

# Research Design Approaches in Medical and Clinical Sciences: Assumptions, Strength, and Weakness

Bartholomew Chukwuebuka Nwoguzé<sup>1\*</sup>, Mary Isioma Ofili<sup>2</sup>, and Elizabeth Osita Egbule<sup>3</sup>

<sup>1</sup>Department of Physiology, Delta State University, Abraka Delta State, Nigeria.

<sup>2</sup>Department of Nursing Science, Delta State University, Abraka Delta State, Nigeria.

<sup>3</sup>Department of Guidance and Counselling, Delta State University, Abraka Delta State, Nigeria.

## ABSTRACT

Basic research is appropriate for finding overarching principles of human behavior and biophysiological processes, whereas applied research is intended to demonstrate how these principles can be used to solve problems in a healthcare setting. Hence, this review paper examined the research design approaches in medical and clinical sciences, considering its strengths and weaknesses. Research process consists of the necessary steps or series of actions required to conduct a scientific research effectively and the desired sequencing of these steps. Research methods are classified into various types, which majorly include qualitative, quantitative, and mixed methods. Qualitative research could be phenomenological, grounded theory, ethnographic, or exploratory-descriptive in nature. Quantitative research uses numerical data to obtain knowledge about the world. Quantitative research conducted in medical and clinical sciences could involve; descriptive research, correlational research, quasi-experimental research, or experimental research in nature. However, qualitative research can also be helpful in examining subjects about which there is little information and in understanding subjective data. Mixed research methods combine quantitative and qualitative research methods in a single study. In general, the knowledge of research design can help researcher better plan the project utilizing the most appropriate methodologies and techniques.

**KEY WORDS:** RESEARCH DESIGN, QUANTITATIVE RESEARCH, QUALITATIVE RESEARCH, MIXED METHOD RESEARCH, MEDICAL AND CLINICAL SCIENCES.

## INTRODUCTION

Research involves a systematic and controlled investigation through which data is collected, organized, analyzed, and interpreted to eliminate difficulties and improve conditions (Kerlinger, 1986). Research is a careful, systematic, organized pertinent study and investigation carried out in some field of knowledge to gather data or information to establish facts or principles. Leedy & Ormrod (2014) maintained that research is conducted for the purpose of description, exploring, explaining, and predicting. The fundamental principles that guide scientific research are empiricism, replicability, objectivity, systematic observation, reliability, accuracy, predictability, ethics, and generalization. Research is primarily committed to establishing systematic, reliable, and valid knowledge. As such, the purpose of conducting research includes; scientific study, generating new knowledge and/or finding

truth, improving understanding, formulating/reviewing theories, clarifying fact, refining existing research method, decision making process for effective planning, program, and implementation, practical contribution and solving problem (Denzin & Lincoln, 2005).

A research design guides the planning and implementation of a conceived study to adequately answer generated questions or test-formulated hypotheses raised for investigation. Knowledge of the different research designs will select the design(s) appropriate for his study. Each design offers a unique approach or plan to answer the research question. Research approaches are plans and research procedures that span the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation. This plan involves several decisions that involve an approach that should be used to study a topic (Cohen et al., 2011). The philosophical presumptions of the researcher, the inquiry processes (referred to as research designs), and the particular research techniques for gathering, analyzing, and interpreting data should be taken into account when making this choice. The type of investigation being conducted, the topic or problem of the research, the target audience for the

**Article Information:**\*Corresponding Author: [bukasono123@gmail.com](mailto:bukasono123@gmail.com)

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study, and the individual experience of the researcher all play a significant role in the choice of research method to be used (Streefkerk, 2022).

Research conducted in medical and clinical sciences varies considerably. Probably, most researchers are familiar with clinical research, basic (laboratory) research, healthcare (services) research, educational research, and health systems (policy) research. The research approach involves a systematic process that clearly defines the objective, managing the generated data, and communicating the research findings within established framework (research design) and in accordance with existing guidelines. Frameworks and guidelines provide researchers with an indication of what to include in the research, how to carry out the research, and what types of inferences are probable based on the collected data (Pandey & Pandey, 2015). Research in the medical and clinical sciences to solve everyday practical health-related problems. When organizing such a study, researchers must consider the presumptions they will apply, the research design, and the particular technique or procedures that will be adopted to carry out the strategy to achieve a desirable outcome (Lincoln et al., 2011).

Medical and Clinical sciences utilize either qualitative, quantitative or mixed methods; however, the researcher is at liberty to choose whatever kind of study to undertake from these three options. Researches involving the use of words (qualitative research) as opposed to figures (quantitative research) or closed-ended questions (quantitative hypothesis) compared to open-ended questions (qualitative interview questions) are common ways to distinguish between the types of research design to be adopted in a study. Both quantitative and qualitative research methods are intended to answer a particular kind of research issue, and examine and investigate the many claims of knowledge (Berg & Howard, 2012). The qualitative approach helps the researcher to investigate and acquire a deeper understanding the complexity of a phenomenon (subjective measurement), whereas the quantitative method offers an objective measurement of reality (Mertens, 2003).

Researchers therefore decides whether to use a qualitative approach, quantitative approach, or a mixed method approach when designing a medical or clinical research project. The latter strategy is based on the combination of quantitative and qualitative research methods (Kothari, 2014). However, the study problem or subject being researched, the audience for whom the researcher writes, and the researcher's own experiences all have an additional impact in determining the research approach of interest to be adopted in solving health related-problems in medical and clinical sciences.

**Research Design:** A research design is the framework or guide used for the planning, implementation, and analysis of a study. Research design refers to the overall strategy or plan for conducting a research study. A research design implies the procedural plan or framework adopted by a researcher in answering the generated questions validly, objectively, accurately and economically in a given research (Kumar,

2005). Research design involving qualitative, quantitative, and mixed method approaches constitutes the forms of inquiry that offer particular guidance for the procedures within a study design (Pathak, 2011). Research design is essential, considering that it sets the pathway for the study as a whole and ensures that the research in medical and clinical sciences are conducted meticulously and precisely. In addition, it describes the core aim and research objectives being adopted in a given study, as well as the research protocols and techniques employed in gathering and processing statistical data. In other words, a research design is the plan or blue print for testing formulated hypothesis or answering research questions generated in medical and clinical sciences research.

Research design equally outlines the fundamental techniques used by researchers to produce reliable and understandable findings. It therefore implies that some of the most significant methodological choices made by researchers are incorporated into the research design (Kerlinger, 1986). When conducting research in medical and clinical sciences, we must focus on a particular design that provides a framework for the study intervention and treatment, as this provides the research with a sense of the statistical methods and logistical arrangements needed in collecting, coding, presenting, analyzing, and interpreting the statistical data as it relates to health-related issues under study. Thus, before starting a research endeavor in medical and clinical sciences, it is critical and pertinent to comprehend and adopt a suitable research design for such study.

**Research Design Used in Medical and Clinical Sciences:** In the medical and clinical sciences, research design is used to investigate the causes, prevention, and treatment of diseases. Researchers in this field employ several methodologies, including case-control, cohort, and randomized controlled trials, to examine various aspects of health and health-related problems (Buiting et al., 2011). Types of research designs used in medical and clinical sciences falls into three broad categories, namely: quantitative research, qualitative research, and mixed methods. This is described as follows;

**Quantitative Research:** In formal, objective, systematic processes like quantitative research, numerical data are employed to gather knowledge about the outside world. Quantitative research design is aimed at discovering how many people think, act, or feel in a specific way. Quantitative research emerged around 1250 A.D. and was driven by investigators with the need to quantify data. Since then, the use of quantitative research as a means of generating new knowledge and understanding has taken center stage in western culture. A numerical or statistical approach to research design is what makes up a quantitative research method. According to Leedy & Ormrod (2014), because quantitative research expands on preexisting theories, it is specific in its surveying and experimentation approach. The methodology of a quantitative research maintains the assumption of an empiricist paradigm (Creswell, 2014). Such research, is probably independent of the researcher. Consequently, data are employed to measure reality

objectively. This implies that meaning is produced by quantitative research via objectivity found in the gathered data.

The method of assessing objective theories by looking at the relationship between variables is called quantitative research. In turn, these variables can be monitored, usually with devices, allowing for the statistical analysis of numbered data. The final written report follows a predetermined format that includes an introduction, methods, analyzes, review of findings, theory, and literatures, and discussion. Similar to qualitative researchers, people conducting this type of research have presumptions about the deductive testing of ideas, the inclusion of bias safeguards, the control of alternative explanations, and the ability to generalize and replicate the results. The purpose of quantitative research is to examine the relationship between variables, such as dependent, independent, and extraneous variables (Creswell, 2014). Data sources for quantitative research includes; ordinal or cardinal data from surveys, financial reporting, census reports, test scores, demographics, and/or observations. The analytic techniques used include; Descriptive statistics, regression, regression discontinuity and hierarchical linear modeling.

**Quantitative research process involves:** large sample sizes, concentrating on the quantity of responses. Methods of measurement commonly used in quantitative research include scales (nominal, ordinal, interval, and ratio), questionnaires (open and closed ended), and physiological measures (control, case, intervention and treatment etc). The data collected in quantitative research are numbers that are analyzed with statistical techniques to determine the results. In quantitative research design, closed-ended questions are typically preferred. Respondents typically will not be able to provide long, open-ended answers when given a predetermined selection of options. The goal of quantitative research is to apply the results outside the context in which it was conducted. The results of in-depth studies in medical and clinical sciences may be extrapolated to other people and environments. Quantitative research methods applicable in medical and clinical sciences include; experimental research, quasi experimental research, survey research, descriptive research, comparative research and correlational research (Lincoln et al., 2011).

**Experimental research:** Experimental research involves manipulation of variables after the research subjects have been divided into treatment groups. Experimental designs typically use random assignment, manipulation of an independent variable(s), and strict controls. Experimental research is a method of collecting information and data on a subject through observation in controlled settings. This is primarily concerned with the type of cause and effect study. It uses two sets of variables. Experimental research seeks to determine whether a specific treatment influences an outcome. A researcher uses the first set as a reference point to calculate the differences in the second set. In experimental research, the researcher identified the dependent and independent variables and sought to determine the effect of changes in the independent variables on the dependent variables. This is purely quantitative in

nature and deals with future events. Experiments include true experiments, with random assignment of subjects to treatment conditions, and quasi experiments that use non-randomized assignments (Keppel, 1991).

The experimental design provides increased confidence in cause-and-effect relationships. Random assignment means that each subject had the same chance to be assigned to the control or experimental group. The use of random assignment of subjects attempts to eliminate systematic bias. Random assignment is different from random sampling. Random sampling means that each subject had an equal chance of being selected from a larger group to participate in the study. However, it is the random assignment to different conditions that distinguishes a true experimental design. When studying the direct causal or anticipated relationship between variables, real experiments must include randomization, a control group, and variable manipulation. When any of these conditions is not met, the design is no longer considered a legitimate experiment and is labelled as quasi experimental (Keppel & Wickens, 2003).

Studies in clinical and medical sciences adopts experimental research designs, and this can be animal experiment studies (Anachuna et al., 2018; Nwogueze et al., 2020; Enebeli et al., 2022; Nwogueze et al., 2023) and human or clinical experimental studies (Ofili & Ncama, 2014; Ofili et al., 2015; Nwogueze et al., 2024a; Ofili et al., 2024) in nature. The simplest of all experimental designs in medical and clinical sciences is the post-test-only control group. Other common true experimental designs include; pretest-posttest control group design, Soloman four group design, and cross-over design.

**Quasi-experimental studies:** The quasi-experimental research design is similar to the experimental research design, but it lacks one or more of the features of a true experiment. The effectiveness of medical and clinical interventions in foreseeing and regulating the outcomes sought for patients and families is determined through quasi-experimental research design. Quasi-experimental, like true experimental designs, examines cause-and-effect relationships between or among independent and dependent variables. However, one of the characteristics of true experimental design is missing, typically the random assignment of subjects to groups. Although, quasi-experimental designs are useful in testing the effectiveness of an intervention and thus can be considered closer to natural settings, these research designs are exposed to a greater number of threats of internal and external validity, which may decrease confidence and generalization of study findings (Fowler, 2009). The most common used quasi-experimental designs used in medical and clinical sciences are: nonequivalent group, pretest-posttest group design, control-group interrupted time series design, single-group interrupted time series design, and counter balanced design.

**Survey Research:** Survey approach involves research that collects information from a sample of people based on their response to questions. This kind of study permits usage of numerous techniques for participant recruitment,

instrumentation, and data collection. The methods used in survey research can be either quantitative (e.g. questionnaires having numerically rated items) or qualitative (such as using open-ended questions) or a combination of both (i.e., mixed methods). Surveys are widely used in research in social and psychological disciplines because they are frequently used to describe and examine human behavior, however, it can be used in research conducted in medical and clinical science discipline. By examining a sample of a population, survey research offers a quantitative or numerical account of the attitudes, trends, or opinions of that population. It comprises cross-sectional and longitudinal research with the goal of extrapolating the findings from a sample to the entire population, using questionnaires or structured interviews for data collection (Fowler, 2009).

**Longitudinal research:** this research examines data from across time. In a longitudinal study, participants are tracked over time as risk factors, health outcomes, or both are continuously or repeatedly monitored. In other words, the variables are measured repeatedly over different periods of time. These investigations come in a wide range of sizes and complexity. At one extreme, a sizable population may be researched for years. Most longitudinal studies look at the links between initial disease morbidity or death and exposure to known or suspected disease causes. The simplest design identifies a sample or cohort of subjects exposed to a risk factor and a sample of controls who were not exposed to the risk factor. The incidence of disease in each of the two groups is then assessed after prospective follow-up with each group. Estimating attributable and relative risks involves comparing incidence rates. Confounding variables can be taken into account in two ways: by matching the controls to the exposed individuals so that they have a comparable pattern of exposure to the confounder, or by determining the exposure to the confounder in each group and correcting for any variation in the statistical analysis. Case studies, historical studies, and genetic research are a few examples of this genre (Fowler, 2009).

**Cross-sectional research:** The gathering of pertinent information (data) at a certain point in time is what distinguishes cross-sectional studies from other types of research. Since all data are obtained and generally refer to the time at or around the time of the data collection, there is no time dimension involved in cross-sectional studies. Although, it is frequently said that data for cross-sectional studies is gathered at a specific point in time, the term "a point in time" is typically not defined or described. The study question may have an impact on the temporal dimension. Each component of the study, including the selection of study participants, the collection of data, and the definition of the conditions or qualities examined, must have a clear understanding of the temporal dimension (Fowler, 2009).

**Descriptive research:** Descriptive research explores new areas of research and describes situations as they exist in the world. A phenomenon or circumstance is described using this kind of study design. It involves gathering information using questionnaires, interviews, surveys, and observations. The researcher observes, describes, and

documents various aspects of a phenomenon. There is no manipulation of variables or search for cause and effect related to the phenomenon. Descriptive designs describe what actually exists, determine the frequency with which it occurs, and categorize the information. Descriptive research can be useful in medical and clinical sciences to identify patterns, trends, and relationships of a given data (Keppel & Wickens, 2003).

**Comparative research:** Comparative research can also be called *ex post facto* or causal-comparative studies. Variations in the variables that naturally exist between two or more cases, subjects, or study units are described by comparative studies. Hence, when using a comparative design, researchers typically make assumptions about how two or more units' variables differ from one another. The main difference between this approach and the quasi-experimental design is the lack of researcher control of the variables (Creswell, 2009).

**Correlational research:** The purpose of the correlational study design is to determine whether two or more variables are related. Using such a research approach makes it easier to build and improve explanatory knowledge. It looks at relationships. Correlational designs, when compared to direct cause-effect correlations, include the systematic exploration of the nature of relationships, or associations between and among variables. Determining the direction and degree of association between variables is the goal of correlational research. Correlations analyze the direction, degree, magnitude, and strength of relationships or associations. The results of correlational studies provide the means for generating hypotheses to be tested in quasi-experimental and experimental studies (Bogdan & Biklen, 1992). Three of the most common correlational designs include; descriptive, predictive, and model testing correlational design.

**Descriptive correlational designs:** This types of descriptive correlation studies describes the variables and the relationships that occur naturally between and among them.

**Designs for predictive correlation:** The variance of one or more variables is predicted through predictive correlational research based on the variance of another variable (s). The study variables, like the experimental designs, are classified as independent (predictor) and dependent (outcome). These variables, however, are not managed and occur spontaneously.

**Correlational design model testing:** Correlational investigations are used to examine or pilot test potential relationships for a model or theory. The study variables, like experimental designs, are classed as independent (predictor) and dependent (outcome). The factors, however, are not adjusted and occur spontaneously.

#### Assumptions of quantitative research

- The following are the perceived key assumptions underlying the quantitative research approach;



- Quantitative research is concerned with questions about: how much? How many? How often? To what extent?
- Reality is objective, "out there" and independent of the researcher; therefore, reality is something that can be studied objectively;
- Research is based primarily on deductive forms of logic, and theories and hypotheses are tested in cause-effect order;
- The researcher should remain distant and independent of what is being researched;
- The goal is to develop generalization that contribute to theory that allows the researcher to predict, explain, and understand a phenomenon.
- Data analysis is mainly statistical, and the result of research is a number, or a series of numbers, presented in tables, graphs or other forms of statistics.

**Strength and Weakness of Quantitative Research:** The quantitative research approach has the following significant strengths. The first is that it can be administered and evaluated quickly. No time is needed in the organization before administering the survey, and the responses can be tabulated in a short period of time (Carr, 2014). Second, numerical data gathered using this approach promote effective comparisons between groups or variables, as well allows for examination of the extent of acceptance or rejection between respondents. Bryman, (2001) argued that the quantitative research approach is research that places emphasis on numbers and figures in data collection and analysis. Imperatively, the quantitative research approach can be seen as being scientific in nature. The use of statistical data for the research descriptions and analysis reduces the time and effort which the researcher would have invested in describing his result.

Third, the use of scientific methods for data collection and analysis makes generalization possible with this type of approach. The interaction made with one group can be generalized. Fourth, replicability is another benefit derivable from the use of this research approach. Since the research approach basically relies on hypotheses testing, the researcher does not need to do intelligent guesswork, he should follow clear guidelines and objectives (Lichtman, 2013). Finally, the advantage of legitimate quantitative data, that is, data which are collected rigorously, using the appropriate method and analyzed critically, is in their reliability, and therefore, can be repeated at any other time or place and still get the same results.

**Quantitative research has the following weakness:** Many crucial characteristics of individuals and societies are not meaningfully reduced to numbers or adequately understood without making reference to the local context in which people live. The detachment of the researcher from the participants means that he is an 'observer' or 'looking in' and can be considered a weakness within the quantitative research approach. With this type of researcher/participant relationship, it will be extremely difficult to get the in-depth study of the phenomena within its natural settings. In quantitative research, a large sample size is required; however, lack of resources often hinders effectiveness of

large-scale research. Another weakness of quantitative data with regard to disaster survey, there is difficulty of in-depth description of the experience of disaster of an affected population.

**Qualitative Research:** A systematic subjective approach called qualitative research is used to describe and give meaning to circumstances and events in the real world. The basis of qualitative approaches is not a forecast between two variables. Rather, open exploration of a particular topic is done using qualitative methodologies. These techniques are especially helpful for examining subjects that are poorly understood and for comprehending subjective data, such as people's experiences. In qualitative research, the research process is inductive, rather than deductive, and begins with broad exploratory aims that provide a focus for study without preempting which aspects of the experience may be deemed important or relevant. When there is a knowledge gap or when little is known about a specific occurrence, experience, or notion, researchers utilize qualitative research designs. The goal of qualitative research is to understand or interpret the meanings people give to their experiences by observing people in their natural environments (Carr, 2014).

A method of investigating and understanding the meaning that individuals or groups assign to a social or human issue is called qualitative research. Emerging questions and processes, data acquired in the participant's context, inductive data analysis leading from specifics to broad themes, and the conclusions drawn by the researcher of what the data means are all part of the research process. The final written report is organized in a customizable way. In qualitative research, information is collected in the form of words that are then meaning-analyzed after being gathered through focus groups, observations, and interviews. Qualitative research findings are unique, dynamic, focus on understanding, and facilitate theory development. The purpose of qualitative research is to explore the meaning of people's experiences, the meaning of the culture of the people, and how people view a particular issue or case (Yauch & Steudel, 2010).

Qualitative research is used to explore health-related or illness-related experiences or groups where little is known, or where current understanding seems inadequate. It is also used to get fresh perspectives on topics, populations, events, or ideas that have already been studied. Although it can be utilized concurrently or sequentially, it frequently comes before quantitative work. The most distinctive characteristics of qualitative research are that the researcher is also considered an instrument of data collection and the resulting data are mainly words or narrative descriptions rather than numbers (Carr, 2014). Data sources for qualitative research includes; normative data from interviews, documents, focus groups, and/or observations. The analytic techniques used include; thematic analysis, content analysis, and analysis of frequency. Types of qualitative research are discussed as follows;

**Phenomenological study:** Phenomenology uses an inductive, comprehensive approach to explain an experience

from the perspective of the person experiencing it, such as the lived experience of losing a child. The purpose of phenomenological research is to describe specific phenomena of interest as they are lived and experienced by individuals. This type of inquiry is derived from philosophy and psychology and involves the researcher summarizing participants' accounts of their lived experiences with a phenomenon. The focus of phenomenological studies is on understanding what an experience means within the context of people's lives.

This is referred to as capturing the lived experience. For a phenomenological study, the researcher purposefully chooses individuals or groups that have encountered the phenomena as their sample. The focus of the study determines the inclusion and exclusion criteria. The scope of the study, the nature of the subject, and the number of interviews conducted with each participant all play a role in estimating the size of the participant pool. The substance of the experiences for multiple people who have witnessed the event is summarized in this summary (Creswell, 2003). This design usually involves interviewing people and has solid conceptual foundations. Example: The experience of being with a seriously ill child.

**Grounded theory research:** Grounded theory research is an inductive research technique used to formulate, test and refine a theory on a particular phenomenon. A theory is developed based on the examination of data (rather than applying a predetermined theory). Researchers use a grounded theory design when they are interested in phenomena involving the social processes underlying human experiences and behavior. The aim of a grounded theory approach is the generation of theory that comes from or is 'grounded' in the data. The primary characteristics of grounded-theory designs are theoretical sampling and the constant comparison of data with emerging categories. This process involves using multiple stages of data collection and the refinement and interrelationship of information categories (Creswell, 2003).

Data collection and analysis occur simultaneously, and each piece of new data is constantly compared and contrasted with previously identified concepts. Sample sizes tend to be larger in grounded-theory designs, when compared to other qualitative designs, because of the need for theoretical sampling. Theoretical sampling means that the selection of participants is directed by the emerging analysis. In other words, the researcher begins with a focused sample, but as different concepts emerge, the researcher sought out additional participants based on a better understanding of these concepts. To obtain the whole spectrum of experiences or complete knowledge, this method frequently involves looking for outliers and bad situations. Theoretical sampling continues until the researcher is satisfied that the theory synthesized from the data and concepts is reflective of the social process under study. Example: Examination of the relationship between self-history and anorexia nervosa eating disorders using ground theory method.

**Ethnographic research:** Ethnography is the research method that comes to mind when considering the study of

the shared pattern of language, behaviour, and action of a culture group in a natural setting over a prolonged period. It involves research intended to provide descriptions of systems, processes, or phenomena within their specific context. It was developed by the discipline of anthropology and sociology to investigate cultures through an in-depth study of the members of the culture. With the primary goal of advancing understanding and communication, the researcher's role in ethnography is to describe the special and distinctive practices or codes of conduct of the subculture or culture. Ethnography equally involves experiencing, most often by participant observation, enquiring, through interviews and oral histories, and examining, the study of cultural documents and artifacts.

Most of the time, ethnography is equated with the extended immersion of the researcher in the culture, group, or community under study. This is often referred to as fieldwork, and the extensive notes taken by the researcher are referred to as field notes. It is crucial to take into account cultural variations in health practices, while treating patients and their families. Researchers use ethnography as a research design when seeking a deeper understanding or description of a specific culture, group, or community (Dagn & Tebeje, 2021). Data collection often involves observations and interviews. Example: Investigation of barriers to the effectiveness of opioids in the management of cancer pain in Delta State.

**Case-study research:** An in-depth study of a particular case, which can be descriptive, explanatory, or exploratory. A case study is described as "an intensive study about a person, a group of people, or a unit, with the aim of generalizing over several units." Case-control studies involve a description of cases with and without a pre-existing condition or exposure. A rigorous and systematic assessment of a single person, group, community, or other unit in which the researcher looks at in-depth data related to various variables has also been referred to as a case study. When it is important to gain a thorough understanding of an issue, event, or phenomenon of interest in its authentic real-life setting, the case study approach is especially helpful to use. It discusses strange occurrences.

Depending on the content, it may be qualitative or quantitative in character. The cases, subjects, or units of study can be an individual, a family, or a group. Case-control studies are more feasible than experiments in cases in which the outcome is rare or takes years to develop (Bryman, 2008). This design is also known as a case report or case study. Example; Assessment of adolescent sexuality in females of childbearing age using a qualitative case study approach or Assessment Knowledge, attitude & adherence of among Type II Diabetes Mellitus patients to a given dietary regimen using a qualitative approach (Ofili et al., 2023).

**Narrative inquiry:** Narrative inquiry is a broadly determined and interpreted research design that involves individual narrative accounts and the interpretation of their meaning. Narrative accounts can be obtained from a number of groups including patients, family, and caregivers.

In narrative inquiry, the researcher studies the lives and experiences of individuals or groups by asking them to talk about or recount their experiences. The researcher then retells or restores the stories that emerge after analysis of the narratives within and between individuals. The main goal of narrative inquiry is to listen and challenge preconceived notions.

Children, for instance, are frequently understood through an adult proxy, primarily their parents. When children are asked to describe their own experiences, their narrative reports are often very different. The same is true for other people in the room and patients as well. The number of participants varies and depends on the general focus and scope of the study and the amount of information gained from each narrative account. To create a meta-narrative, or overarching story, the researcher first analyzes each participant's narrative individually, then compares them with those of other participants (Bryman, 2008; Dagn & Tebeje, 2021). Example: Evaluation of the life experiences of the Alzheimer's disease trends from childhood to adulthood.

**Exploratory research:** Exploratory research is conducted to address an issue or problem in need of a solution or understanding. Explanatory research focuses on why questions. Answering the 'why' questions involves developing causal explanations. Causal explanations argue that phenomenon Y is affected by factor X. Qualitative researchers' use this methodology to investigate a problem area using a variety of qualitative methodology with the goal of articulating the issue of interest and fostering knowledge. The way in which researchers develop research designs is fundamentally affected by whether the research question is descriptive or explanatory. It affects the information collected (Bogdan & Biklen, 1992).

**Philosophical research:** Philosophical research is entirely qualitative in nature. The researcher concentrates on how other people see the research subject matter. It is a method of research that aims to critically evaluate a philosophy or school of thought in order to gather new knowledge that can be applied to create new concepts, theories, or benchmarks. It involves research into the evolution of philosophical thought in general as well as philosophical history and various philosophers (Bogdan & Biklen, 1992; Johnson & Christensen, 2012).

**Historical research:** Historical research aims to provide descriptions of systems, processes, or phenomena within their specific context. To understand how previous events or ideas affected the events and ideas of the present, historians collect and analyze data on historical events or ideas. In order to understand how particular events affected the ones that followed, it investigates potential causes for those events. Historical research can give a scholar adequate knowledge about potential future events in addition to aiding in the identification of linkages between past and present events (Johnson & Christensen, 2012).

The primary sources of information used in historical research include documents from the time period studied,

including historical records, books, photographs, letters, and other documentary evidence. Simply said, those sources were written by those who took part in or were present during the event.

Research can also benefit from secondary source materials, such as books and articles that were written after the events. However, secondary sources of information, which usually contain content that the writers developed, utilizing a range of sources, should be used with caution because they can be more slanted. It is important to note that primary sources might potentially be prejudiced and that there is no assurance of information authenticity because the research is looking for solutions in the past. The analysis of recent or distant past events is a component of historical study (Bogdan & Biklen, 1992). Example: Evaluation of breastfeeding trends among women attending the Federal Medical Center, Asaba, Delta State.

**Assumptions of qualitative research:** The following are the perceived key assumptions underlying the qualitative research approach;

- Qualitative research is concerned with finding the answer to questions that begin with why? how? In what way?
- A process of building a complex and holistic picture of the phenomenon of interest, conducted in a natural setting. Multiple realities exist in any given situation.
- When conducting qualitative research, the researcher collects data consisting mostly of words, pictures, observations of events, etc. These may eventually be categorized in some way and possibly quantified. The goal is to uncover and discover patterns of theories that help explain a phenomenon of interest
- The researcher interacts with those he/she studies and actively works to minimize the distance between the researcher and those being researched.
- Determination of accuracy involves verifying the information with informants or triangulation among different sources of information.
- Research is context-bound and is based on inductive forms of logic; categories of interest emerge mainly from informants (subject).
- Collect narrative data to gain insight into phenomena of interest. Data analysis includes the coding of the data and production of a verbal synthesis.

**Strength and Weakness of Qualitative Research:** Qualitative research has no structured procedure and is heavily dependent on the interpretation and ingenuity of the researchers who collects, interprets, and analyze the data. It is argued that it will not be possible to conduct the same research and get the same result at any other time and place. Qualitative research is not replicable as opposed to quantitative research (Lichtman, 2013). Qualitative methods that allow researchers to explore the views of homogeneous and diverse groups of people help to unpack these differing perspectives within a community.

The primary strength of the qualitative approach to cultural assessment is the ability to investigate the underlying values,

beliefs, and assumptions. Another strength of the qualitative research approach is that the investigation is broad and open-ended and allows participants to raise issues related to their opinion. Typically, a qualitative researcher does not have a finite or preconceived set of issues to explore. In testing hypotheses, quantitative researchers try to look at cause-and-effect relationships which perhaps enable them to predict and generalize their findings to a relevant larger population. This is not possible with a qualitative research approach (Johnson & Christensen, 2012).

Despite the usefulness of a qualitative research approach for conducting research, there are still some criticisms about the efficacy of the approach. The two main disadvantages of qualitative methods are that it takes a lot of time to complete and that it may leave out anything crucial. One possible difficulty is that all researchers' views are constrained and that a specific issue may go unreported. Additionally, because qualitative research is typically unrestricted, participants have a greater say on information gathered. Another drawback of qualitative approaches is that they require labor-intensive analysis procedures, such as recoding and categorization.

Lastly, competent interviewers are necessary to carry out the core data collection operations. However, replicability is another problem associated with a qualitative research approach. Critics of this approach argue that the constructivist has abandoned scientific methods and procedures of enquiry and investigation (Cohen et al., 2011). Meanwhile, nonuse of numbers by qualitative researchers makes it difficult and impossible to simplify findings and observations. Since the approach is characterized by feelings and personal reports, it is believed that the approach cannot provide reliable and consistent data compared to using quantifiable figures (Atkins & Wallace, 2012).

**Mixed Method Research:** Mixed method research is an approach to inquiry that combines quantitative and qualitative research methods in a single study. The mixed methods approach to research provided researchers with an alternative to believing that quantitative and qualitative research approaches are incompatible and, in turn, their associated methods 'cannot and should not be mixed' (Mertens, 2003). Both the quantitative and qualitative components of the study are addressed by the specified research goal and questions. A mixed methods research design incorporates the collection of both qualitative and quantitative data, their integration, and the use of unique designs that may incorporate theoretical frameworks and philosophical presumptions. Depending on the objective of their study, researchers may be more focused on using a quantitative or qualitative research approach. In mixed methods research, qualitative and quantitative data are frequently collected and then analyzed (Bryman, 2012).

Methodologies in mixed method research are increasingly being used to increase the depth and breadth of understanding of medical and clinical phenomena. Mixed method research blends qualitative and quantitative research tools to broaden and deepen understanding. Selecting the right research method begin with identifying the research question and the

objective of the study. Creswell, (2014) suggests that mixed method research is an approach in which the researcher collects analyze and interprets quantitative and qualitative data, integrates the two approaches in various ways, and frames the study within a specific design.

Mixed methods can be used to gain greater insight into relationships or discrepancies between qualitative and quantitative data; they can give participants a voice and a chance to share their experiences throughout the research process; and they can open up new lines of inquiry that strengthen the evidence and allow for more in-depth answers to research questions. This type of study is predicated on the idea that combining qualitative and quantitative methods yields a more thorough grasp of a research problem than each method alone. The use of mixed method can promote increased academic exchange and enhance researchers' experiences by bringing diverse viewpoints to bear on the topics under investigation.

Research topics that neither quantitative nor qualitative methods alone could address are best addressed by a mixed methods strategy. However, combining different approaches in a single study can make research more difficult to perform. As diverse research teams must become familiar with alternative research paradigms and various techniques to sample selection, data collection, data analysis, and data synthesis or integration, it frequently demands additional resources (time and staff) and more research training (Lichtman, 2013). Mixed methods research comprises different types of design categories, including; explanatory, exploratory, parallel, and nested (embedded) designs.

**Explanatory sequential mixed methods:** This is a research design in which the researcher first performs quantitative research, evaluates the findings, and then builds on the findings to provide a more thorough explanation using qualitative research. Because the qualitative data further explains the initial quantitative data results, it is regarded as explanatory. Because the qualitative phase comes after the first quantitative phase, it is regarded as sequential. This kind of design is common in disciplines with a strong focus on numbers (the project starts with quantitative research). However, it may be difficult to identify the quantitative results to investigate further because there are different sample sizes for different stages of the investigation (Lichtman, 2013). Example: Identify levels of stress among interns working in hospital emergency room settings or assessing awareness & utilization levels of medical students towards insecticide-treated bed nets as measure for reducing malaria (Ofili & Nwogueze, 2024)

**Exploratory sequential mixed methods:** This is the explanatory sequential design is a reverse sequence. Under the exploratory sequential technique, the researcher starts by examining the perspectives of the participant during a qualitative research phase. After that, the data are examined and the results are utilized to construct a second quantitative phase. The development of an instrument that best fits the study sample, the selection of relevant instruments for the quantitative follow-up phase, or the specification of variables required for a quantitative follow-up study are



all possible uses for the qualitative phase. The focus on the relevant qualitative findings to employ and the selection of samples for both research stages present unique challenges to this strategy (Lichtman, 2013). Example: Identify the highest sources of workplace stress among physicians on internship working in the hospital emergency room or assessing levels of Serum Zinc and body mass index as Trajectory for hyperlipidemia and dyslipidemia among Welders following exposure to Welding Fumes & Smoking (Nwogueze et al., 2024b)

**Convergent parallel mixed methods:** To provide a thorough examination of a particular research topic, researchers would sometimes converge or integrate quantitative and qualitative data in a mixed methods research design. When using this strategy, the researcher usually gathers both types of data at about the same time and combines the data to evaluate the overall findings. In this design, discrepancies or inconsistent results are clarified or further investigated (Lichtman, 2013; Yauch & Steudel, 2010). Example: Identify sources of stress for nurses working in emergency room settings, personal coping strategies used, and types of programs or support systems provided by hospitals or assess pulmonary function parameters among females having Type II Diabetes (Eke et al., 2019).

**Embedded (Nested) mixed methods:** The fundamental principle of this design is that either quantitative or qualitative data are contained within a broader design (like an experiment), and the data sources play a supportive role in the overall design. This design also incorporates the usage of data in a convergent or sequential manner. Example: Test an online peer support program designed to reduce workplace stress for new medical house officers working in the hospital emergency room or evaluate the cognitive behaviour of health workers as it concerns sedentary lifestyle and physical activities during COVID-19 Pandemic (Nwogueze & Ofili, 2023).

**Transformative mixed methods:** This design incorporates both quantitative and qualitative data, with an overall perspective provided by a theoretical lens derived from social justice or power. In this kind of investigation, the data may be sequentially arranged with one building upon the other, or they may converge.

**Multiphase mixed methods:** In the domains of program interventions and evaluation his approach is typical. This advanced design best understands a long-term program goal by using sequential or concurrent procedures in tandem over time.

## CONCLUSION

Understanding how to select the best design to answer a research question or test a hypothesis is the first step in conducting meaningful research that can be used to generate evidence that informs medical and clinical practice. The first and most crucial stage in conducting scientifically sound research, whether qualitative or quantitative, is to narrow the research topic and select the appropriate study

design to address it. Both quantitative and qualitative approaches look at and examine various knowledge claims, and both are intended to respond to a particular research issue. The qualitative approach enables the researcher to investigate and gain a deeper understanding of the intricacy of a phenomenon, while the quantitative method offers an objective measurement of reality. The goal of researchers using mixed methods design is to draw from the strengths of quantitative and qualitative research approaches while minimizing its weaknesses. Becoming familiar with the research methods used in medical and clinical sciences allows a researcher to understand them more effectively. This is crucial for the study of human beings in both health and sickness, since a wide variety of research designs can be applied.

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