RAMA UNIVERSITY

www.ramauniversity.ac.in

UNIT – IV
RESEARCH APPROACHES AND DESIGN (PART-1)

Mrs. S. Andal, M.Sc(N).,

Professor cum Research Co-ordinator

Faculty of Nursing

INTRODUCTION

- A Research design is the framework or guide used for the planning, implementation and analysis of a study. It is a systematic plan of what is to be done, how it will be done and how the data will be analyzed.

DEFINITION

"Research design is the master plan specifying the methods and procedures for collecting and analyzing the needed information in a research study".

CONT..

“Research design is a plan of how, when and where data are to be collected and analyzed”.

CONT…

“Research design is the researcher’s overall plan for answering the research questions or testing the research hypothesis”.

ELEMENTS OF RESEARCH DESIGN

- Research design is also known as a blueprint that researchers select to carry out their research study, sometimes research design is used interchangeably with the term methodology. Research design includes major elements like.

1. *The Approach*
2. *The Population, Sample and Sampling Technique*
3. *The Time, Place and Sources of Data collection:*
4. *Tools and methods of data collection*
5. *Methods of data analysis*

- ***The Approach***:

  It involves the description of the plan to investigate the phenomenon under study in a structured, unstructured or a combination of two methods. Therefore the approach helps to decide about the presence or absence as well as manipulation and control over variables.

- ***The Population, Sample and Sampling Technique***:

  It also provides the researcher with directions about population, sample and sampling technique which will be used for research study.

- ***The Time, Place and Sources of Data collection***:

  The Time, Place and Sources of the requisite data are the other important constituents essential to ensure effective planning to conduct research study.

- ***Tools and methods of data collection***:

  This element of research design involves the description of different tools and methods of data collection.

- ***Methods of data analysis***:

  A research design must also include the description of the methods of data analysis either quantitative or qualitative techniques that helps the researcher to collect the relevant data, which later can be analyze as per research design plan.

Factors Affecting Selection of Research Design

- ***Nature of Research Problem***:

  Researcher decides whether it should be investigated through an experimental, Non Experimental or Quasi experimental approach.

- ***Purpose of study***:

  Study may be conducted for the purpose of the prediction, description, exploration or correlation of research variable.

- ***Researcher Knowledge and Experience***:

  Selection of research design is largely influenced by researcher knowledge and experience, because they avoid using those designs wherein they lack confidence, relevant knowledge or experience.

- ***Researcher Interest and Motivation***:

  Motivated researcher always analyze most aspects of research design before selecting one or a combination of designs.

- ***Researcher's Ethics and Principles***:

  Incorporation of ethics and principles in research design is essential. This includes moral obligations such as respect for participants and their rights.

- ***Subjects/ Participants***:

  The number and availability of study subjects may influence the selection of research design if only few subjects are involved, an in-depth qualitative research design may be choose, but in case of large samples the researcher may opt for quantitative research design.

- ***Resources***:

  None of the researcher can be conduct without resources such as money, equipments, facilities and support from colleagues.

- ***Time***:

  Time is also a major deciding factor for the selection of research design.

- ***Possible Control of Extraneous Variables***:

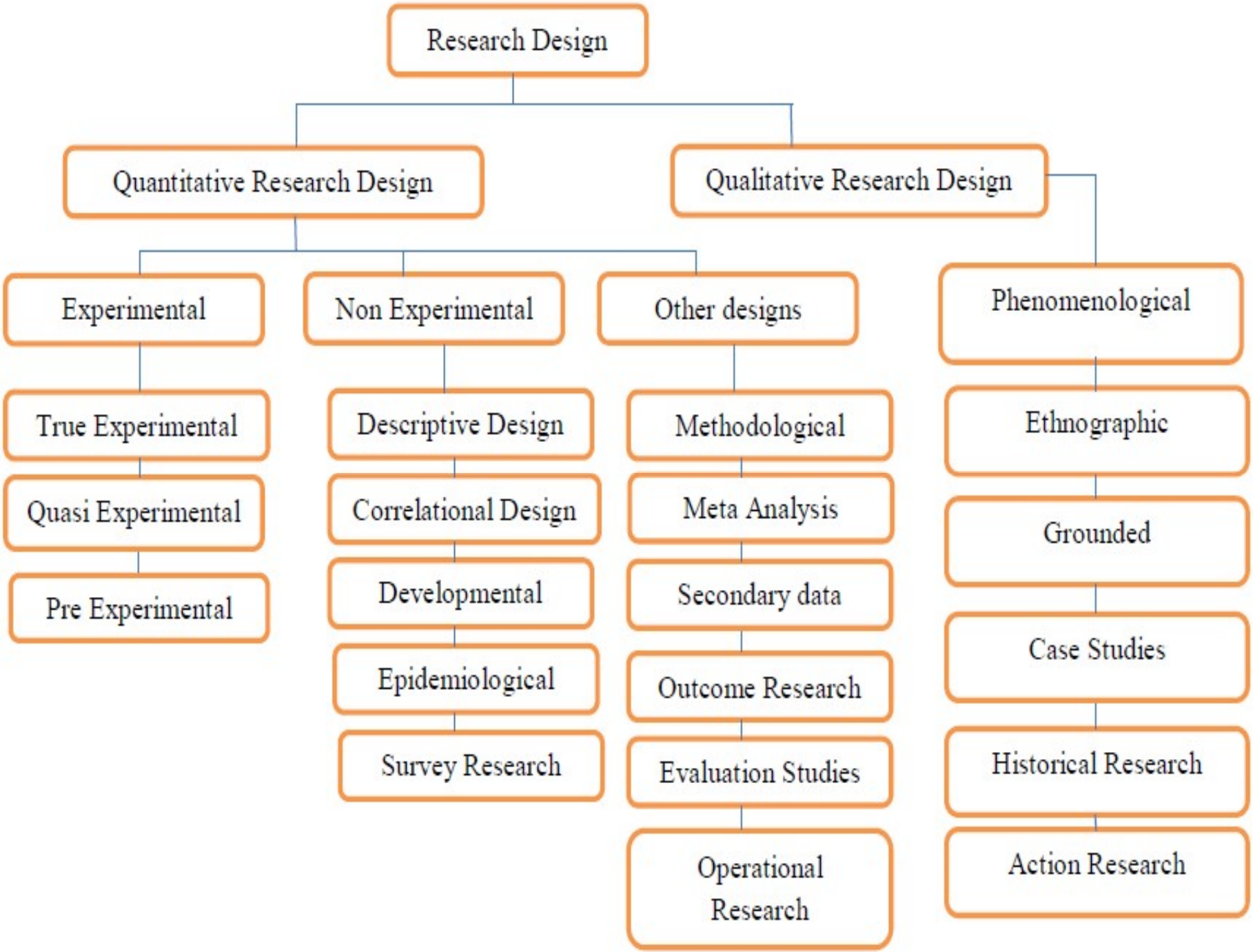
  An efficient design can maximize results decrease errors and control preexisting and impaired conditions that may affect the outcome of the study.

- ***Users of the Study Finding***:

  A research design also involves various methods data collection and analysis. Therefore while choosing a research design researcher must ensure that research design is as appropriate for the users of the study findings.

TYPES OF RESEARCH DESIGN.

- Research designs are classified into two broad categories and several subtypes


Research Design
Quantitative Research Design
Qualitative Research Design
Experimental
Non Experimental
Other designs
Phenomenological
True Experimental
Quasi Experimental
Pre Experimental
Descriptive Design
Correlational Design
Developmental
Epidemiological
Survey Research
Methodological
Meta Analysis
Secondary data
Outcome Research
Evaluation Studies
Operational Research
Ethnographic
Grounded
Case Studies
Historical Research
Action Research

EXPERIMENTAL RESEARCH DESIGN

EXPERIMENTAL RESEARCH DESIGN

- They are concerned with examination of the effect of independent variable on the dependent variable, where the independent variable is manipulated through treatment or interventions and the effect of these interventions is observed on dependent variable.

True Experimental Design

- They are those where researchers have complete control over the extraneous variables and can predict confidently that the observed effect on the dependable variable is only due to the manipulation of the independent variable.

Essential Characteristics

A True Experimental research design must essentially consists of following three characteristics

- Manipulation,
- Control and
- Randomization.

***Manipulation*:**

- It refers to conscious control of the independent variable by the researcher through treatment or interventions to observe its effect on dependent variable.

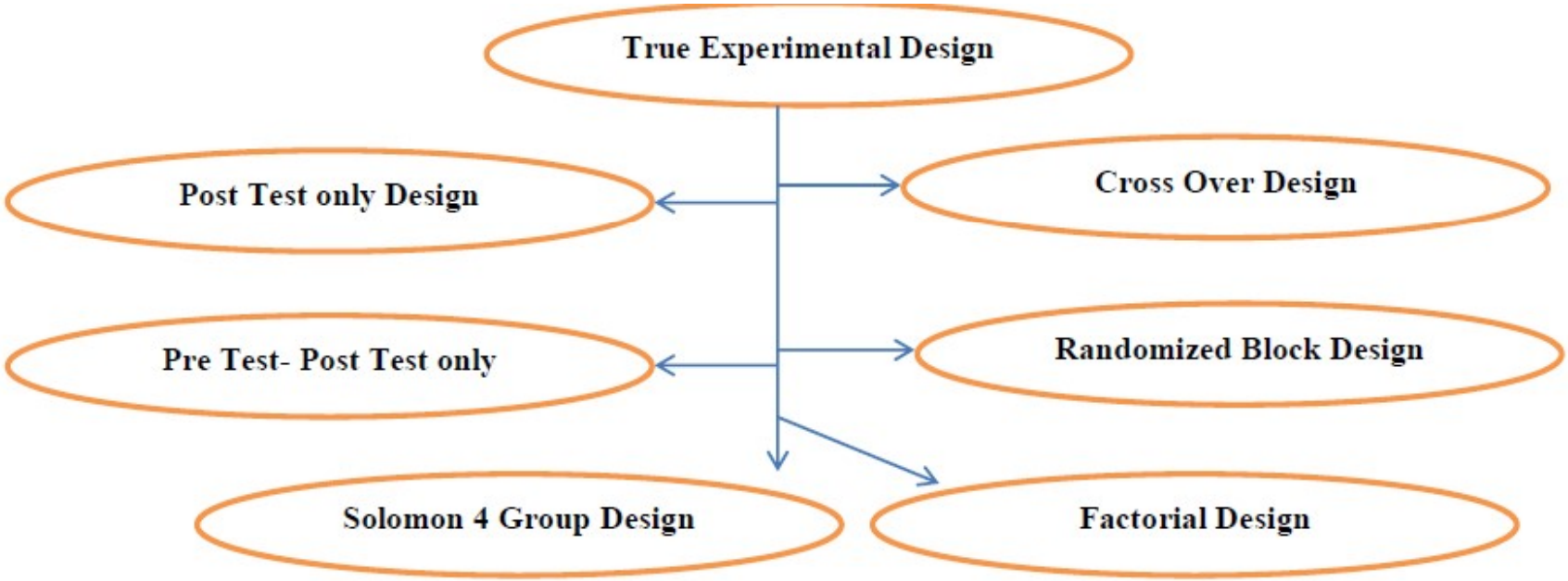
Control:

- It refers to the use of control group and controlling the effects of extraneous variables on the dependent variable in which researcher is interested.

***Randomization*:**

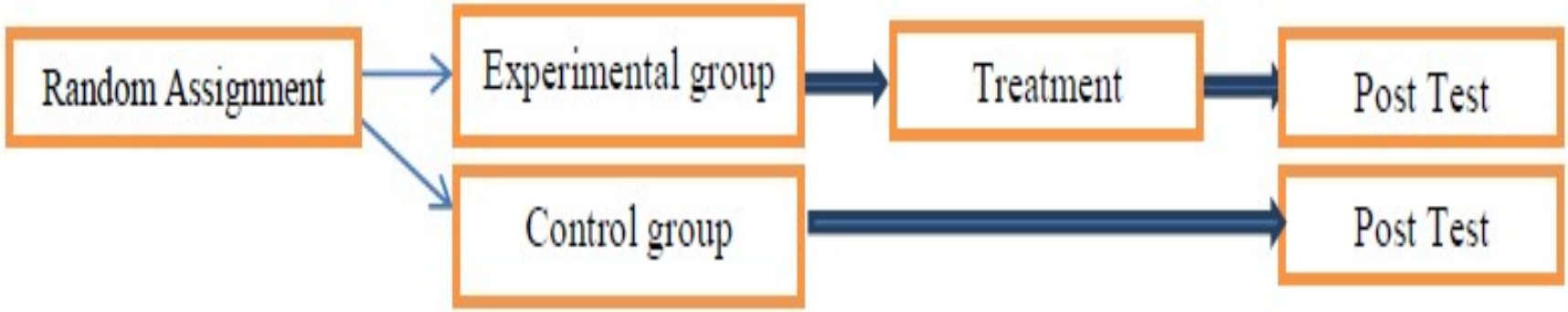
- It means that every subject has an equal chance of being assigned to experimental or control group this is also known as random assignments of subjects which involves the placement of study subjects on the random basis. Through random assignments of subjects under experimental or control group, chances of systemic bias is eliminated.

Types of True Experimental Design



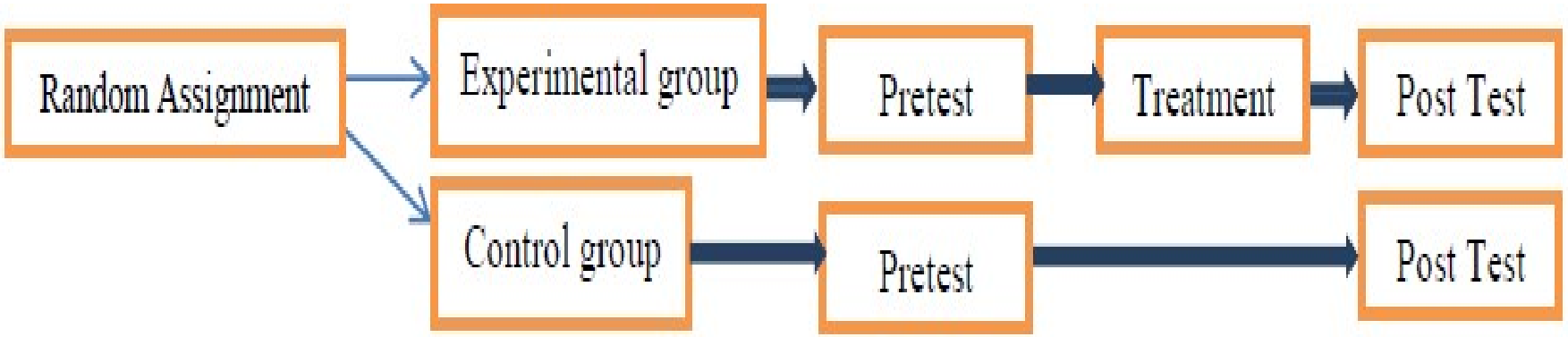
1.Post Test only design

Composed of two randomly assigned groups (i.e) experimental and control group, but neither of which is pretested before implementation of treatment on the experimental group. In addition while treatment is implemented on experimental group only, post test observation is carried out on both the groups to assess the effect of manipulation.



2.Pretest – Posttest only Design

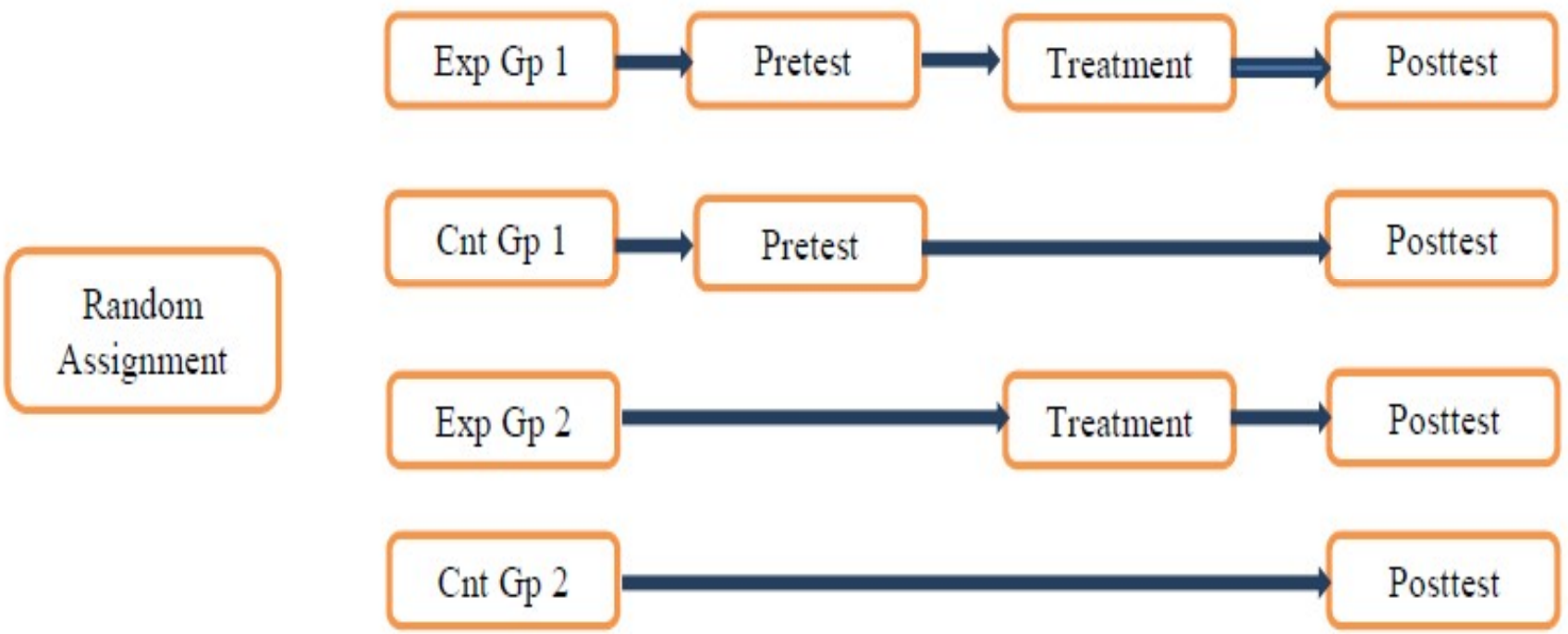
In this subjects are assigned to control and experimental group. The effect of the dependent variable on both the groups is seen before the treatment and later the treatment is carried out on experimental group only and after treatment observation of dependent variables is made on both the groups to examine the effect of the manipulation of independent variable on the dependent variable.



3.Solomon Four Group Design

There are two Experimental Groups (E1 & E2) and two Control Groups (C1 & C2). Initially the researcher randomly assigns subjects to the four groups. Out of four groups only E1 and C1 receives pretest followed by the treatment to E1 and E2. Finally all the four groups receive posttest, where the effects of the dependent variable of the study are observed and comparison is made of four groups to assess the effect of the independent variable on the dependent variable.

Cont…


Random Assignment
Exp Gp 1
Pretest
Treatment
Posttest
Cnt Gp 1
Pretest
Posttest
Exp Gp 2
Treatment
Posttest
Cnt Gp 2
Posttest

4.Factorial Design

In this researcher manipulates two or more independent variables simultaneously to observe the effects on the dependent variables. This design is useful when there are more than two independent variables.

5.Randomized Block Design

Control of inherent differences between experimental subjects and differences in experimental conditions is one of the difficult problems faced by researcher in biological sciences.

Type of Anti-Hypertensive Drug	*Patients with primary H.T*	*Diabetes Patients With Hypertension*	*Renal Patients With Hypertension+*
Drug A	*A1*	*A2*	*A3*
Drug B	*B1*	*B2*	*B3*
Drug C	*C1*	*C2*	*C3*

6. Cross over Design

Subjects are exposed to more than one treatment where subjects are randomly assigned to different orders of treatment. This design is more efficient in establishing the highest possible similarity among subjects exposed to different conditions. Where groups compared obviously have equal distribution of characteristics.

Groups	Protocols of mouth care	
Gp 1	Chlorhexidine	Saline
Gp 2	Saline	Chlorhexidine

Advantages

- To establish casual relationship between independent and dependent variables
- The controlled environment in which the study is conducted can yield a greater degree of purity in observation.
- Conditions not found in natural settings can be created in an experimental setting where the independent variable is manipulated by investigator.
- In this approach, we can often create conditions in a short period of time that may take years naturally.
- When experiment is conducted in laboratory, the pressure and problems of real life situations are removed and the researcher can pursue the studies in a more leisurely careful and concentrated way.

Disadvantages

- The results of experimental designs cannot be replicated in studies conducted on human beings due to ethical problems.
- Many of the human variables neither have valid measurable criteria nor instruments to measure them.
- If experimental studies conducted in natural settings like hospitals or community, it is not possible to impose control over extraneous variables.
- It is difficult to get cooperation from the study participants because it may involve medical or surgical treatment or intervention which may make the prospective subjects reluctant to participate in research study.

QUASI EXPERIMENTAL RESEARCH DESIGN

It involves the manipulation of independent variable to observe the effect on dependent variable, but it lacks at least one of the two characteristics of the true experimental design randomization or control.

***Characteristics*:**

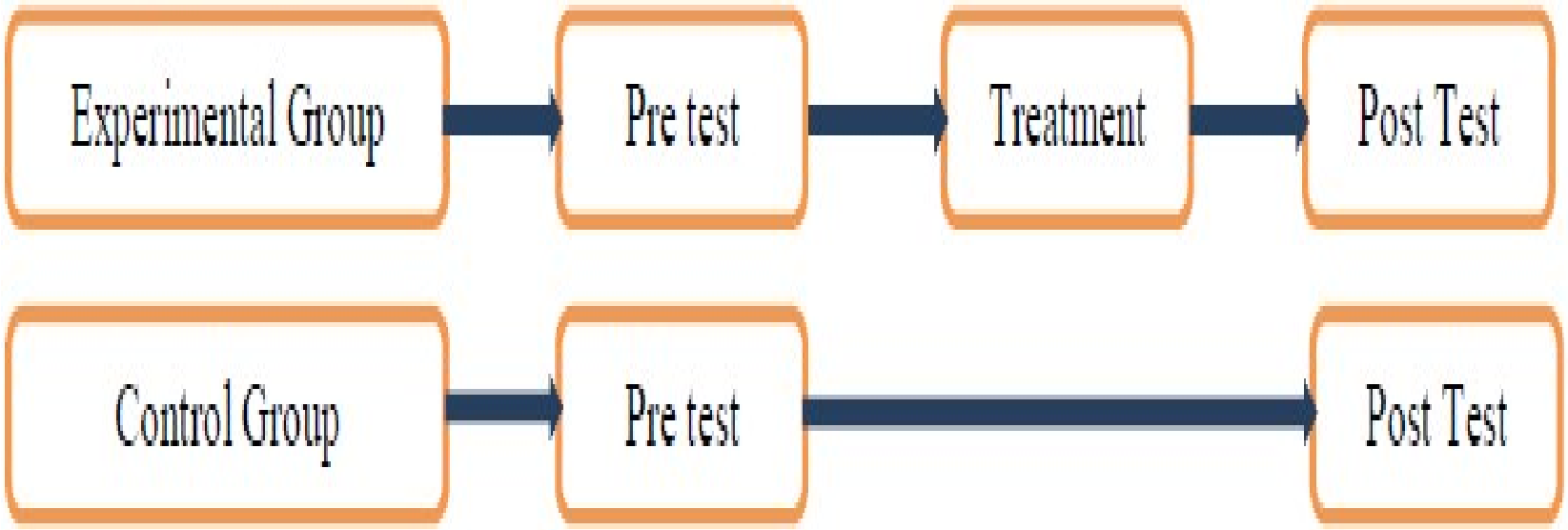
- Manipulation of the independent variables to observe the effects on the dependent variables.
- Lack at least one of the two other essential characteristics of the true experimental design
- Quasi-independent variable are used instead of true independent variables.

TYPES OF QUASI EXPERIMENTAL DESIGN

1.Non Randomized Control Group Design

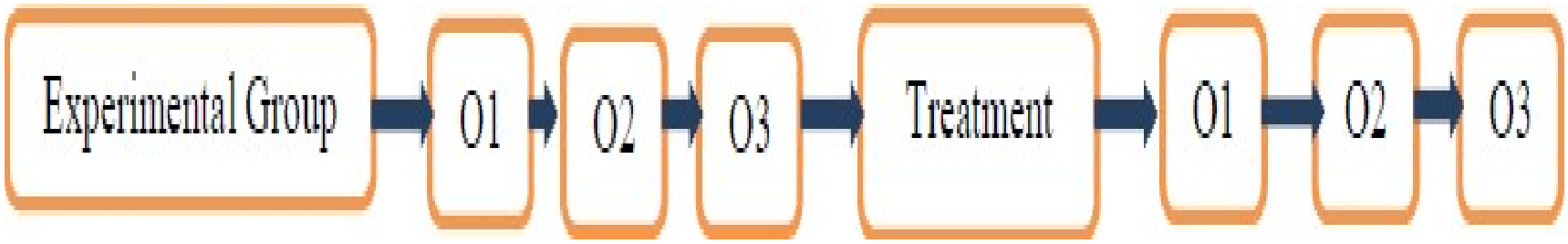
- In this design experimental and control group are selected without randomization and dependent variables are observed in both groups before intervention, later the experiment group alone receives treatment and after that posttest observation of dependent variables is carried out for both the groups to assess the effect of treatment on experiment group.

Cont…


Experimental Group
Pre test
Treatment
Post Test
Control Group
Pre test
Post Test

2. Time Series Design

- This design is useful when the experimenter wants to measure the effects of a treatment over a long period of time. The researcher carries out an experiment on an individual or on a small number of individuals by alternating between administering and then withdrawing the treatment to determine the effectiveness of the intervention.



Advantages

- They are more frequently used because they are more practical and feasible to conduct research studies in nursing.
- This design is more suitable for real world natural settings than true experimental research designs.
- It may be able to establish casual relationship and where in some of the hypotheses are practically answered through this design only.

***Disadvantages*:**

- There is no control over extraneous variables influencing the dependent variables.
- The absence of control group makes the results of this design less reliable and weak for the establishment of casual relationship between dependent and independent variable.

Pre Experimental Research Design

This research design considered very weak because the researcher has very little control over the experiment.

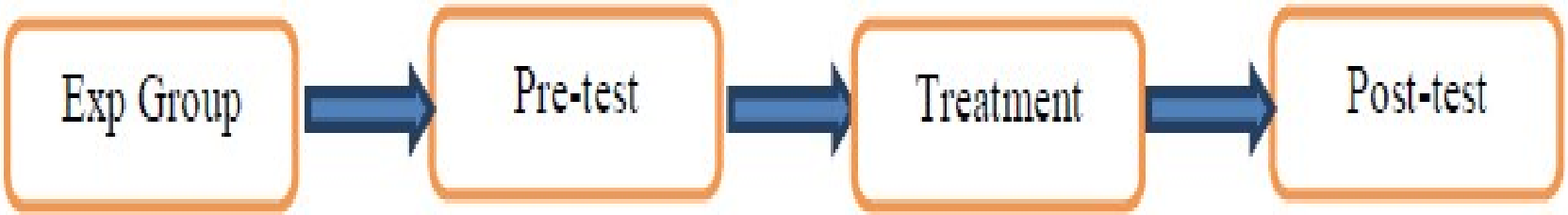
TYPES OF PRE EXPERIMENTAL RESEARCH DESIGN

1. One shot case design :

In this design, a single experimental group is exposed to a treatment and observations are made after the implementation of that treatment

2. One group pre-test and post-test design:

It is a simplest type of pre experimental design, where only the experimental group is selected as the study subjects. A pretest observation of the dependent variables is made before implementation of the treatment to the selected group, the treatment is administered and finally a post observation of dependent variables is carried out to assess the effect of treatment on the group.



***Advantages* :**

- Very simple and convenient to conduct these studies in natural setting especially in nursing.
- Most suitable design for the beginners in the field of experimental research.

***Disadvantages* :**

- It has very little control over the research.
- Considered a very weak experimental design to establish casual relationship between independent and dependent variables, because it controls no threat to internal validity.

NON-EXPERIMENTAL RESEARCH DESIGN

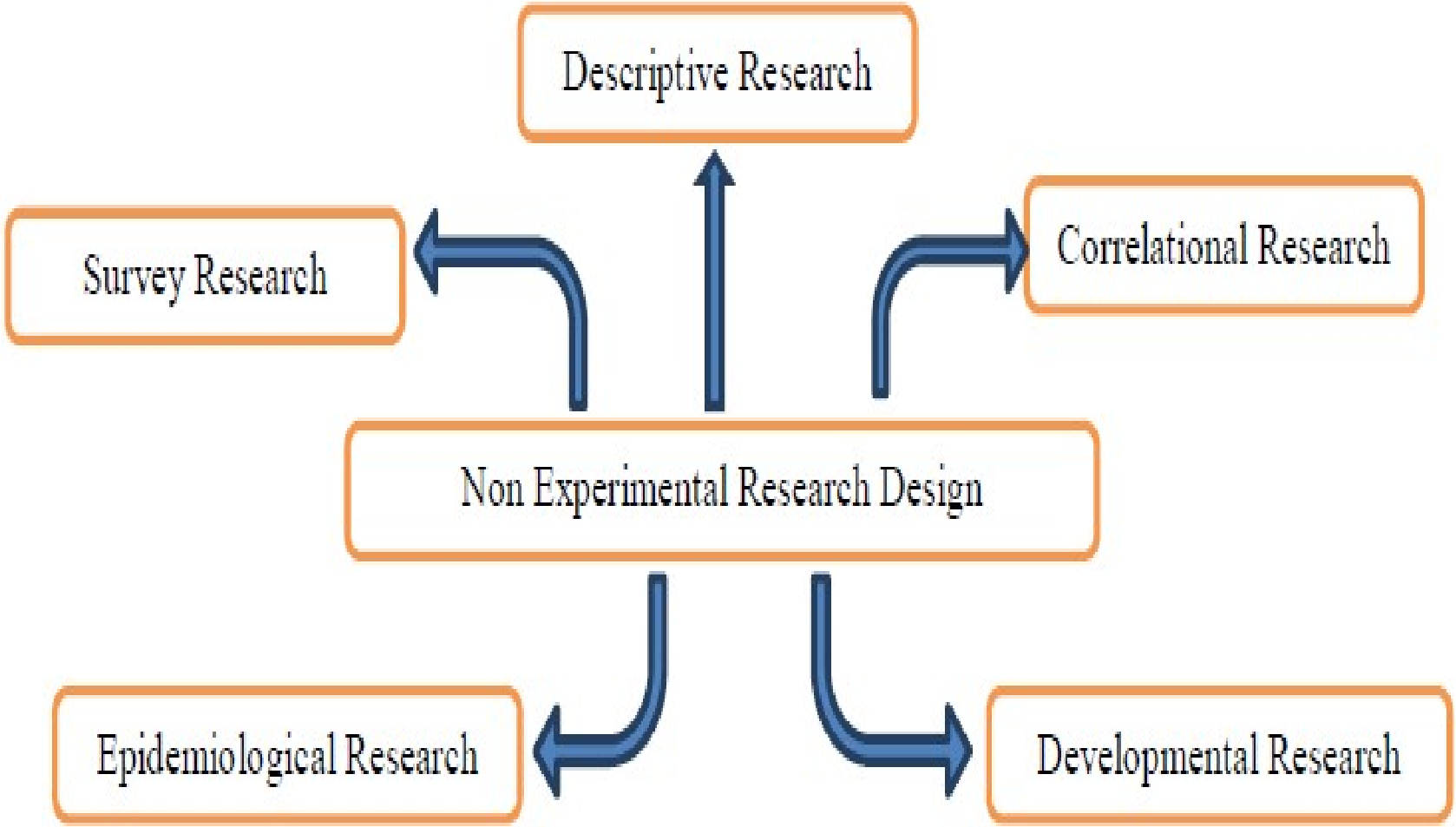
NON EXPERIMENTAL RESEARCH DESIGN

- It is one of the broad categories of research designs in which the researcher observes the phenomena as they occur naturally and no external variables are introduced.
- In this non experimental research, Researcher collects data without making changes or introducing treatments. Data obtained are analyzed and the results may lead to the formation of hypothesis that can be tested experimentally.

Needs:

- Independent variable cannot be manipulated
- The studies where it is not practically possible to conduct experiment
- Descriptive study that do not require any experimental approaches.

TYPES OF NON-EXPERIMENTAL RESEARCH DESIGN



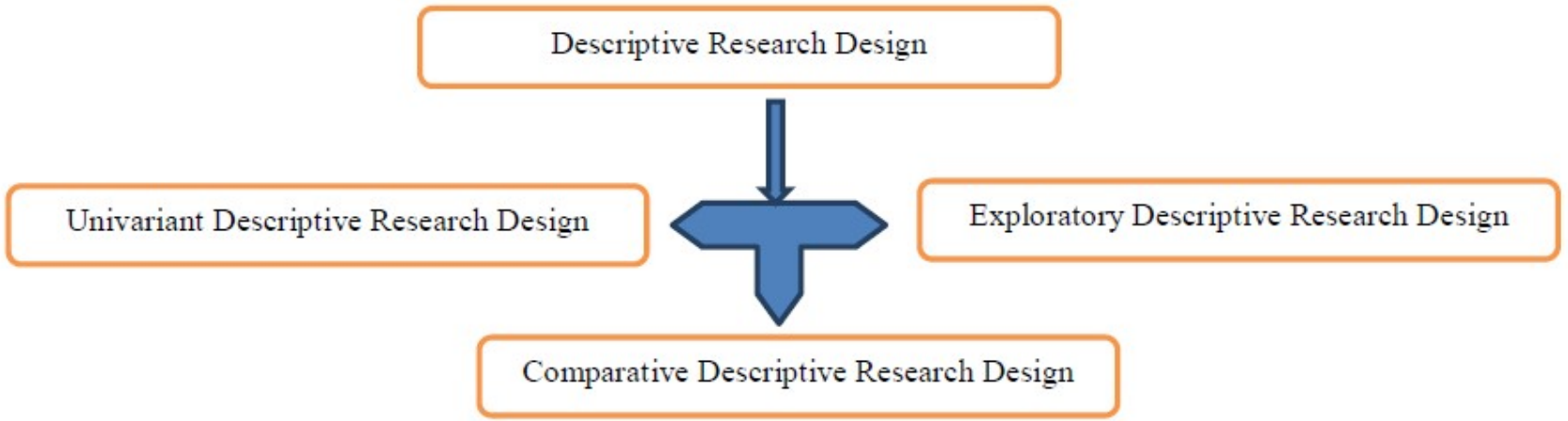
Descriptive Research Design

- The purpose of descriptive design is to describe and document aspects of a situation as it naturally occurs and sometimes to serve as a starting point for hypotheses generation or theory development.

Main features

- They are used to observe, document and describe a phenomenon occurring in its natural setting without any manipulation or control.
- They provide an impression of a situation as it occurs in natural settings.
- They do not involve the manipulation of variables and they are studied as they exist in the real world.
- They may be used to develop theories, identify problem with current practices, justify current practices or determine other practices in similar situations.

TYPES OF DESCRIPTIVE DESIGN



1.Univariant Descriptive Design

They are undertaken to describe the frequency of occurrence of a phenomenon. This design does not necessarily focus on the study of a single variable. They are may be one or more variables involved in the study.

- **Ex:** A researcher is interested in assessing the experiences of patients suffering from Rheumatoid arthritis. In this study researcher may describe the frequency of different symptoms experienced by the patient and the type of they received during the course of disease.

2.Exploratory Research Design

- It is used to identify, explore and describe the existing phenomenon and its related factors. It is not only a simple description or the frequency of occurrence of a phenomenon but is in depth exploration and a study of its related factors to improve further understanding about a less understood behavior.
- **Ex:** an exploratory study to assess the multi-factorial dimensions of falls and home safety measures for elderly people living in selected communities.

3.Comparative Design

- It involves comparing and contrasting two or more samples of study subjects on one or more variables, often at a single point of time.
- This design is used to compare two distinct groups on the basis of selected attributes such as knowledge level, perceptions and attitudes.

Correlational Research

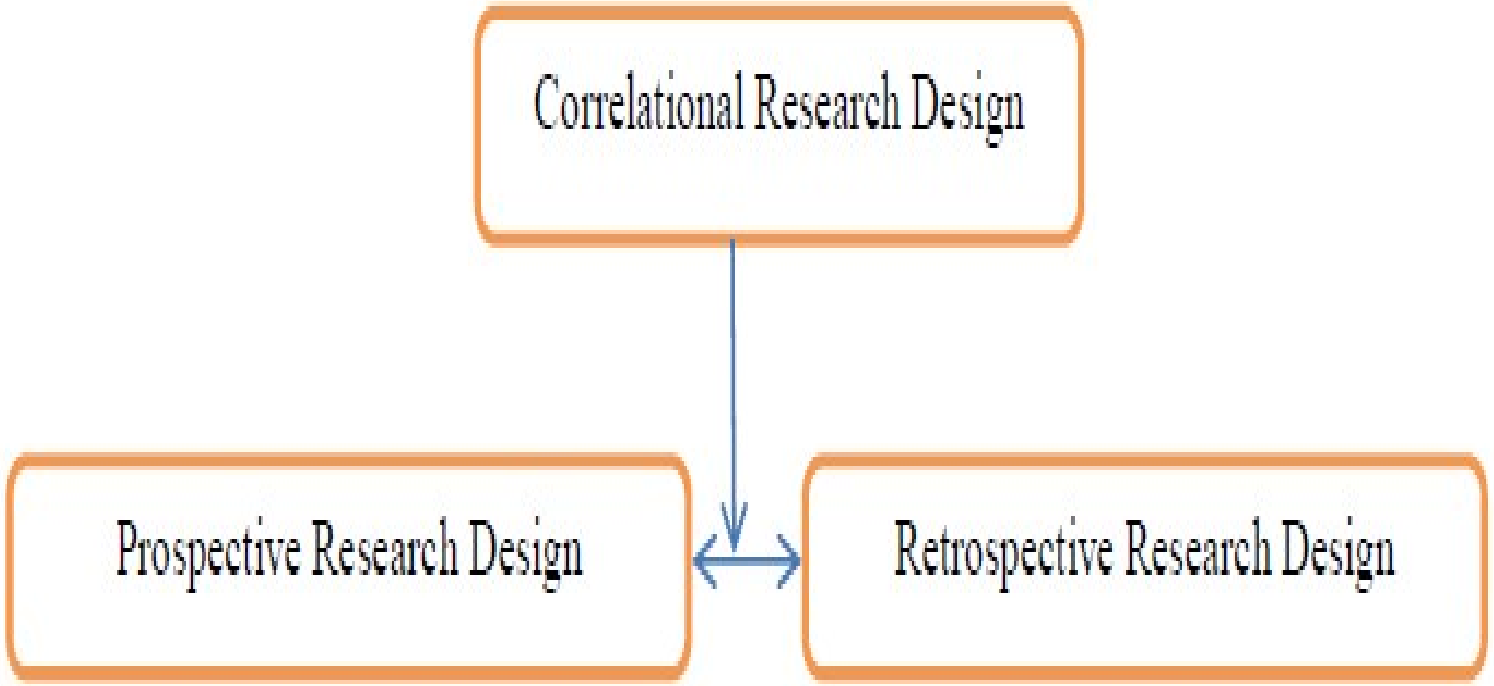
- This is Non-Experimental Research design, where researcher examines the relationship between two or more variables in a natural setting without manipulation or control.
- In this researchers study the relationship of two or more variables without any intervention.

***Main Features*:**

- The researcher examines the strength of relationship between variables by determining how change is correlated with changes in the other variables.
- Generally they have independent and dependent variables, but the effect of independent variable is observed on dependent variable without manipulating the independent variable

- Magnitude and direction of relationship of independent and dependent variable is measured by using the correlation coefficient statistical measure, where results range between -1 to +1
- -ve results shows negative correlation
- +ve results shows positive correlation
- Zero results shows no correlation
- Theoretically a positive relationship means increase in one variable leads to increase of the other variable. While negative relationship means increase in one variable leads to decrease of the other variable or vice versa.

TYPES OF CORRELATIONAL DESIGN



1. Prospective Research Design:

- A design in which the researcher relates the present to the future is a prospective research design. In this researcher observes phenomena from cause to effect.

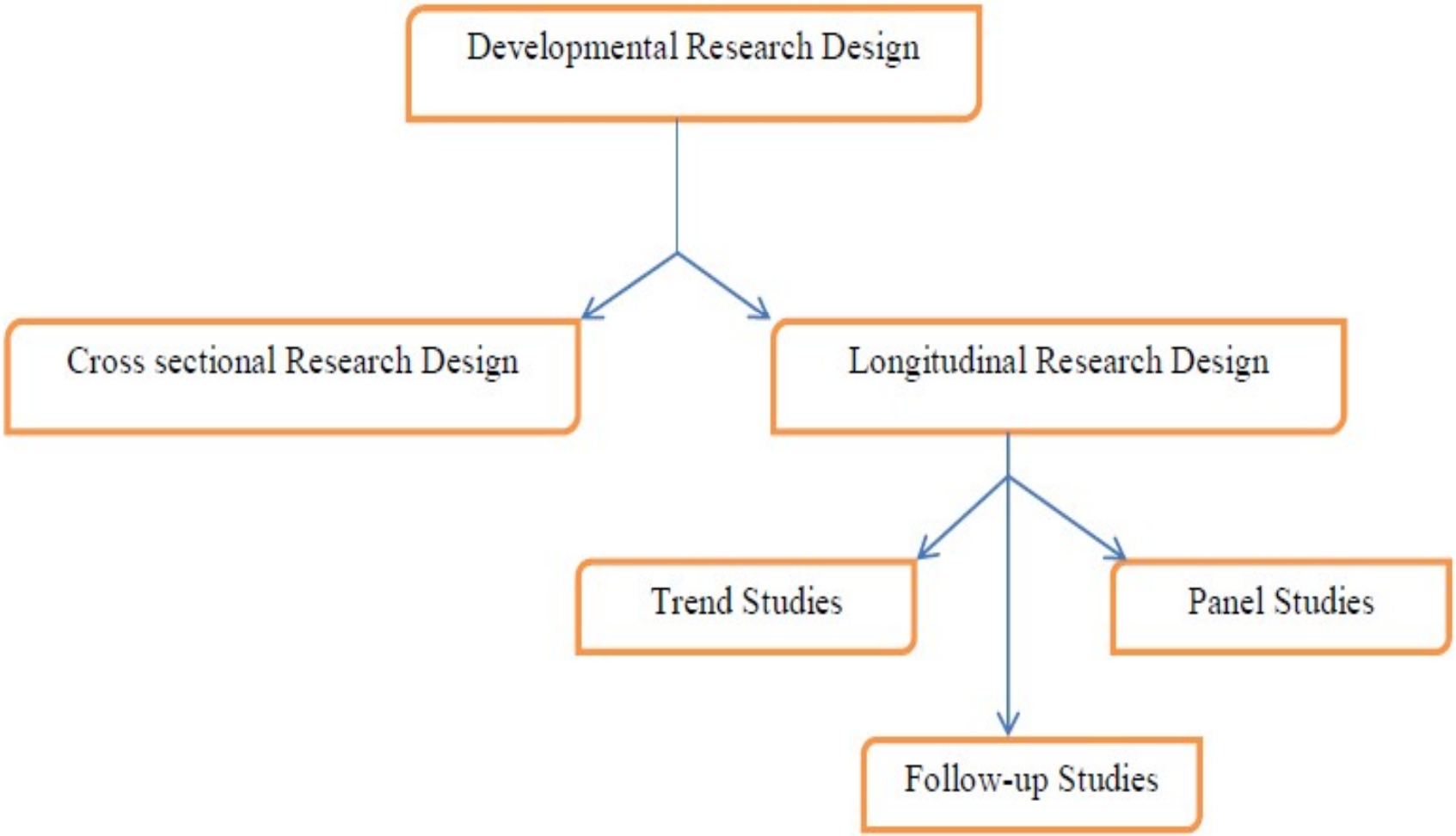
2. Retrospective Research Design:

- In this researcher studies current phenomenon by seeking information from past. In other words researcher has a backward approach, in other words the researcher has a backward approach where he or she move from effect to identify cause.

Developmental Research Design

- They are generally used as adjuvant research designs with other research designs such as cross sectional, descriptive, longitudinal, correlational research design.
- This design examines the phenomenon with reference to time.

TYPES OF DEVELOPMENTAL RESEARCH DESIGN



1. Cross sectional Design:

- Is one in which researcher collects data at a particular point of time.

2. Longitudinal Design:

- It is used to collect data over an extended period of time. Its value is in its ability to demonstrate change over a period of time.
- These are generally classified into three types they are trend studies, panel studies and follow up studies.

Trend Studies

- They permit researchers to examine pattern and the rate of changes and to make prediction about future direction based on previously identified patterns and rates of changes.

Panel Studies

- In this, some people are involved and over a period of time they become more informative on the phenomenon that the subjects in trend studies because the researcher cannot only examine the pattern of change and also reasons for change.

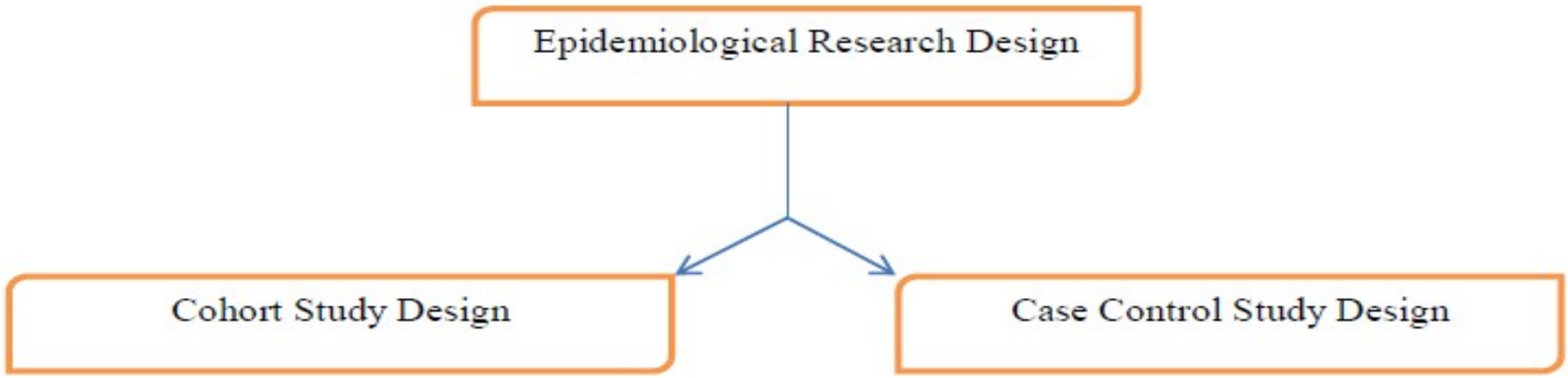
Follow up Studies

- These are undertaken to determine the subsequent states of subjects with a specified condition or those who have received a specific intervention.

Epidemiological Research Design

- It is a study to investigate the distribution and causes of the disease in population.
- Epidemiological studies are generally conducted to investigate causes of different diseases in either prospective researches or retrospective researches.

TYPES



Cohort Studies

- A longitudinal approach is used to investigate the occurrence of a disease in existing presumed causes.

Case Control Studies

- In this design, cause of a disease are investigated after the occurrence of disease

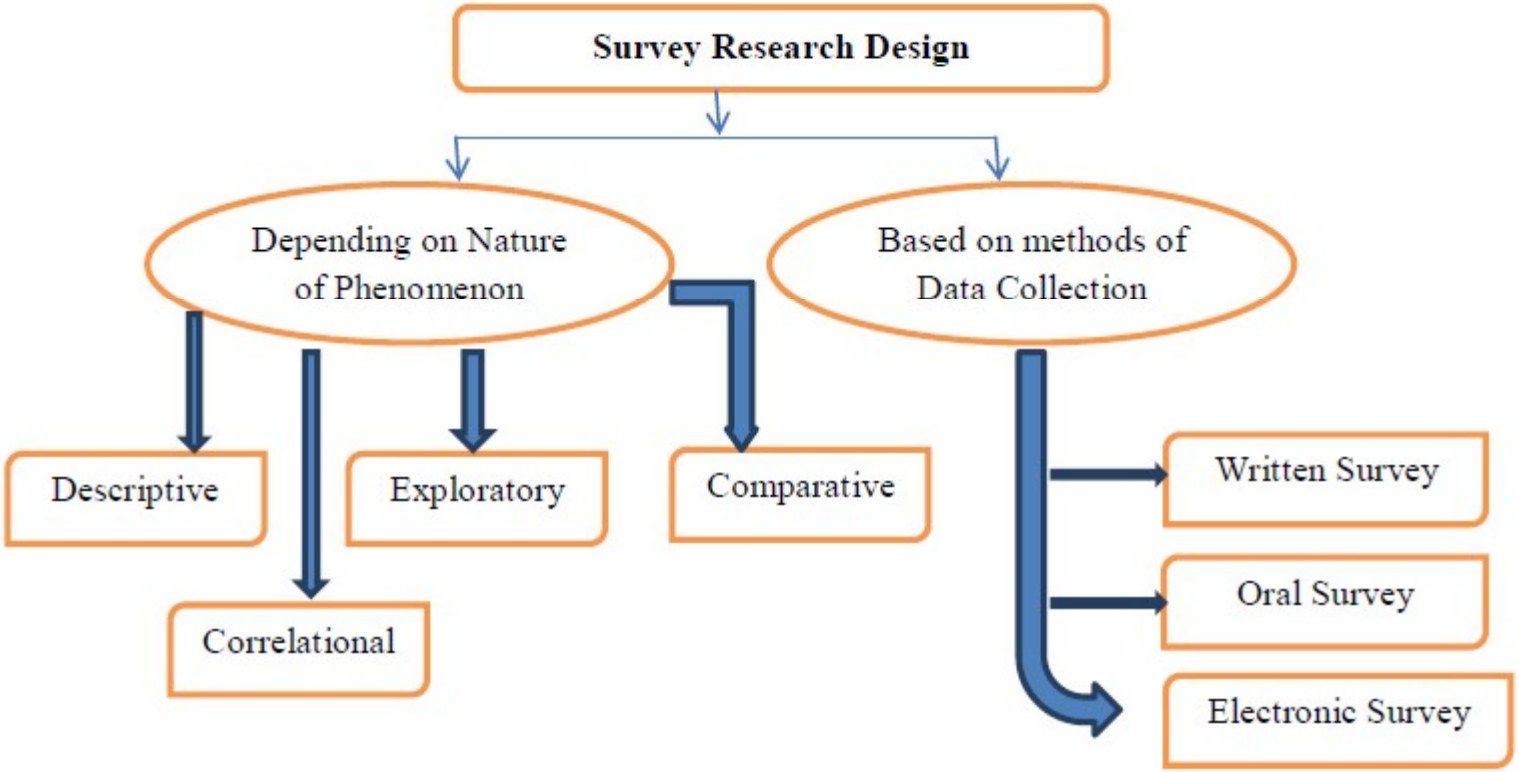
SURVEY RESEARCH DESIGN

- A survey is a research design which is used to collect information from different subjects within a given population having same characteristics of interest.

***Main features*:**

- It is the process of gathering current required data from the subjects so that new information can be obtained.
- In survey research information is collected from a mix of subjects who represent the total population in the characteristics being studied
- It relies heavily upon the validity of verbal reports.
- Personal interview are regarded as the most useful method of collecting survey data, because of the quality of information that can be obtained.

TYPES


Survey Research Design
Depending on Nature of Phenomenon
Based on methods of Data Collection
Descriptive
Correlational
Exploratory
Comparative
Written Survey
Oral Survey
Electronic Survey

1. Depending on the nature of phenomenon under study

Descriptive:

- Undertaken to describe the frequency of occurrence of a phenomenon rather than to study relationship

Exploratory:

- It is a survey of a phenomenon and its related factors about which much is not known

Comparative:

- Comparing and contrasting the existence of a certain phenomenon in two or more groups is done by comparative study

Correlational:

- It is a study of relationship between two or more variables in a natural settings without manipulation or control.

2. Based on methods of data collection:

Written survey

- In this data are collected with a help of written, structured tools such as questionnaire

Oral Survey

- In this data is collected by using face to face or telephonic conversation or oral interview with respondents

Electronic survey

- When data is collected by using electronic means such as email messages, web forms, SMS etc.

Advantages

- They tend to be closest to real life situation
- They are most useful to enhance our understanding about the existing real world setting around us.
- Numerous human characteristics are not subject to experimental manipulation. Therefore the effects of these characteristics on other phenomena cannot be studied experimentally.
- There are many situations in which it is simply not practical to conduct a true experiment like shortage of funds, lack of administrative approval, insufficient time etc.

Disadvantages

- The results obtained and the relationship between the dependent and independent variables can never be absolutely clear and error free.
- They are conducted for comparative purpose using non randomly selected groups.

OTHER ADDITIONAL RESEARCH DESIGNS

OTHER ADDITIONAL RESEARCH DESIGNS

- There are some of the research designs, which cannot be categorized under either experimental or non-experimental research designs.

1. METHODOLOGICAL STUDY

- Methodological studies are conducted to develop, validate, test and evaluate the research instruments and methods. The basic steps of methodological study are
- Defining behavior or construct to measure
- Formulating the items for tool
- Developing instruments for users and respondents
- Testing the reliability and validity of research tool.

2. META-ANALYSIS

- Quantitatively combining and integrating the finding of the multiple research studies on a particular topic is known as meta-analysis.
- Meta analysis is considered as the statistical analysis of a large amount of analyzed results from individual studies for the purpose of integrating the finding.
- Meta analysis studies starts with selecting studies with similar variables and population samples, followed by identifying & coding study characteristics and finally statistically Analyzing and reporting the assessed findings of the meta analysis study.

***Steps in conducting meta analysis*:**

- Define Hypothesis
- Locate the studies
- Input data
- Calculate effect sizes
- Analyse variables

3. SECONDARY DATA ANALYSIS

- It is a research design in which the data collected by one researcher is re analyzed by another researcher, usually to test new hypothesis.
- Sometimes researchers collect lots of data in a study, out of which some of the data is left unused or unanalyzed that is taken up later and utilized by another researcher.

4.OUTCOME RESEARCH

It involves the evaluation of care practices and systems in place. These studies are conducted in response to the increasing demand from public to justify care practices and system that improve patient treatment outcome and reduces costs of care.

5.EVALUATION STUDIES

- They are an applied form of research design, which involves the judgement about how well a specific programme, practice or policy is working.
- They may also be used to determine the effectiveness or value of processes, personnel, equipment and the material used in particular setting.
- Formative Evaluation: refers to assessment of a programme as it is being implemented.
- Summative Evaluation: refers to assessment of the outcome of the programme that is conducted after the completion of the programme.

6.OPERATIONAL RESEARCH

- It involves study of complex human organizations and services to develop new knowledge about institutions, programme, use of facilities and personnel in order to improve working efficiency of an organization.
- It is the application of scientific method of investigation to the study of complex human organization and services.