**Chapter- Research Methodology in Nursing**

Introduction:

Research is the careful consideration of study concerning a certain subject or research problem utilizing scientific methodologies. Research is a method of methodical investigation that is either tested or studied to add to a body of information. Research is conducted across many fields to support a goal. To achieve effective solutions, new information is required. Nursing research oriented at clinical issues can make a substantial contribution to the development of those solutions. Nurses perform several types of studies in order to develop clinical interventions to help persons who require nursing care. Nursing research's intricacy and breadth frequently necessitate scientific support from multiple fields. Nursing research develops knowledge about health and the promotion of health over the full lifespan, care of persons with health problems and disabilities, and nursing actions to enhance the ability of individuals to respond effectively to actual or potential health problems.

Definition:

Research methodology is a way of explaining how a researcher intends to carry out their research. It's a logical, systematic plan to resolve a research problem. A methodology details a researcher's approach to the research to ensure reliable, valid results that address their aims and objectives.

Importance of Research Methodology:

* A research methodology lends credibility to study and produces scientifically sound results. It also includes a clear plan that assists researchers in staying on track, making the procedure seamless, effective, and manageable.
* The methodology of a researcher allows the reader to comprehend the strategy and procedures utilized to obtain findings.
* When researchers face criticism, they might appeal to the methodology to explain their approach.
* It can assist researchers in developing a precise plan to follow throughout their research.
* The methodology design process assists researchers in selecting the most appropriate approaches for their aims.
* It enables researchers to document their goals for the research from the start.

Research methodology in Nursing

A researcher must make various options when developing a study approach. Research methodology describes the overarching structure of the process used to collect accurate and trustworthy data for problem analysis. Research methodology includes following:

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

**1. Research Design:** 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. 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.

**2. Research Approach**: It includes a description of the plan to explore the phenomenon under inquiry using a structured, structured, unstructured, or a combination of two methodologies. As a result, the technique aids in determining the presence or absence of variables, as well as manipulating and controlling them. One of the most critical is deciding whether to employ qualitative, quantitative, or a combination of the two data methodologies. Regardless of the sort of research, the data acquired will be in the form of numbers or descriptions, and researchers can choose to collect words, numbers, or both. The different research methodologies are explained below:

**A. Qualitative Research:** Qualitative researches include gathering and analyzing written or spoken words as well as textual data. It may also concentrate on body language or visual features, assisting in the creation of a precise account of a researcher's observations. This study process is more subjective and time-consuming than using quantitative data. When the research aims and objectives are exploratory, researchers frequently utilize a qualitative methodology.

**Types of Qualitative Research:**

To perform qualitative research, you must choose at least one research design approachthat fits your topic. It is not uncommon for a researcher to employ more than one approach throughout their study. Here are five common design approaches:

**i. Historical Study:**

A historical study is the ideal choice for studies that involve extensive examination of the past — including people, events and documents. The purpose of a historical study is to draw conclusions about the present and future, based off research conducted in the past. This model depends on adequate interview sources and historical documents. It is essential to validate the accuracy of the data and find primary sources. Depending on the goal of the researcher, this form of study may result in a biography, which is why the term “historical study” is sometimes used interchangeably with “biographical study.”

**ii. Phenomenology:**

Phenomenology is a wide-ranging form of study. In this research model, the researcher looks to gather information that explains how individuals experience a phenomenon and how they feel about it. This model recognizes that there is no single objective reality; instead, everyone experiences things differently. The outcome is described from the point of view of the participants. However, the researcher is still able to derive a set of findings that can be used to identify themes surrounding the phenomena under study.

**iii. Grounded Theory:**

The purpose of grounded theory is to develop a theory surrounding a social issue. This theory seeks not only to identify problems in social scenes, but also to define how people deal with those problems. Grounded theory is unique among qualitative design approaches, because it depends solely on the data gleaned through the research process.2. Often, the initial research question is progressively reformed and refined as more information is gathered on the topic. In this sense, the participants help shape the study.

**iv. Ethnography:**

Ethnography is the study of a specific grouping within a culture. Researchers pursuing this study format will immerse themselves into the culture they are researching. The qualitative data is gathered through direct observation of — and interaction with — participants who belong to that culture. The information is then presented through their perspective. Ultimately, this study aims at understanding group culture.1

**v. Case Study:**

Case studies, one of the most common qualitative designs, are used to examine a person, group, community or institution. Researchers often use a bounded theory approach that confines the case study in terms of time or space. To conduct the case study, the researcher may draw upon multiple sources of data, such as observation, interviews and documents. All participants chosen must share a unifying factor, which means they all must have a direct or indirect connection to the research question or subject being studied. After collecting the data, the researcher will analyze it to identify common or prominent themes.

**Qualitative Research Methods**

Qualitative data can be collected using a variety of methods, and multiple methods may be used throughout the data collection phase of a single qualitative study.

* **Interview:** Researchers can conduct in-depth, face-to-face interviews with participants. This allows them to gain insights from the participants to best understand their experience.
* **Focus Groups:** Focus groups are similar to interviews, but involve multiple participants at once. They are another route to obtaining responses and making interview observations.
* **Observation:** A less direct method than interviews or focus groups, this method requires careful attention to participants’ activities and behaviors in order to gather data.
* **Document analysis:** Researchers can gather useful data from print documents as well as electronic records. Careful analysis is needed to draw conclusions from the body of related documents.

**Designing of Qualitative Research:**

The process of designing a qualitative research study can be organized into five steps, each of which parallels a step in designing a quantitative research study. Each of these steps requires the qualitative researcher to do something that quantitative research would regard as “unscientific,” imprecise, and insufficiently rigorous.

**a. Literature Review**: Designing qualitative and quantitative research both begin with a literature review. In the quantitative paradigm the function of the literature review is to find out what is already known and develop this knowledge further. In the qualitative paradigm the function of the literature review is to find out what is not known. Hence the qualitative paradigm gives you permission to not know. For example, very little was known about the population of Cambodian refugees.

**b. Formulation:** In the quantitative paradigm the research hypothesis must specify how an independent variable (or variables) affects a dependent variable (or variables). In contrast, the research focus of a qualitative study need not be so definite. Qualitative research permits, indeed encourages, a broad research focus. For example, it can be as broad as understanding the experience of Cambodian refugees.

**c. Instrumentation**: Quantitative research requires that the researcher make use of psychometrically validated measurement scales. Qualitative research, in contrast, assumes that the researcher does not know enough to develop such instruments. Rather, the research participants are assumed to be experts on their own experience, capable of teaching the researcher what she or he needs to know. The research participants are enlisted as co-investigators, and the research interview becomes a collaborative conversation in which both parties investigate the research participant’s experience. Thus, the permission to not know is accompanied by a permission to ask. For example, the experience of Cambodian refugees was investigated simply by asking them about it.

**d. Selection:** In quantitative research a random sample of the population of interest is used in order to allow for generalization. In qualitative research, generalizabity is not an issue. Rather, the sample is selected in order to develop theory, and questions about the developed theory are answered by additional sampling. Thus, qualitative research gives permission to explore. For example, the initial study of Cambodian refugees used only successful, resilient community leaders. Having learned how they coped, subsequent studies could explore the experience of less resilient individuals.

**e. Sample Size:** In quantitative research the sample size is selected using a power analysis procedure that takes into account effect size and also desirable type 1 and type 2 errors. In qualitative research the sample size is not determined in advance. Rather, theory is generated as the sampling proceeds, and sampling ends when theoretical saturation occurs; that is, the researcher has interviewed enough participants that no new information emerges from their stories. Thus, qualitative research gives permission to theorize during data collection. For example, theoretical saturation occurred for the Cambodian refugees after six participants were interviewed.

**B. Quantitative Research:** Quantitative research is the systematic gathering and analysis of data from a variety of respondents that is based on numerical figures. The data is then analysed for the purpose of obtaining the results using a variety of mathematical, statistical, and computational tools. The researcher can identify averages and patterns thanks to the quantitative study approach.

**Types of quantitative research:**

Quantitative research methods are used for descriptive, correlational, causal-comparative, and experimental research. Let’s take a closer look at each type.

**a. Descriptive research:**

This type of quantitative research is used to explain the current state of a variable or topic. It can answer what, where, when, and how, but not why questions (those are answered in qualitative research). The researcher does not control or manipulate the variables. They just observe and measure them.

i. Surveys are often used to gather a large amount of data that can be analyzed for frequencies, averages, and patterns. For example, surveys can be used to describe the demographics of a given region, gauge public opinion on political topics, and evaluate customer satisfaction with a company’s products.

ii. Observations are often used to gather data without relying on survey respondents' honesty or accuracy. This method of descriptive research is used to understand how individuals act in real-life situations.

iii. Case studies can also be used to gather detailed information to identify characteristics of a narrowly defined subject. They are frequently used to generate hypotheses and theories.

iv. Correlational research

The correlational research method examines the relationships between different subjects and variables without the researcher controlling or manipulating any of them. It is focused on relationships between fixed variables. Correlational research relies on the scientific method and hypotheses.

**b. Quasi-experimental research:**

The causal-comparative research method is used to identify a cause and effect relationship between two variables, where one variable is dependent and another is independent. It has aspects in common with experimentation but cannot be considered a true experiment. There are three main types of quasi-experimental research designs:

**i. Nonequivalent groups**: groups are similar, but only one experiences treatment or variable

**ii. Regression discontinuity**: researchers assign an arbitrary cutoff in the list of participants. Those above the cutoff receive treatment or variable and those below do not. The individuals just below the threshold are used as a control group because they are so near the threshold.

**iii. Natural experiments**: an external event or situation (nature) results in the random assignment of subjects to the variable recipient group. These experiments are observational and are not considered true experiments.

**c. Experimental research:**

The experimental research method is research that is guided by a specific hypothesis or hypotheses. It is very useful for guiding decision-making. Any research conducted using the scientific method uses experimental research methods. There are three types of experimental research designs:

i. Pre-experimental: a researcher observes a group or multiple groups after implementing a treatment or introducing a factor that is assumed to lead to changes in the groups. This is used to understand if further research is necessary for the observed groups.

ii. True experimental: depends on statistical analysis to support or refute the hypothesis. The participants must be chosen in random sampling.

iii. Quasi-experimental: participants are not chosen at random.

**3. Mixed Method Research:**

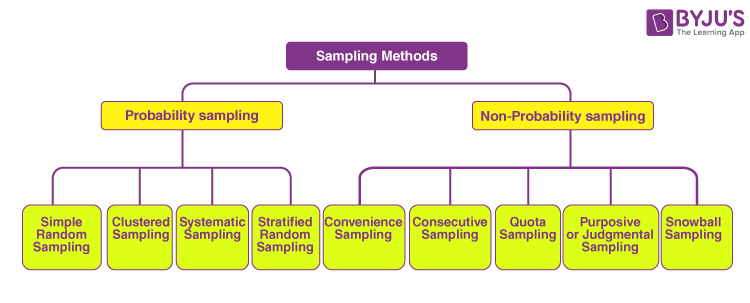
The**mixed methods research** definition is a design that utilizes both quantitative (numeric) and qualitative (descriptive) research elements to gain a conclusion for a study. A mixed methods study is likely to utilize several data collection practices and evaluation processes that are appropriate for both quantitative and qualitative approaches. Mixed methods research can most easily be identified by the following characteristics:

* Collection and analysis of both quantitative and qualitative data
* Integration of the data during the collection process
* Theoretical model(s) serving as a research framework

A mixed methods research design is most often used when there is an interest both in testing theories or integrating a specific theoretical perspective while also exploring a better understanding of an experience or process. If the research question cannot be answered just by analyzing qualitative or quantitative data alone, it would be best to use a mixed methods approach. This type of research is most often done in behavioral and health settings since both usually involve completed situational research from a large sample size.

**3. 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 sampling method or sampling techniqueis the process of studying the population by gathering information and analyzing that data. There are several different sampling techniques available, and they can be subdivided into two groups. All these methods of sampling may involve specifically targeting hard or approach to reach groups. Types of Sampling Method

In Statistics, there are different sampling techniques available to get relevant results from the population. The two different types of sampling methods are as shown in the fig no1 below:



**Fig No: 1**

**A. Probability Sampling:** The probability sampling method utilizes some form of random selection. In this method, all the eligible individuals have a chance of selecting the sample from the whole sample space. Probability Sampling methods are further classified into different types, such as simple random sampling, systematic sampling, stratified sampling, and clustered sampling. Let us discuss the different types of probability sampling methods:

**i. Simple Random Sampling:** In simple random sampling technique, every item in the population has an equal and likely chance of being selected in the sample. Since the item selection entirely depends on the chance, this method is known as “Method of chance Selection”. As the [sample size](https://byjus.com/maths/sample-size/) is large, and the item is chosen randomly, it is known as “Representative Sampling”.

**ii.** **Systematic Sampling**: In the systematic sampling method, the items are selected from the target population by selecting the random selection point and selecting the other methods after a fixed sample interval. It is calculated by dividing the total population size by the desired population size.

**iii. Stratified Sampling:** In a stratified sampling method, the total population is divided into smaller groups to complete the sampling process. The small group is formed based on a few characteristics in the population. After separating the population into a smaller group, the statisticians randomly select the sample.

**iv.** **Clustered Sampling:** In the clustered sampling method, the cluster or group of people are formed from the population set. The group has similar significatory characteristics. Also, they have an equal chance of being a part of the sample. This method uses simple random sampling for the cluster of population.

**B. Non-probability Sampling:**

The non-probability sampling method is a technique in which the researcher selects the sample based on subjective judgment rather than the random selection. In this method, not all the members of the population have a chance to participate in the study. Non-probability Sampling methods are further classified into different types, such as convenience sampling, consecutive sampling, quota sampling, judgmental sampling, snowball sampling. Here, let us discuss all these types of non-probability sampling in detail:

**i. Convenience Sampling:** In a convenience sampling method, the samples are selected from the population directly because they are conveniently available for the researcher. The samples are easy to select, and the researcher did not choose the sample that outlines the entire population.

**ii. Consecutive Sampling:** Consecutive sampling is similar to convenience sampling with a slight variation. The researcher picks a single person or a group of people for sampling. Then the researcher researches for a period of time to analyze the result and move to another group if needed.

### iii. Quota Sampling: In the quota sampling method, the researcher forms a sample that involves the individuals to represent the population based on specific traits or qualities. The researcher chooses the sample subsets that bring the useful collection of data that generalizes the entire population.

**iv. Purposive or Judgmental Sampling:** In purposive sampling, the samples are selected only based on the researcher’s knowledge. As their knowledge is instrumental in creating the samples, there are the chances of obtaining highly accurate answers with a minimum marginal error. It is also known as judgmental sampling or authoritative sampling.

**v. Snowball Sampling:** Snowball sampling is also known as a chain-referral sampling technique. In this method, the samples have traits that are difficult to find. So, each identified member of a population is asked to find the other sampling units. Those sampling units also belong to the same targeted population.

**4. 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. The strategies and procedures used to collect data for research purposes are known as data collecting methods. These techniques might entail either quantitative or qualitative approaches to data collection and can range from straightforward self-reported surveys to more intricate experiments. There are mainly two sources of Data collection:

**a. Primary Data Collection Method**: It is collected from first-hand experience and is not used in the past. The data gathered by primary data collection methods are specific to the research’s motive and highly accurate.

**b. Secondary Data Collection Methods:**

Secondary data is the data that has been used in the past. The researcher can obtain data from the data sources, both internal and external, to the organizational data.

* Internal sources of secondary data:
* Organization’s health and safety records
* Mission and vision statements
* Financial Statements
* Magazines
* Sales Report
* CRM Software
* Executive summaries
* External sources of secondary data:
* Government reports
* Press releases
* Business journals
* Libraries
* Internet

The secondary data collection methods can also involve quantitative and qualitative techniques. Secondary data is easily available and hence, less time-consuming and expensive than primary data. However, with the secondary data collection methods, the authenticity of the data gathered cannot be verified.

**5. Tools and methods of data collection:** This element of research design involves the description of different tools and methods of data collection. The various steps used for gathering and analyzing data in a research investigation are known as the methods of data collection. The various steps used for gathering and analyzing data in a research investigation are known as the methods of data collection. The means of gathering data with the use of specific tools that are used in given methods Instruments/Tools of data collection. Instrument is a device used to measure the concept of interest in a research project that the researcher uses to collect data. There are different techniques as follow:

**i. Interview:** An interview is a conversation between two or more people, where questions are asked by the interviewer to obtain information from the interview. It may be defined as the two ways systematic conversation between an investigator and an informant initiated for obtaining information relevant to specific study.

Characteristics:

• The participants, the interviewer and the respondents are stranger.

• It is a mode of obtaining verbal answers to questions put verbally.

• Investigator records information furnished by respondents

• It is a conversation with specific purpose • It should not need face to face because it can be conducted over telephone also

• It is a conversation between two persons and is not always limited to a single respondent.

**ii. Questionnaire** : A questionnaire is structured instrument consisting of a series of questions prepared by researcher that a research subject is asked to complete, complete, to gather data from individuals about knowledge, attitude and feeling. A questionnaire is a structured self-report paper and pencil instrument that a research subject is asked to complete

**Types:**

• Open Ended Questions

• Closed Ended Questions

* + Dichotomous Questions
  + Multiple Choice Questions
  + Cafeteria Questions
  + Rank Order Questions
  + Contingency Question

**iii. Attitude scales**: A scale is a device designed to assign a numeric score to people to place them on a continuum with respect to attributes being measured.

**Types:**

• Likert scale

• Semantic differential scale

• Visual analogue scale

• Observations

• Rating scale

**iv. Observations:** It is a way of gathering data by watching behavior, events or noting physical characteristics in their natural settings. Observations can be overt (everyone knows that they are being observed) observed) or covert (everyone do not know that they are.

**Types:**

• Structured Observation

• Unstructured Observation

• Participant Observation

• Non Participant Observation

**v. Rating Scales:** They are refers to a scale with a set of opinion, which describes varying degree of the dimensions of an attitude being observed. Rating scales is a device by which judgment may be qualified or an opinion concerning a trait can be systematize.

**Types:**

• Graphic Rating Scale

• Descriptive Rating Scale

• Numerical Rating Scale

• Comparative Rating Scale

**vi. Checklist:** A checklist is a simple instrument consisting prepared list of expected items of performances or attributes where are

**vii. Bio Physiological Methods**: The method involves the collection of bio physiological data from subjects by using the specialized equipment’s to determine physical and biological status of subject.

**Types:**

a. In vivo Bio Physiological Methods: The measurements are directly performed over the organism or study subject by using specialized instruments or equipment’s. Ex: BP, ECG

b. In vitro Bio Physiological Methods: They are the measurements carried out outside the organism or study subject by using specialized instruments or equipment’s. Ex: Radiological Measure

**viii. Projective Technique**: These are the methods of measuring psychological attributes by providing respondents with unstructured stimuli to which they respond.

**Types:**

• Association Technique

• Completion Technique

• Construction Technique

• Expressive Technique

**6. 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.

**a. Steps in Quantitative Data Analysis:**

1. Data management – Test run your software and finally perform data cleaning.

2. Understanding variable types – identify your dependent or independent variables and their measurement scales (nominal, ordinal, interval, and ratio).

3.Run descriptive statistics – Summarize the basic features of your data set through measures of central tendency (mean, mode, and median), dispersion (range, quartiles, variance, and standard deviation), and distribution (skewness and kurtosis).

4. Run appropriate inferential statistics – This allows researchers to assess their ability to draw conclusions that extend beyond the immediate data. Differences between two or more groups; Changes over time; or Relationship between two or more variables

5. Make sure you selecting the right statistical test – This relies on knowing the nature of your variables; their scale of measurement; their distribution shape; and the types of question you want to ask.

6. Look for statistical significance – This is generally captured through a ‘p -value’, which assesses the probability that your findings are more than coincidence. The lower the p -value, the more confident can be that findings are genuine

**b. Steps in Qualitative Data Analysis:**

1. Write down all discussions verbatim on a paper

2. Tag points: fear of pain, Fear of disability, Fear of surgery

3. Form similar ideas/points: fear

4. Develop themes which reflects your interpretation of pertains across your data: lack of emotional control

5. Use quotations to illustrate categories and themes to keep the analysis firmly grounded in the data.

6. Draw conclusions.

***Factors to consider when choosing a research methodology***

* **Research objective:** Consider the research project's goal. When researchers know what information they need at the conclusion of the project to accomplish their goals, they can choose the best technique and research method.
* **Nature of the research:** If the goals and objectives are exploratory, qualitative data collecting approaches will most likely be required. However, if the research's goals and objectives are to measure or test something, quantitative data collection methods will be required.
* **Sample size:** How large of a sample is required to answer the studies questions and satisfy the objectives? The sample size can influence your data collection methods, such as whether you conduct in-person interviews with smaller samples or employ online surveys with bigger ones.
* **Significance of statistics:** Another thing to think about is whether you need concise, data-driven study results and statistical solutions. Alternatively, consider whether the study questions necessitate an understanding of reasons, perspectives, opinions, and motivations.
* **Availability of time:** If there is a time constraint, consider strategies such as random or convenience sampling and instruments that allow for data collecting in a matter of days. In-person interviews and observations are feasible if additional time is available for data collection.

Summary

* Nursing research is research that provides evidence used to support nursing practices. Nursing, as an evidence-based area of practice, has been developing since the time of Florence Nightingale to the present day, where many nurses now work as researchers based in universities as well as in the health care setting.
* Research design is broadly divided into quantitative and qualitative research design
* Quantitative research design aims at finding answers to who, what, where, how, and when through the course of research. Moreover, the outcome of the quantitative analysis is easy to represent in the form of statistics, graphs, charts, and numbers.
* Qualitative research design focuses on finding answers to how and why. It uses open-ended questions and helps the subjects express their views clearly.
* Types of research designs into five categories: Experimental design, Correlational design, Descriptive design, Explanatory design, Diagnostic design.
* Data collection gathers information needed to make accurate judgments about a patient's present condition.
* The client is the primary source of data. Family members or other support persons, other health professionals, records and reports, laboratory and diagnostic analyses, and relevant literature are called secondary sources.
* Some common data collection methods include surveys, interviews, observations, focus groups, experiments, and secondary data analysis. The data collected through these methods can then be analyzed and used to support or refute research hypotheses and draw conclusions about the study's subject matter.

**References:**

* American Nurses' Association. Research priorities for the 1980s: Generating a scientific basis for nursing practice (Publication No. D-68). Kansas City, Mo.: American Nurses' Association, 1981.
* Auerbach, C. F., & Silverstein, L.B. (2003). Qualitative data: An introduction to coding and analysis. NY: NYU Press.
* Denzin, N. K., & Lincoln, Y. S. (Eds.). (2000). Handbook of qualitative research (2nd ed.). Thousand Oaks, CA: Sage.
* Flick, U. (1998). An introduction to qualitative research. Thousand Oaks, CA: Sage.
* Formplus,2021. Data Collection Methods & Tools For Research https://www.formpl.us/blog/data-collection-method
* Hill, C. E., Thompson, B. J., & Williams, E. N. (1997). A guide to conducting consensual qualitative research. The counseling psychologist, 25, 517 – 557
* Jotform. 2021. Data collection methds.https://www.jotform.com/data- collection-methods
* Mixed Methods (nova.edu)
* O’Leary,Z.The essaential guide to doing your research project.SAGE Publishing,3rd edition,2020. https://study.sagepub.com/oleary3e/student- resources/analysing-data/steps-in-qualitative-analysis
* Research Design: Qualitative, Quantitative, and Mixed Methods Approaches by John W. Creswell, 4th edition. John Creswell
* Seers,K. Qaulitative data analysis.BMJ Evidense based Nursing.2012:11;(1) <https://ebn.bmj.com/content/15/1/2>
* Suresh K. Sharma Nursing Research and Statistics Edition: 4th Edition, 2022
* Tools for data collection and data analysis in Nursing research (tghn.org)
* Types of Quantitative Research | Voxco
* What is Quantitative Research? Definition, Methods, Types, and Examples | Researcher.Life