Chapter Four
Overview of Research Designs

Research Design

- The design decision should be oriented in answering the following question.
  - What is the study about?
  - Why is the study being made?
  - Where will be the study being carried out? Here a researcher is expected to ***define place and the research target population***
  - What types of data are required?
  - Where can the required data be found and what techniques of data collection will be used?
  - What period of time will the study include?
  - What will be the sample design?
  - How will be the data analyzed?
  - In what style will the report be prepared?

- Why we need to have a research design?
  - It facilitates the smooth sailing of the research operation
  - It makes research project as efficient as possible and help to yield maximum information with minimum expenditure, time and effort.
  - It helps the researcher to organize ideas in a form where by it will be possible to look for flaws and inadequacies
  - Design will be given to others for their comment and critical evaluation.
  - In absence of research design, it will be difficult for the critics to provide comprehensive review of the proposed study.

- Important concepts relevant to research design:
  - **Dependent variable**: It is a variable depends upon or a consequence of the other variable(s).
  - ***It is a variable that is to be predicted or explained***.
  - **Independent variable:** is a variable that is expected to influence the dependent variable.
  - **Extraneous variable:** is an independent variables that are not related to the purpose of a study, but may affect the dependent variable.

- **Control:** A good research design has to minimize the influences of extraneous variable. To do so the researcher uses control as a remedy to minimize the effects of extraneous variable.
- **Confounded relationship**: When dependent variable is ***not free from the influence of extraneous variable***, then the relationship between dependent and independent variables is said to be confounded relationship.

- **Experimental and control groups**: In experimental research when a group is exposed to **usual condition** is called **control group**, but when a group is exposed to ***special condition*** is an ***experimental group***.
- **Treatments:** is different condition under which experimental and controlled groups are put.
- **Experiment:** is the process of examining the truth of a statistical hypothesis, relating to some problem.

Types of Research Designs

- Researchers choose among different types of possible research designs depending on such dimensions as;
  - purpose of the research,
  - method of data collection,
  - control of variables,
  - the time dimension,
  - the research environment,
  - depth of the research, etc
- **Purpose of the research,**
  - Research has purpose of exploration, description or explanation or a combination of them.
  - Therefore, based on the "**purpose of research**" dimension, there are at least three classes of research designs: exploratory, descriptive and explanatory.

- **Method of data collection** :
  - Based on the level of involvement of the data collector- participant observation, unstructured interview, focus group discussion, non-participant observation, and mail questionnaire/or survey.
  - Hence, method of data collection generally ranges between observation and survey.
- **Control of variables:**
  - Between experimental and ex post designs.
  - Research design that plans to use past data, instead of experimental data, is known as ex post design.

- **The time dimension:**
  - As- cross-sectional and longitudinal designs.
- **Research environment:**
  - Field- real data and simulation- artificial data.
- **Depth of research:**
  - Qualitative and Quantitative designs

- Research projects that emphasize on depth of analysis are usually aimed at particularization- **qualitative**.
- Whereas, research projects that emphasize on breadth of analysis are usually aimed at generalization- **quantitative**.

- # Sources of Information
  - Any research is based on various types of information.
  - The more valid is the sources of information, the more reliable will be the information received, which in turn, will lead to correct and reliable conclusion.
- # Information Vs Data:
  - The **data** are simply facts or recorded measures of certain phenomena;
  - **Information** refers to a body of facts in a format suitable for decision making or in a context that defines relationships between pieces of data.

- **According to W.A. Bagley**, the sources of **information in the field of social sciences** may be classified into:
  - **Primary sources**: Include the actual information received from individuals directly concerning the problem of the study. It also includes observed social phenomenon and facts that may be discovered.
  - **Secondary sources of information**: These include all types of published and unpublished, public or private documents and other such types of information.

- **Primary sources:**
  - The information obtained from primary sources is often called as primary data.
  - **Primary data:** Are those information **gathered by researcher him/herself** and are **gathered for the first time**, thus happening to be original.
  - The sources of such information are individuals and the incidence around them.

- **Secondary Sources:**
  - Secondary data are those, which **have already been collected by someone/for other purpose** and which, **have already been passed through statistical process.**
  - The sources of secondary data are:
    - Personal documents such as diaries, letters, photographs and so on.
    - Public documents such as reports of survey by private and public institution: variety of information published in newspapers and magazines.

Methods of Primary Data Collection

- **Commonly used methods** of collecting **primary data** in survey and descriptive research are as follows:
  - Observation method
  - Interview:
    - (Personal: Structured & unstructured and Telephone)
  - Questionnaires:
    - (Self–administered & Schedule Interview questionnaires)
  - Focus group discussion (FGD)

1. Observation method: accurate watching and noting of phenomena as they occur in nature with regard to cause and effect or mutual relations"

- **Advantages of observation method:**
  - Observation is the only satisfactory way of studying varied aspects of human behavior.
  - Communication gap created by language could be overcome by this method.
  - The information required is collected directly.
  - Moser and Kalton viewed that observation can predict the future behavior of individual by means of watching their present behavior.
- **Disadvantages of observation method:**
  - Events about the past can**not** be collected by observation. If people say nothing about the past we have to depend purely on their memory.
  - It is expensive method.
  - Some people or phenomenon is rarely accessible to direct observation.

Types of observation method:

- The following are the different types of observation methods:
  - Participant Vs non-participant observation
  - Structured Vs Unstructured observation
- **Participant observation**: (overt observation)
  - Under this method the researcher him/herself participates on the occasion and observes the behavior.
  - The aim is to provide the means of obtaining a detailed understanding of values, motives and practices of those

- **Non-participant observation**: **(covert observation)**
  - Under this method the researcher keeps distant, keeps away from the occasion or observed and watches the happenings.
  - The purpose of non-participant observation is to observe and record what people do in terms of their actions and their behavior without the researcher being involved.

- **Structured observation**:
  - It is structured and preplanned observation technique.
  - This observation is characterized by a careful definition of units, the style of recording the observed information; standardize conditions of observation and the selection of pertinent observation.
  - This observation is appropriate in **descriptive research**.
- **Unstructured observation:**
  - The observation takes place without the characteristics mentioned above, i.e. without standardized format and plan.
  - There is no specification of subject of observation, behavior to be observed and no standard format for recording the observed information.
  - This observation is very much flexible and commonly used in exploratory research.

2. Interview Method:

- In an interview, the researcher meets people and discusses his/her social, economic or some other problem with them.

- The **objectives of interview** are:
  - The exchange of ideas and experiences
  - To elicit information
- **Basic principles of interviewing:**
  - Ask only one question at a time.
  - Repeat the question if necessary.
  - Listen carefully to the subject matter.
  - Observe the subjects facial expression, gesture and tone of the voice.
  - Allow the subject sufficient time to answer the question.

(i). **Personal Interview:**

- are direct communications where interviewers in face to face situations ask respondents questions.

- The personal interview can be of **two types:**
- **Structured Interview:**
  - Personal interview method of data collection is usually carried out in a structured and pre-planned way.
  - It involves the use of a set of predetermined question and has highly standardized technique of recording.
  - It is not possible for interviewer to change even the sequences of the questions.
  - The recording formats are also standardized.

- **Unstructured Interview:**
  - is characterized by a flexibility of questions to questioning.
  - does not follow a system of pre-determined question and standardized techniques of recording information.
  - The researcher is allowed much greater freedom to ask supplementary questions if it is needed
  - Unstructured interview is much ***more difficult and time consuming*** than that of the structured one
  - It also ***demands deep knowledge and greater skill*** on the part of interviewer
  - This approach is **used in exploratory research** and provide a safe basis for generalization.

(ii) Telephone Interview:

- Telephone interviewing is now the primary method of survey research
- A study comparing telephone interviews with personal interviews concluded that respondents are willing to provide ***detailed and reliable information on a variety of personal topics over the telephone***;

3. Questionnaires:

- A questionnaire is a tool to collect data from ***diverse, large and widely scattered social groups***

Types of Questionnaires

- ***Scheduled or structured Interview questionnaire*** : the interviewer will be there to ask the questions
- ***Self administered questionnaires***/mailed- filled by the respondent him/her self

Considerations in Formulating Questions

- Always use simple language
- Do not use ambiguous questions
- Do not ask double barreled questions- a double barreled question is two questions within a question.
  - The main problem with such kind of question is one does not know which particular question a respondent has answered.
  - E.g. Does your department have a special recruitment policy for racial minorities and women?

- **Do not ask leading questions**
  - E. g. Unemployment is increasing, isn't it?
  - Smoking is bad, isn't it?
- **Do not ask questions based on presumptions/guess**

  E.g. How many breads do you eat in a day?
  - How many hours do you spent watching movies?
  - How many cigarettes do you smoke in a day?

Focus Group Discussion (FGD)

- FGD is a group discussion of approximately ***6-12 people guided by a facilitator and discuss an issue among themselves in detail***:
  - ✓ **Group size** : 6-12
  - ✓ **Group composition**: Homogenous,
  - ✓ **Physical setting**: Relaxed, informal setting
  - ✓ **Time duration:** 1 – 1:30 hours
  - ✓ **Recording:** Use of audio and video cassettes
  - ✓ **Moderator:** good communication skills, use interview guide for facilitation
  - ✓ **Note taker**: records all the verbal and non-verbal message.

Methods of Secondary Data collection

- Secondary data are data gathered and recorded by someone else prior to (and for purposes other than) the current needs of the researcher.
- Secondary data are usually historical, already assembled and do not require access to respondents or subjects.
- Secondary data are data which already exist.
- The **method of data collection for the secondary data is document analysis.**

CHAPTER SIX
SAMPLE DESIGN AND PROCEDURE

❖ Sampling Terminology

- Any research work has conclusion inferred from set of premises; about groups of people, organizations, employees and the like.
- The broad class of people, objects, or events that are targeted by the conclusion is known as population or universe.
- A population or universe has individual members called population element.
- Population has countable population elements such as people whereas a universe has uncountable population elements.
- The study of all individual members of a population is known as census.

- Population can be divided into theoretical and accessible.
- Theoretical population draws the boundary of the scope of conclusion of the research.
  - That is, conclusion of a research is irrelevant for entities beyond the theoretical population's boundary.
- Accessible population (working population) is subset of a population whose members can possibly be accessed by the researcher.
- The enumerated list of all population elements of an accessible population from which sample can be drawn is called sampling frame.

- Sampling unit is a member of a sample selected from a sampling frame.
  - Sampling unit can be either an individual member or a group of members of the sampling frame.
  - If the sampling unit is a group of members of the sampling frame, you can also take sample from the sampling unit itself.
- Random selection is how you draw the sample of people, objects, or events for your study from a population.
- If the sampling units are randomly selected from the sampling frame then the sample-based conclusion of your research can be generalized onto the population, that is, your research has external validity.

- Random assignment refers to categorization of sample units into treatment groups (control and treatment groups) based on certain matching criteria.
- Random assignment is related to internal validity of the research design.
- Sample units are randomly assigned in order to help assure that the treatment groups are similar to each other (i.e. equivalent) prior to the treatment.
- Starting from operational definition of the population until the final selection of the sampling unit you may commit errors.
- Magnitude of these errors can be measured as a difference between results using census and sample.
- These errors are called random sampling error.

Types Of Probability Sampling Designs

- Each member of a population has a known non-zero probability of being chosen.
  - Simple random sampling,
  - stratified random sampling,
  - systematic random sampling,
  - cluster random sampling, and
  - multi-stage sampling are the common types of probability sampling.

- ***Simple Random Sampling***
  - sets a criterion of "equal probability of selecting each *x from N*".
  - most appropriate if the population elements are highly homogenous.
- Methods
  - » Lottery method
  - » Table of random numbers.
- ***Stratified Random Sampling*/Quota Sampling**
  - involves dividing your population into homogeneous subgroups
  - taking a simple random sample from each subgroup.
  - Each of the homogenous sub-group is known as strata.
- Sizes of each stratum is:
  - Proportionate SRS –if equal sampling fraction.
  - Disproportionate – if unequal sampling fractions.
- For each stratum simple random sampling is applied.

- ***Systematic Random Sampling***
  - selecting sampling units using a fixed interval
  - homogeneity
  - useful when too cumbersome elements in the population
  - take care of the sampling interval size
  - analyzes at individual household level
- ***Cluster or Area Random Sampling***
  - homogeneous sub-groups (usually geographic areas)
  - The elements within each cluster are heterogeneous.
  - aims at cost reduction
  - data analysis will be at a cluster level/woreda, i.e. single stage CRS

- ***Multi-Stage Sampling***

- a two or more stage cluster random sampling.
- **Weredas → Kebeles → sub-Kebeles**
- In effect, multi-stage sampling creates clusters within clusters.

Types of non-probability sampling designs

- Do not involve random selection of sampling units.
- Probability sampling is preferred over nonprobability sampling.
- Types of non-probability sampling;
  - convenience, and
  - purposive sampling.

✓ ***Convenience Sampling***

- taking sample simply by asking for volunteers.
- Clearly, the problem is no evidence that they are representative of the population.

✓ ***Purposive Sampling***

- takes sample with a purpose in mind.
- types of purposive sampling :
  - Modal instance sampling, expert sampling, quota sampling, heterogeneity sampling, and snowball sampling.

Sample Size determination

- ✓ **Sample size** and **precision** of the study are **directly related**.
- ✓ Variance or **heterogeneity** of the population: it refers to the *standard deviation of the population* parameter.
- ✓ The larger the sample size the more power sample statistics has to infer about the population parameter.

There are a number of sample size determination methods

- Personal Judgment: the personal judgment and subjective decision of the researcher in some cases can be used as a base to determine the size of the sample.
- Traditional inferences: based on precision taste and confidence level. Estimated variance of the population, the magnitude of acceptable error and the confidence interval.

- $n = \left[\frac{Z\ S}{E} \right]^2$
- Sample size depends on three variables: heterogeneity of the population or population standard deviation (approximated by *S), magnitude of acceptable error (E), and* confidence level (*Z).*
- *Heterogeneity of the population varies from most homogeneous to* most heterogeneous.
- The more heterogeneous the population the higher expected population standard deviation and accordingly the larger sample size is required.

- Budgetary Approach: is another way to determine by the sample size.
  - Under this approach the sample size is determined by the available fund for the proposed study
- ***Example:*** *If cost of surveying of one individual or unit is 30 birr and if the total available fund for survey is say 1800 birr, the sample size then will be determined as,*
- *Sample size (n)=total budget of survey/cost of unit survey, accordingly, the sample size will be 60 units (1800/30= 60 units)*

Chapter seven
Data Processing and Analysis

Data Processing

- Data processing implies editing, coding, classification and tabulation of collected data so that, they are amendable to analysis.
- Steps related to processing and analysis are as follows:
  - (i)Editing,(ii)Coding,(iii)Classification and Tabulation, and (iv)Data Entry
- **Editing:**
  - Is the process of making data ready for coding and transfer to data storage.
  - Its purpose is to ensure completeness, consistency and reliability of data.
  - Editing is the process of checking and adjusting the data for omission, legibility and consistency.

- **Coding:**
  - The process of identifying and classifying each answer with a numerical score, or other symbol.
  - The purpose of coding is that the responses can be put into a limited number of categories or classes.
- **Classification and tabulation:**
  - Data classification implies the processes of arranging data in groups or classes on the basis of common characteristics.
  - Data having common characteristics placed in one class and in this way the entire data get divided into a number of groups or classes.

- **Data analysis** is further transformation of the processed data to look for patterns and relations among data groups.
- Analysis refers to the computation of certain indices or measures along with ***searching for patterns or relationship that exist among the data groups.***
- Analysis particularly in case of survey or experimental data involves estimating the ***values of unknown parameters of the population*** and ***testing of hypothesis*** for drawing inferences.
- Analysis attempts to portray consistent patterns in the data so the results may be studied and interpreted in a brief and meaningful way.

- Analysis can be categorized as
  - i) Descriptive Analysis, and
  - (ii) Inferential Analysis
- Descriptive Analysis
  - Descriptive analysis refers to **transformation** of raw data into a form that will make them **easy** to ***understand*** and ***interpret*.**
- Descriptive statistics are a set of techniques that organize, *summarize* and provide a *general overview of data***.**

The most common forms of describing the processed data are:

- ✓ Tabulation
- ✓ Percentage
- ✓ Measure of central tendency
- ✓ Measure of dispersion

Measurement of central tendency

- ✓ Measure of central tendency is a **sort** of **average** or typical value of the items in the series.
- ✓ Its **function** is to **summarize** the series in terms of this average value.

The most common measures of central tendency are–

(i) Arithmetic mean or mean

(ii) Median and

(iii) Mode

- Mean – the sum of all measurements divided by the number of observations in the data set
- Median: is the number present in the middle when the numbers in a set of data are arranged in ascending or descending order.
  - If the number of numbers in a data set is even, then the median is the mean of the two middle numbers.
- Mode: Mode is the value that occurs most frequently in a set of data.
  - This is the only central tendency measure that can be used with nominal data, which have purely qualitative category assignments.

Measurement of dispersion

- ✓ Dispersion measure how the **value of an item** is **scattered** around the **true value of the average**.
- ✓ It is a measurement of **how far** is the value of the variable from the average value.

Important measures of dispersion are:

- ➢ **Range:** d/c between the max & min value of an observed variable.
- ➢ **Mean deviation**: It is the **average dispersion** of an observation around the mean value.
- ➢ **Standard deviation**: is defined as the **square-root**

Inferential Analysis

- ✓ Inferential analysis involves using **quantitative data** collected from a sample to draw **conclusion or inferences** about a complete population.
- ✓ Seek to determine the **relationship between variables** and **test statistical** significance.

- Two questions should be answered to determine the relationship between variables:

(i) Does there **association** between the two (or more) variables? If yes, of what degree?

✓ This question is answered by the use of **correlation technique**.

(ii) Is there any **cause and effect relationship** between the two variables? If yes, of what degree and in which direction?

✓ This will be answered by **technique of regression**.

Chapter Eight
Interpretation and Reporting the Research Result

Meaning of interpretation

- Interpretation refers to the **task of drawing inferences** from the collected facts after an analytical and/or experimental study.

The task of interpretation has two major aspects

(i) The effort to establish continuity in research through linking the results of a given study with those of another, and

(ii) The establishment of some explanatory concepts.

Thus, interpretation is:

- The device through which the factors that seem to explain what has been observed by researcher in the course of the study can be **better understood**,
- It also **provides a theoretical conception** which can **serve** as a guide for further researches.

Technique of interpretation

- Interpretation is an art that one learns through practice and experience.
- The researcher may, at times, seek the guidance from experts for accomplishing the task of interpretation.

The technique of interpretation often involves the following steps:

i. Researcher must give reasonable explanations of the relations which he has found.

ii. Extraneous information, if collected during the study, must be considered while interpreting the final results of research study, for it may prove to be a key factor in understanding the problem under consideration.

iii. Consult someone having insight into the study.

iv. Researcher must accomplish the task of interpretation only after considering all relevant factors affecting the problem to avoid false generalization.

Layout of the research report

- A comprehensive layout of the research report should comprise;

  (A) preliminary pages;

  (B) the main text; and

  (C) the end matter.

A. Preliminary Pages

- In its preliminary pages the report should carry *a title and date, followed by acknowledgements in* the form of ‘Preface’ or ‘Foreword’.
- Then there should be a *table of contents followed by list of tables and illustrations so that the decision-maker or anybody interested in reading the report can* easily locate the required information in the report.

(B) Main Text

- The main text provides the complete outline of the research report along with all details.
- Each main section of the report should begin on a new page.
- The main text of the report should have the following sections:

(i) Introduction;

(ii) Statement of findings

(iii) The results; and The implications drawn from the results;

(iv) The summary

(v) Recommendations;.

(C) End Matter

- At the end of the report, appendices should be enlisted in respect of all technical data such as questionnaires, sample information, mathematical derivations and the like ones.
- Bibliography of sources consulted should also be given.

Types of reports

- The results of a research investigation can be presented in a number of ways.
    i. A technical report
    ii. A popular report

(A) Technical Report

- In the technical report the main emphasis is on:

  i. The methods employed,

  ii. Assumptions made in the course of the study,

  iii. The detailed presentation of the findings including their limitations and supporting data.

- A general outline of a technical report can be as follows:

  1. Summary of results: A brief review of the main findings just in two or three pages.
  2. Nature of the study: Description of the general objectives of study, formulation of the problem in operational terms, the working hypothesis, the type of analysis and data required,

3. Methods employed: Specific methods used in the study and their limitations. For instance, in sampling studies we should give details of sample design.
4. Data: Discussion of data collected, their sources, characteristics and limitations. If secondary data are used, their suitability to the problem at hand be fully assessed. In case of a survey, the manner in which data were collected should be fully described.

5. Analysis of data and presentation of findings.

6. Conclusions: A detailed summary of the findings and the policy implications drawn from the results be explained.

7. Bibliography: Bibliography of various sources consulted be prepared and attached.

8. Technical appendices*:* Appendices be given for all technical matters relating to questionnaire, mathematical derivations, elaboration on particular technique of analysis and the like ones.

(B) Popular Report

- In such a report emphasis is given on practical aspects and policy implications.

General outline of a popular report.

1. *The findings and their implications: emphasis in the report is given on the findings of most* Practical interest and on the implications of these findings.
2. *Recommendations for action:* recommendations for action on the basis of the findings of the study is made in this section of the report.
3. *Objective of the study:* A general review of how the problem arise is presented along with the specific objectives of the project under study.

4. *Methods employed:* A brief and non-technical description of the methods and techniques used, including a short review of the data on which the study is based, is given in this part of the report.
5. *Results:* This section constitutes the main body of the report wherein the results of the study are presented in clear and non-technical terms with liberal use of all sorts of illustrations such as charts, diagrams and the like ones.
6. *Technical appendices:* More detailed information on methods used, forms, etc. is presented in the form of appendices.