrument is the most important part of conducting a high quality research study.**
- **Developing an instrument takes a lot of work and advanced preparation.**

Steps in Measurement

- Step 1: Identify other research studies that study the key variable.
- This will help you:
 - Develop a good understanding of your key variables.
 - Provide ideas on how each variable should be measured.

Steps in Measurement

- Step 2: Develop a Construct Definition of your key variables
 - **Construct definition:** Theoretical definition
 - Developed by referencing other research studies that have studied the same concept.
- Once the construct definition has been developed, the researcher must translate that theoretical definition into a concrete way of measuring the variable.

Steps in Measurement

- Step 3: Operationalize the Construct Definition
 - **Operational definition:** A statement of specifically how the construct will be measured in the study.
 - The operational definition must directly relate to the construct definition.
 - When developing the operational definition, consider practical limitations
 - How can these limitations be overcome?
 - This requires perseverance and creativity on behalf of the researcher.

Steps in Measurement

- Step 4: Develop or Choose an Instrument

Measurement

Variable Name (From Research Questions/ Hypotheses)	Construct Definition	Operational Definition	Items/ Instrument to Measure

Types of Instruments

- **Self-Report:** Participants are asked to report on their own demographic characteristics (biodata), attitudes, beliefs, knowledge, feelings, and behavior.
 - Self-report can be either a questionnaire or interview
 - Participants generally **cannot** report on the attitudes, beliefs, knowledge, and feelings of **others**.

Types of Instruments

- **Questionnaire:** Paper-pencil responses
- **Interviews:** Face-to-face conversations
- **Focus Group:** Unstructured discussions among a small group of participants
 - Each person shares their experiences and perspectives while brainstorming off the ideas of others

Types of Instruments

- **Observation:** Researchers observe the behavior of others or specific situations
- **Archival Records:** Existing information such as church bulletins, written sermons, etc.
- **Examinations:** Best when interested in participants' knowledge of a topic