ESSENTIALS OF
RESEARCH METHODOLOGY

FOR STUDENTS & PROFESSIONALS

Kehinde Joseph Awosan

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Volume 1

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Dedication

This book is dedicated to my dear wife, Florence Foluso Awosan, for being my wonderful companion, confidant, and pillar of support.

Contents

Foreword

With great pleasure and confidence, I introduce this remarkable book, *Essentials of Research Methodology for Students and Professionals*, by Professor Awosan KJ, a distinguished colleague with whom I have had the privilege of collaborating. In the academic world, the significance of research methodology cannot be overemphasized because it serves as the researcher's compass on the convoluted and rewarding path of knowledge generation and discovery.

As a university professor, I have seen firsthand how research methodologies have evolved over the years. I know the need for a resource that meets the various needs of undergraduate and postgraduate students and seasoned professionals navigating the complexities of their respective fields. In this sense, the author's thorough and approachable guide has met and surpassed expectations.

This work stands out for its dedication to clarity and conciseness. The author has taken a subject often perceived as formidable and presented it in a manner that ensures optimal comprehension. This approach is a testament to his dedication to students' educational journey, recognizing that a clear understanding of research methodology is foundational to academic success.

The writer has skillfully composed a piece that addresses every essential topic for the intended readership. Each chapter carefully examines the vital elements that make up solid research, ranging from the basic ideas of research design to the complexities of data processing. The book offers a well-rounded viewpoint that speaks to its readers' academic and professional demands by smoothly transferring from theoretical underpinnings to real-world applications.

The author has done a great job of distilling the essence of research methods into a clear and understandable piece when information overload is a daily issue. Due to its well-written style and thoughtful material arrangement, this book is a priceless tool for students starting their academic careers and professionals looking to improve their research skills.

This book is a goldmine of information and direction, whether you are a student struggling with the intricacies of research design or a veteran professional looking to improve your methodological toolset. The book is an invaluable tool for anyone navigating the field of research methods, and I heartily recommend it.

The book *Essentials of Research Methodology for Students and Professionals* will meet and exceed its readers' expectations, serving as an invaluable resource on the exciting and rewarding path of scholarly exploration.

Professor Igoche George Ameh, PhD
Department of Medical Microbiology and Parasitology,
College of Health Sciences,
Usmanu Danfodiyo University, Sokoto, Nigeria.

Preface

This book's sole goal is to provide students, trainees, and professionals with a strong foundation in research techniques, which is an essential tool for planning and conducting reliable investigations in various subject areas. In my teaching career and practice as a Consultant Physician, I have observed a variety of difficulties that students and resident doctors encounter when researching because they lack sufficient understanding of research techniques.

The problems encompass a variety of issues, such as inadequate formulation of relevant research questions and hypotheses, faulty methodology, inadequate comprehension of data-gathering tools, and subpar abilities in data processing and presentation.

One skill that cuts across disciplinary boundaries in the dynamic world of academia and professional practice is the ability to conduct robust research. A sound understanding of research methodology is paramount for systematically designing studies, conducting investigations, and comprehending various phenomena. Additionally, it allows people to judge based on solid facts by gathering, arranging, evaluating, interpreting, and presenting data in an orderly and insightful manner.

Over the years, I have seen many students and professionals struggle with dissertations, falling short at critical points because of deficiencies in their understanding of research techniques. These deficiencies show themselves in their incapacity to explain the purpose and importance of their research, critically evaluate the body of current literature, and plan and carry out a methodologically sound study. After realizing how difficult they were, I set out to produce a guide that directly addresses these concerns.

Essentials of Research Methodology for Students and Professionals is presented in a simplified format to accommodate students starting at the undergraduate level.

This book aims to provide the necessary knowledge to navigate the complexities of the "Research Design" course and the practical skills required to design and execute valid research projects. It is equally beneficial for lecturers, trainers, and professionals who want to increase the quality of their technical research, sharpen their teaching skills, and renew their grasp of research techniques.

The book is divided into three volumes, each with four chapters. Volume 1, the focus of this edition, comprises four essential chapters. Chapter One serves as an introduction to research, laying the groundwork for the subsequent chapters. Chapter Two delves into the critical aspects of formulating research questions, hypotheses, and project titles. Chapter Three provides an overview of study designs, guiding readers through selecting the most appropriate study design for their research. Chapter Four tackles the crucial topics of sample size estimation and sampling techniques.

I heartily recommend this book to academics of all stripes, including undergraduate and postgraduate students, lecturers, trainers, and professionals in other fields. To equip readers with the knowledge and abilities needed to succeed in research projects, this book's thorough content and approachable structure are designed to promote academic and professional success. This book will be your guide and companion on your journey to mastering the essentials of research methodology.

K.J. Awosan

Acknowledgements

In embarking on the journey to compile the "Essentials of Research Methodology for Students and Professionals," I am overwhelmed with gratitude for the myriad of influences that have shaped my personal and professional development. At the forefront, I express my deepest thanks to the Almighty God, the ultimate source of knowledge and wisdom, whose grace has guided me through every challenge and triumph, enabling me to complete this endeavour against all odds.

My educational odyssey, from the early days at Saint Mary Primary School, Ilogbo Ekiti, to the formative years at Ilogbo High School, and pursuing an Advanced Level Certificate at the School of Arts and Science, Ondo, has been a transformative voyage. The academic rigours continued at the University of Ibadan, where I undertook the demanding journey to become a medical doctor. They later extended to Usmanu Danfodiyo University, Sokoto, where I earned my Master's degree. My indebtedness extends to the exhaustive training I received during my residency training at Usmanu Danfodiyo University Teaching Hospital, Sokoto, and the Faculty of Community Health of the West African College of Physicians.

I am profoundly grateful to my teachers and mentors, who have been guiding lights throughout my educational trajectory. From the early days of primary school to the advanced stages of medical training, their influence has been immeasurable. They have shaped my understanding of research methodologies and facilitated a lifelong commitment to learning.

To my esteemed colleagues, from the camaraderie cultivated in primary school to the enriching experiences at the university and the West African College of Physicians, your friendship and peer mentorship have been invaluable.

"There is a difference between interest and commitment. When you're interested in something, you do it when it's convenient. When you're committed to something, you accept no excuses, only results."

Kenneth H. Blanchard

Chapter 1

Introduction to Research

1.1 The Essence of Research

Research is a systematic inquiry into a specific topic or question to obtain new knowledge, expand existing knowledge, or confirm and refine previous findings. It is a disciplined approach to acquiring information, critically analyzing it, and drawing meaningful conclusions. Research lies at the heart of human progress and our quest for understanding the world around us, and it concerns the systematic pursuit of knowledge driven by curiosity and the desire to unravel the mysteries that shape our existence. Whether in the health, life, and social sciences, business, or engineering, research forms the bedrock upon which advancements, innovations, and informed decisions are built.

Research is a rigorous and disciplined process involving collecting, analyzing, and interpreting data to answer specific questions or solve particular problems. It is not a haphazard endeavour but a structured and systematic journey guided by a well-defined methodology. This methodology serves as the roadmap, providing direction and coherence to the research endeavour.

1.2 The Purpose of Research

Research serves as the cornerstone of human progress and intellectual exploration. Its purpose extends far beyond academia, permeating every facet of society. Whether driven by scientific inquiry, societal improvement, or the quest for innovation, research plays a pivotal role in shaping our understanding of the world. Research serves multiple crucial purposes in various domains of human endeavour, including:

1.2.1 Generating Knowledge

Research is a dynamic process that creates new knowledge. It seeks to uncover answers to questions, solve problems, or explore uncharted territories. By conducting research, we contribute to the collective pool of human understanding.

1.2.2 Advancing Knowledge and Understanding
At its core, research's primary purpose is to advance our collective knowledge and understanding. It is the engine that propels us forward, enabling us to unravel the mysteries of the natural world, human behaviour, societal dynamics, and beyond. Through rigorous investigation, researchers seek to expand the boundaries of what we know, often leading to paradigm-shifting discoveries.

1.2.3 Solving Real-world Problems
Research is an indispensable tool in addressing practical challenges and solving real-world problems. It provides the foundation for devising practical solutions, driving technological advancements, and fostering innovation. From medical breakthroughs that combat diseases to technological innovations that enhance our quality of life, research provides the foundation upon which solutions are built. By harnessing the power of inquiry and systematic investigation, researchers develop strategies, technologies, and interventions that have a tangible impact on society.

1.2.4 Fostering Innovation and Creativity
Innovation thrives in the fertile soil of research. It sparks new ideas, encourages creativity, and drives progress. Researchers pioneer novel approaches, technologies, and methodologies through experimentation, analysis, and exploration. This spirit of innovation permeates various domains, from cutting-edge technologies to artistic expressions, ultimately enriching human endeavours.

1.2.5 Informing Decision-making
Research equips us with the tools to make informed decisions in an increasingly complex and data-driven world. It provides a rigorous framework for gathering and analyzing information, enabling us to navigate a sea of data and discern meaningful insights. Research underpins decision-making, from policymakers crafting evidence-based policies to business leaders making strategic choices.

1.2.6 Validating, Refining, or Refuting Existing Knowledge
Research is crucial in validating, refining, or challenging existing hypotheses, theories, models, and concepts. Hypotheses are the building blocks of scientific inquiry, and research offers the means to test them rigorously.

Through empirical evidence and systematic analysis, researchers can either confirm the validity of a hypothesis or disprove it, contributing to the refinement of scientific knowledge. Also, through empirical investigation, researchers can prove or disprove previous findings, leading to a more accurate and nuanced understanding of a given subject.

1.2.7 Contributing to Societal Well-being
Research plays a pivotal role in enhancing the quality of life for individuals and communities. It informs public health initiatives, guides educational practices, drives social reforms, and shapes educational policies. By addressing pressing issues such as poverty, inequality, and environmental sustainability, research contributes to the betterment of society.

1.2.8 Nurturing Intellectual Curiosity and Exploration
Beyond its practical applications, research nurtures a spirit of intellectual curiosity and exploration. It encourages a mindset of questioning, probing, and seeking to understand the world's intricacies. This spirit of inquiry fuels individual growth and enriches the broader intellectual landscape.

1.3 Research Methodology
Research methodology is a systematic and strategic framework that guides the entire research process. It encompasses the philosophical approach, methods, and techniques employed to collect and analyze data, leading to the generation of new knowledge or the enhancement of existing knowledge.

The critical components of research methodology include the Philosophical Underpinnings (Ontological and Epistemological), Research Approach (Quantitative, Qualitative, and Mixed Methods), Research Design, Data Collection Methods, Sampling Techniques, Data Analysis Techniques, Validity and Reliability, Ethical Considerations, Study Limitations, and Reporting and Communicating Research Findings. Some of them are described in this section, while the remaining ones are explained in subsequent sections to avoid unnecessary repetitions.

1.3.1 Philosophical Underpinnings

Philosophical underpinnings refer to the foundational principles, beliefs, and assumptions that form the basis of a particular theory, approach, or system of thought. In the research context, philosophical underpinnings provide the fundamental framework that guides the researcher's perspective, shaping their views on the nature of reality, knowledge, and the research process.

Philosophical underpinnings serve as the guiding framework that influences how researchers conceptualize and approach their studies. They contribute to the researcher's worldview, shaping their understanding of the nature of existence, human behaviour, and the universe.

Regarding philosophical underpinnings, ontological and epistemological perspectives are believed to determine the overall research philosophy and influence decisions regarding research design, methodology, and the interpretation of findings. Researchers often align themselves with a particular philosophical underpinning based on their ontological and epistemological beliefs, creating a coherent and consistent approach to inquiry.

Ontology refers to the nature of reality and the researcher's beliefs about the existence of the phenomenon under investigation. It asks questions about what can be known and how knowledge is acquired. On the other hand, epistemology deals with the nature and scope of knowledge. It explores how knowledge is obtained, the relationship between the researcher and the subject, and the criteria for validating knowledge.

1.3.2. Research Approach

A research approach refers to the overall strategy or plan that guides the researcher in designing and conducting a study. It involves the researcher's philosophical stance, the type of data collected, and the methods used to analyze the data. The three research approaches include quantitative, qualitative, and mixed methods.

1.3.2.1 Quantitative approach

The quantitative research approach involves systematically collecting and analysing numerical data to identify patterns, relationships, or cause-and-effect associations. It is associated with a positivist or objectivist philosophy that assumes an objective reality that can be measured and analysed.

Quantitative research relies on standardised and structured measures, often in surveys, experiments, or statistical data. Data collected are typically in numerical form, allowing for statistical analysis. It usually involves larger sample sizes to enhance generalizability. Quantitative research aims to test hypotheses and theories, establish patterns and relationships, and generalise findings to a larger population. Data analysis involves statistical techniques such as descriptive statistics, hypothesis testing, estimation of population parameters, and regression analysis. Examples include Surveys and Questionnaires, Experiments, and Observational studies with structured data collection.

1.3.2.2 Qualitative approach

The qualitative research approach focuses on understanding the complexities of human behaviour, beliefs, and experiences. It is associated with an interpretivist or constructivist philosophy that recognises multiple subjective realities and emphasises context, meaning, and interpretation.

Qualitative research seeks to provide detailed and context-rich descriptions of phenomena. The emphasis is on understanding individuals' subjective experiences and the meanings they attribute to those experiences. Qualitative studies often have flexible and iterative designs that allow researchers to adapt their approach based on emerging insights. Data collected are usually in text, audio, or visual materials.

Qualitative research may involve smaller sample sizes, focusing on depth rather than breadth. It aims to explore and understand complex phenomena, generate hypotheses or theories, and provide in-depth insights into human behaviour. Examples include In-depth interviews, Focus group discussions, Participant observation, and Content analysis.

1.3.2.3 Mixed-methods approach

While the quantitative and qualitative approaches are often presented as distinct, researchers can also use a mixed-methods approach that combines elements of both. This approach involves collecting and analysing both quantitative and qualitative data to provide a more comprehensive understanding of the research question.

1.3.3. Research Design
Research design is the overall plan or structure that guides the researcher in systematically collecting, analysing, and interpreting data. It involves decisions about the type of research, the sampling strategy, data collection methods, and data analysis, interpretation and presentation. Designing and documenting research as a Research Proposal is one of the steps in the Research Process (as described in the next section). Research has been classified into various types based on the following parameters:

- The objectives of carrying out the research – Basic or Applied
- The research design employed – Observational or Experimental
- The method of data collection used – Quantitative, Quantitative, or Mixed
- Whether it involves primary data collection or not – Empirical or Non-Empirical
- The discipline involved – Epidemiological, Biomedical, Behavioural, Educational, Health Systems, Policy Making and Management, Business, Agricultural, etc.

1.3.3.1 Basic or Applied Research
Basic research focuses on curiosity and pursuing knowledge for its own sake. It is a fact-finding research that explores a situation of study or phenomenon. It explores the problem or phenomenon to learn about it and answer any related questions. Basic research has a relatively broad scope and aims to enhance the existing body of knowledge in a particular field. It is not about creating a new product, improving a process, or solving a societal problem. Instead, it is about laying the groundwork for future investigations, paving the way for applied research to build on. The researcher's attention here is focused on the question, What is? Or What are they? For example, What is the attitude of undergraduate students in Nigeria toward premarital haemoglobin genotype, counselling, and testing?

Applied research primarily examines how real-world phenomena or outcomes can be altered. It is oriented towards identifying practical solutions to specific problems. It explains or exposes a situation, enabling the researcher to understand it better.

It is often called explanatory research or expository research. It is aimed at discovering why certain events, conditions, or phenomena occur. Applied research is deeply rooted in real-world issues. Whether finding a cure for a specific disease, developing a new technological solution for environmental challenges, or creating strategies to improve education in underprivileged communities, the primary goal is to generate practical outcomes that can be directly implemented. Its relevance is often immediately apparent, as it's tailored to answer particular challenges faced by society, industries, or organizations. It assumes that the problem being investigated exists or has probably been established to have occurred, and the researcher wants to know why it exists or why it happened. For example, why is the prevalence of malnutrition high among children in Nigeria?

1.3.3.2 Observational or experimental research

An observational study is when the researcher observes the effects of a specific variable as they occur naturally without attempting to intervene. In this case, the researcher only monitors situations or objects and then describes or analyzes them without manipulating anything.

Observational research can be descriptive or analytical. Examples of descriptive observational studies include case reports, case series, and cross-sectional studies. Examples of analytical observational studies include comparative cross-sectional, case-control, and cohort studies.

In experimental research, the researcher manipulates situations or objects and then describes or analyses the outcome in a more controlled setting. Examples include Randomized Control Trials (RCT) and Quasi-experimental study designs.

1.3.3.3 Quantitative or qualitative research

Quantitative research is expressed in numbers. It is used to test or confirm theories and assumptions. It is also used to establish generalizable facts about a topic. Standard quantitative methods include surveys using questionnaires, experiments, and observations recorded as numbers. Since quantitative data is based on numbers, simple mathematics or more advanced statistical analysis is used to discover commonalities or patterns in the data, and the results are often presented using texts, tables, and charts.

Qualitative research is expressed in words. It is used to understand concepts, thoughts, or experiences. It enables the researcher to gather in-depth insights on poorly understood topics. Standard qualitative data collection methods include case studies, interviews (which involve asking open-ended questions verbally to respondents), focus group discussions (which involve discussion among a group of people about a topic to gather opinions that can be used for further research), and ethnographic studies (which consists in participating in a community or organization for an extended time to observe culture and behaviour closely).

Since qualitative data consists of texts, images, or videos instead of numbers, it is more difficult to analyze than quantitative data. Some common approaches to analyzing qualitative data include Qualitative content analysis (which involves tracking the occurrence, position, and meaning of words and phrases), Thematic analysis (which involves closely examining the data to identify the main themes and patterns), and Discourse analysis (which consists in studying how communication works in social contexts).

Mixed methods research involves using quantitative and qualitative data collection methods in a study, such as administering questionnaires to the participants and conducting focus group discussions among a subset.

1.3.3.4 Empirical or non-empirical
Empirical research is any study whose conclusions are exclusively drawn from concrete, verifiable evidence. It is based on observations and measured phenomena and derives knowledge from experience rather than theory or belief. Empirical research uses data collected, usually but not necessarily by the researcher, to answer the research questions. Examples include interviews, surveys (e.g., to understand public opinion), and experiments (e.g., to test the effectiveness of a new drug).

Non-Empirical research is based on theory rather than what is experienced or seen. It focuses more on theories, methods, and their implications for the discipline. Examples include comprehensive reviews that concentrate on methodology, a philosophical analysis of ethical theories, a literature review exploring existing research, or developing a conceptual model. The main differences between empirical and non-empirical research are described in Table 1.1.

Table 1.1: Differences between Empirical and Non-Empirical Research

Parameters	Empirical Research	Non-Empirical Research
Definition	It involves collecting and analysing data obtained through direct observation or experimentation. It relies on evidence derived from sensory experience and observation.	It involves exploring and analysing existing theories, concepts, or literature without collecting new, firsthand data. It relies on theoretical or conceptual reasoning.
Data Collection	It involves collecting new, observable, and measurable data. This can include experiments, surveys, observations, or other methods that directly concern empirical evidence gathering.	It relies on existing data, theories, or literature. Researchers analyze and interpret information that has been documented without conducting new experiments or observations.
Source of Knowledge	It derives knowledge from direct experience, observation, or experimentation. It emphasizes the importance of sensory information and real-world evidence.	It derives knowledge from theoretical frameworks, literature reviews, and conceptual reasoning and relies on previously established ideas and concepts.
Focus of observation	It prioritizes the collection and interpretation of observable and measurable phenomena. It aims to provide concrete evidence that can be tested and validated.	It focuses on theoretical or conceptual exploration, relying on existing knowledge to build upon or challenge established ideas.
Research Methods	It involves experimental designs, surveys, case studies, and other methods that directly engage with collecting new data from the real world.	It involves literature reviews, theoretical analyses, meta-analyses, and other methods primarily dealing with existing information and concepts.
Hypothesis Testing	It often includes the formulation of hypotheses that can be tested through direct observation or experimentation.	It may involve the development or exploration of theoretical frameworks without necessarily testing specific hypotheses through new data collection.
Generalizability	Based on the collected empirical evidence, it aims for findings that are generalizable to a broader population.	The findings may be more theoretical and conceptual, potentially influencing specific areas of knowledge without generating universally applicable results.
Validation	It seeks validation through the replication of experiments and statistical analysis to confirm the significance of the results.	It relies on logical coherence, theoretical soundness, and the persuasiveness of arguments for validation.

In summary, empirical research relies on firsthand data collection and direct observation, while non-empirical research is based on existing theories, concepts, and literature, emphasizing theoretical exploration and conceptual reasoning. Both approaches contribute valuable insights to the body of knowledge in different ways.

1.3.3.5 Biomedical, Epidemiological, Educational, etc.

Some types of research based on the discipline involved include Epidemiological, Biomedical, Health Systems, Management, Business, and Agricultural (Figure 1.1).

Figure 1.1: Types of research based on the discipline(s) involved

1.3.4. Data Collection Methods, Sampling Techniques, etc

Subsequent book sections describe the other components of the Research Methodology. These include data collection methods, sampling techniques, data analysis techniques, validity and reliability, ethical considerations, study limitations, and reporting and communicating research findings (as applicable) to prevent repetitions.

It is necessary to clarify some misconceptions here because students often use the terminologies research methodology and research design interchangeably as if they are the same but not. They are distinct but closely related concepts in the field of research.

Whereas research methodology is a systematic and strategic framework that guides the entire research process, research design is a structured plan or blueprint that outlines the techniques, methods, and procedures to be followed in a research study. The key differences between the research methodology and research design are summarised in Table 1.2.

Table 1.2: Differences between Research Methodology and Research Design		
Parameters	**Research Methodology**	**Research Design**
Definition	It refers to the systematic way in which a research problem is solved. It involves the theoretical framework, methods, and techniques used to conduct research.	It is a blueprint or plan outlining how the research will be conducted, specifying the overall structure and organization of the study.
Scope	It encompasses the entire research process, including the philosophical underpinnings, approach, and data collection and analysis techniques.	It specifically focuses on the structure and strategy employed to carry out the research, including the type of study, sampling method, and data collection procedures.
Nature	It is broader and more theoretical, addressing the overall philosophy of research and guiding principles that underlie the study.	It is more concrete and practical, dealing with the logistics and mechanics of conducting the research.
Components	It includes aspects such as the research philosophy, approach (quantitative, qualitative, or mixed methods), data collection methods, and data analysis techniques.	It encompasses decisions about the research type (descriptive, exploratory, experimental), sampling strategy, data collection instruments, and procedures.
Focus	It concerns the strategy and rationale behind the chosen research methods and techniques.	It concerns the specific details of the study, outlining the steps that will be taken to answer the research question.
Level of Detail	It provides a high-level view of the research process, guiding the researcher to approach the study.	It offers a detailed and specific research plan, outlining the procedures and steps involved.
Flexibility	It provides a framework within which different research designs can be applied based on the nature of the research question.	It is more rigid and specific to the particular study being conducted.

In summary, while research methodology outlines the overarching philosophy and principles guiding the research, research design is a more focused plan detailing how the study will be executed, specifying the methods and procedures to be used. Both are integral parts of the research process and work together to ensure a systematic and rigorous approach to inquiry.

1.4 The Research Process

The research process is a dynamic and systematic journey that transforms a curious inquiry into a structured and meaningful exploration. It is a carefully orchestrated sequence of steps designed to gather, analyze, and interpret data to generate new knowledge or address specific questions. Understanding the intricacies of this process is essential for conducting rigorous and impactful research. Research involves a structured and systematic approach that typically follows seven key steps:
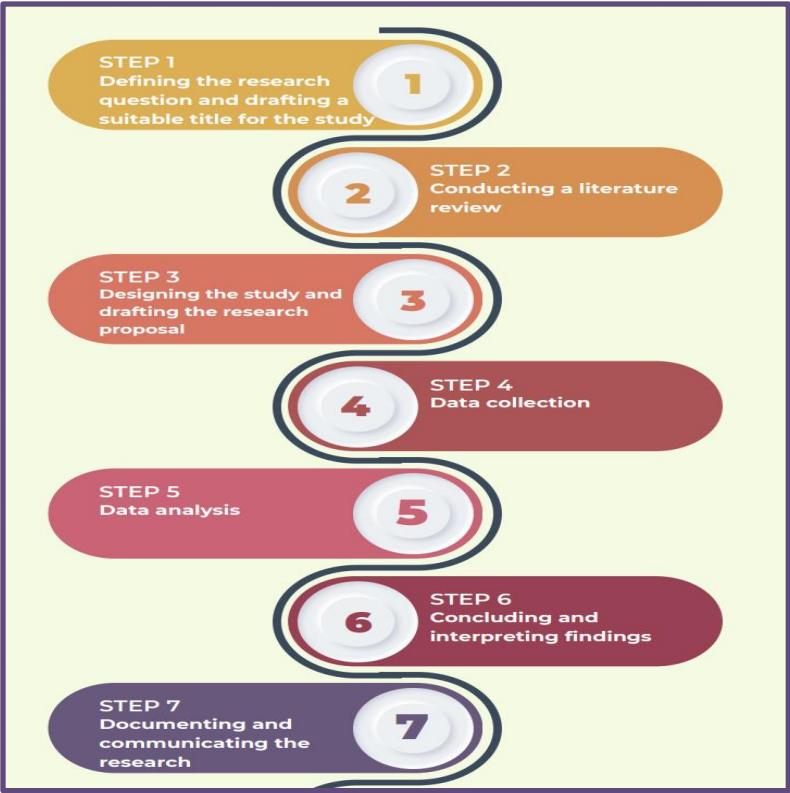

Figure 1.2: Steps in conducting research

Step 1: Defining the research question and drafting a suitable title for the study

The foundation of any research endeavour lies in formulating a clear and focused research question or hypothesis. The research process begins with a well-defined research question. This question serves as the guiding star, directing the focus of the entire study. A research question is the question a study sets to answer. It should be specific, clear, and aligned with the overall objectives of the research. The research question is the foundation for the whole research endeavour. Some studies can have two or more research questions. A hypothesis predicts the relationship between two or more variables that can be tested through scientific research. It is an educated guess based on previous knowledge and observations. Not all studies have hypotheses, but they are usually used to guide the research process in experimental studies. The key differences between the "research questions" and "hypotheses" are summarised in Table 1.3.

The title of a study should be concise (preferably about 13 to 15 words), captivating, and informative. It can be descriptive, declarative, or interrogative and can also be modified at the end of the study if necessary. The full details of research questions and hypotheses are available in Chapter 2.

Step 2: Conducting a literature review

Before embarking on a new study, reviewing existing literature on the chosen topic is imperative. This step involves exploring relevant studies, articles, and scholarly works that pertain to the research question. Conducting a thorough literature review helps situate the research within the broader context, identify gaps in the current body of knowledge, and understand relevant theories and methodologies.

Step 3: Designing the study and drafting the research proposal

This phase involves selecting appropriate research methods, data collection techniques, and sampling strategies. The research design outlines how data will be collected and analyzed. It encompasses decisions regarding the research approach (quantitative, qualitative, or mixed methods), sampling strategies, data collection methods, and data analysis techniques.

The research design must align with the research question and objectives. A well-designed study is crucial for generating reliable and valid results.

Table 1.3: Differences between Research Questions and Hypotheses

Parameters	Research Questions	Hypotheses
Definition	Research questions refer to the inquiries a research study sets to answer.	Hypotheses are tentative predictions about the relationship between two or more variables.
Nature	Research questions are typically broad, open-ended inquiries about a particular topic or issue. They aim to explore, describe, or understand a phenomenon without making a specific prediction.	Hypotheses are specific statements that make a clear and testable prediction about the relationship between variables. They are designed to be empirically tested through data collection and analysis.
Purpose and Focus	Research questions guide the overall research inquiry and help shape the study's design and methodology. They focus on understanding various aspects of a phenomenon or exploring relationships between variables.	Hypotheses are used to test the validity of a proposed relationship or effect between variables. They make predictions about the expected outcomes of the study.
Format	Research questions are curious. They are framed as *interrogative statements*, often beginning with words like "what," "how," "why," or "to what extent".	Hypotheses are predictive. They are framed as *declarative statements*, often in an "if-then" format, indicating the expected relationship between variables.
Flexibility	Research questions can be adapted and refined as the research progresses and new insights emerge.	Hypotheses are less flexible than research questions. Once formulated, they are typically tested without significant modification.
Application	Although research questions are primarily used in observational studies (whether quantitative or qualitative), they can also be used in experimental studies.	Although hypotheses are primarily used in experimental studies, they can also be used in observational studies.
Example	What is the relationship between the length of practice and knowledge of telemedicine among healthcare professionals in Abuja, Nigeria?	I hypothesized a positive relationship exists between the length of practice and good knowledge of telemedicine among healthcare professionals in Abuja, Nigeria.

The research design for every study should be drafted and submitted to an institutional ethical committee as a "Research Proposal" for approval to conduct the study. A research proposal is a document that contains the outlines of the plan for a study, including the problem statement, objectives, methodology (under which the specific "study design" to be used in conducting the study is specified), and timeline. It contains a complete description of the research and will act as a manual for the research team members to ensure everyone adheres to the methods outlined. As the investigation gets underway, it can be used to monitor the study's progress and outline its outcome. The research proposal format varies from institution to institution, but it generally contains two sections: the preliminary section and the body of the proposal. The full details of drafting the "Research proposal" are available in Chapter 5.

It is also necessary to clarify some misconceptions here because students often use the terminologies research design and study design interchangeably as if they are the same but not. While "research design" pertains to the overarching plan that guides the entire research process, "study design" zooms in on the particulars of a single investigation within that larger framework. The distinction is somewhat contextual, and the terminology may vary across disciplines, but understanding these differences helps researchers communicate their methods and plans more precisely. The key differences between the "research design" and "study design" are summarised in Table 1.4.

Step 4: Data collection
This step involves gathering relevant data using chosen methods, ranging from surveys and experiments to interviews, observations, or analysis of existing datasets. Rigorous attention to detail is crucial to ensure that data is accurate, reliable, and relevant to the research objectives.

Step 5: Data analysis
Once the data is gathered, it undergoes a systematic process of analysis. The choice of analysis method depends on the research question, study design, and type of data collected. Quantitative research involves statistical analysis to identify patterns, correlations, and significant findings. Qualitative research involves coding, categorizing, and interpreting textual or visual data. Both approaches aim to derive meaningful insights from the collected information.

Table 1.4: Differences between Research Design and Study Design

Parameters	Research Design	Study Design
Definition	Research design is the overall plan or strategy that outlines the entire research process. It provides a framework for conducting the study and achieving the research objectives.	Study design refers to the specific plan or blueprint for a particular research investigation within the broader research design. It is a focused set of decisions about how a specific study will be conducted.
Scope	It encompasses the entire research project.	It pertains to a specific investigation within the broader research.
Planning	It involves comprehensive planning, including selecting methods, data collection procedures, and the theoretical framework.	It involves immediate planning for a particular research endeavour, specifying data collection methods and procedures.
Theoretical Framework	It often includes establishing a theoretical framework or conceptual model guiding the research process.	It may operationalize the theoretical framework established in the research design for a specific study.
Longitudinal Perspective	It may extend beyond a single study, especially in complex research projects involving multiple studies.	It focuses on the immediate planning of a single study but may contribute to an overarching longitudinal perspective as part of the broader research design.
Application	The term "research design" is versatile and can be applied to various studies, including experimental, observational, qualitative, and quantitative research.	In some disciplines, especially in health and social sciences, the term "study design" is commonly used to describe the specifics of a research project, particularly in clinical trials and observational studies.
Focus	It focuses on the overall research process and framework. Examples include experimental design, observational design, and mixed-methods design.	It focuses on the specific details and procedures of an individual study. Examples include Cross-sectional study design, case-control study design, and randomized controlled trial (RCT) design.
Practical Application	It guides the researcher in making decisions about the overall approach to the study.	It guides the researcher in making specific decisions about implementing a particular study.

Step 6: Concluding and interpreting findings

Researchers draw conclusions directly addressing the research question based on the data analysis. This step requires careful consideration of the evidence and an in-depth understanding of its implications. The findings are interpreted in the context of existing literature and contribute to the broader body of knowledge.

Researchers must critically examine the implications of their results and how they contribute to the broader body of knowledge. They are required to explore the practical, theoretical, and societal relevance of the research outcomes.

Additionally, researchers should acknowledge the study's limitations, which may include constraints in methodology, sample size, or data collection, and also comment on the extent to which the study's findings can be generalized to the reference population.

Step 7: Documenting and communicating the research

The culmination of the research process involves documenting the entire journey in a formal research report (or project report, dissertation or thesis, depending on the level of training). This report includes an introduction, literature review, methodology, results, discussion, and conclusion. Clear and concise writing, supported by visual data representation, ensures the research is effectively communicated. Other methods of disseminating the research findings include conference presentations and publishing the results in scholarly journals.

The comprehensiveness and sequence of the steps involved in the research process show that it is a deliberate and iterative endeavour that transforms a research question into a body of knowledge. It demands meticulous planning, rigorous execution, and thoughtful interpretation of findings. By embracing each step, researchers contribute to the cumulative advancement of knowledge and understanding in their respective fields.

However, it is essential to note that the research process does not end with completing a single study. Researchers engage in reflection, considering what worked well and areas for improvement. They may refine their approach, adjust methodologies, or formulate new research questions based on the insights gained from the previous endeavour.

1.5 Ethical Considerations in Research

Ethical considerations are the moral compass that guides the conduct of research. They serve as the foundation for ensuring the rights, welfare, and dignity of all individuals involved in the research process, including researchers, participants, and stakeholders. Ethical guidelines and institutional review boards play a crucial role in ensuring the welfare and rights of participants. Upholding ethical principles is not only a moral imperative but also essential for the credibility and validity of research outcomes. The critical issues involved in ethical considerations are shown in Figure 1.3.
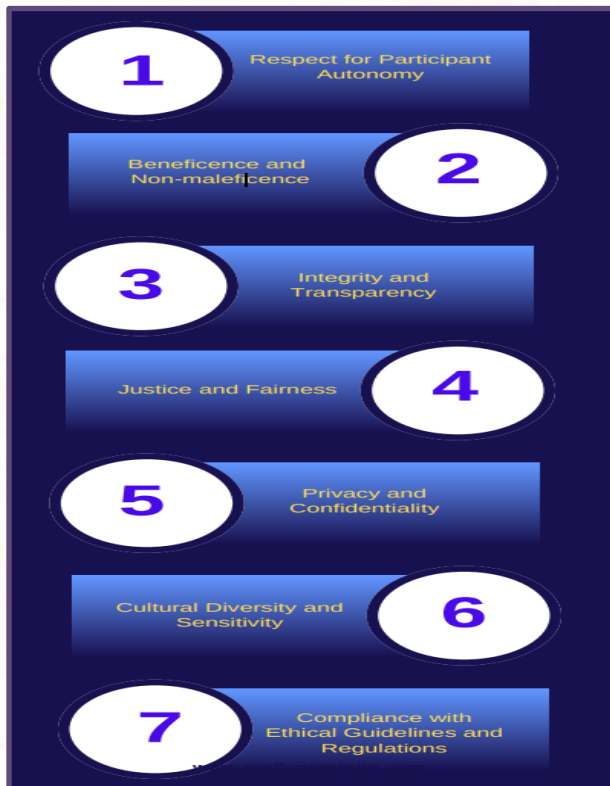

Figure 1.3: Critical issues in ethical consideration

1.5.1 Respect for Participant Autonomy

Respecting participant autonomy is a fundamental ethical principle. It entails providing clear and comprehensive information about the research, including its purpose, procedures, potential risks, and benefits.

Informed consent, where participants voluntarily and willingly agree to participate, is a cornerstone of ethical research. This principle recognizes the right of individuals to make autonomous decisions regarding their involvement in the study.

1.5.2 Beneficence and Non-maleficence

Respecting participant autonomy is a fundamental ethical principle. It entails providing clear and comprehensive information about the research, including its purpose, procedures, potential risks, and benefits. Informed consent, where participants voluntarily and willingly agree to participate, is a cornerstone of ethical research. This principle recognizes the right of individuals to make autonomous decisions regarding their involvement in the study.

Beneficence requires researchers to maximize benefits and minimize potential harm to participants. This involves carefully considering the risks and benefits of the research and taking measures to ensure that the potential benefits outweigh any potential harm. Researchers must also prioritize the well-being and safety of participants throughout the research process, from data collection to dissemination of findings.

Non-maleficence complements beneficence by emphasizing the obligation not to harm. Researchers must take proactive steps to minimize potential risks or discomfort to participants. This includes implementing appropriate safeguards, ensuring confidentiality, and providing access to support or resources, particularly in studies involving sensitive topics or vulnerable populations.

1.5.3 Integrity and Transparency

Integrity is a cornerstone of ethical research. It involves conducting research with honesty, transparency, and a commitment to truthfulness. Researchers are expected to accurately represent their findings, even when results may be unexpected or contrary to initial hypotheses. Transparency involves the disclosure of conflicts of interest and potential biases that may influence the research process or findings.

1.5.4 Justice and Fairness

Justice pertains to the fair and equitable treatment of all individuals involved in the research process. This includes considerations related to participant selection, ensuring that recruitment methods do not unfairly exclude or disadvantage

specific groups. Additionally, researchers must be mindful of distributing the benefits and burdens of research fairly, avoiding exploitation or undue harm to particular populations.

1.5.5 Privacy and Confidentiality
Protecting participant privacy and confidentiality is paramount in ethical research. Researchers must implement measures to safeguard sensitive information collected during the study. This includes anonymization techniques, secure data storage, and limiting access to identifiable information. Participants should have confidence that their personal information will be handled with the utmost care and confidentiality.

1.5.6 Cultural Sensitivity and Diversity
Respecting cultural diversity and sensitivity is essential in research involving diverse populations. Researchers must be attuned to participants' cultural norms, values, and beliefs and take steps to ensure that the research process is inclusive and respectful. This may involve adapting research protocols, using culturally appropriate language, and engaging with communities in a culturally sensitive manner.

1.5.7 Compliance with Ethical Guidelines and Regulations
Adherence to established ethical guidelines and regulatory frameworks is non-negotiable in ethical research conduct. Researchers must familiarise themselves with relevant ethical codes of conduct, institutional review board (IRB) requirements, and legal frameworks governing research in their field. Seeking appropriate approvals and permissions demonstrates a commitment to ethical research.

In addition to obtaining approval to conduct a study from an institutional review board, in studies involving human subjects, researchers must obtain informed written consent (either by signature or thumbprinting) from every participant involved in the study. In addition to the proposed research's title and purpose, participants should be informed of the benefits and risks of the study.

1.5.7.1 Research Benefits
The benefits that participants can derive from a study include:

1.5.7.1.1 Increased Self-awareness
Participation in the study may prompt participants to reflect on their habits regarding the condition or disease being studied. This self-awareness can be valuable for individuals wishing to assess and potentially modify their practices for their well-being.

1.5.7.1.2 Contribution to Knowledge
By sharing their experiences and insights, participants contribute to the body of knowledge on the condition or disease being considered. Their input can help researchers and policymakers better understand the phenomenon or disease and develop more effective interventions and support systems.

1.5.7.1.3 Access to Resources
In some cases, participants may gain access to information, resources, or support services related to the condition or disease being studied. Researchers or study organizers may provide information on preventing or mitigating the effects of or coping with the phenomenon or disease being researched.

1.5.7.1.4 Community Engagement
Participation in research can foster a sense of community engagement and cooperation. Participants may feel satisfied contributing to a study addressing an issue relevant to their community or social/occupational group.

1.5.7.1.5 Potential for Positive Change
The study's findings may inform the design of policies, programs, and interventions designed to address the condition or disease concerned by government, policymakers, and other stakeholders. Participants can benefit from these changes, such as improved support services or initiatives promoting healthy behaviours.

1.5.7.1.6 Personal Growth
As part of the study, engaging in surveys or interviews can be an opportunity for personal growth. Participants may gain communication skills, self-reflection abilities, and an understanding of the research process.

1.5.7.1.7 Awareness of Research Ethics
Participation in research exposes individuals to ethical considerations in the study, including informed consent and data privacy. This awareness can contribute to their understanding of research ethics in general.

1.5.7.1.8 Support for Well-being
Depending on the study design, participants experiencing adverse effects of the condition or disease being studied may receive support or referrals to appropriate resources, such as counselling, treatment, and rehabilitation services, or referral to professionals.

1.5.7.1.9 Empowerment
Participation can empower individuals to actively discuss the prevention and control of the condition or disease being studied and related topics. They may become advocates for healthy behaviours to prevent the phenomenon or disease.

It is, therefore, crucial for researchers to communicate the potential benefits of participation clearly to participants in the informed consent process.

Often, researchers only focus on physical injuries or adverse effects of a particular medication or procedure being tested and wrongly conclude that the research is not associated with any risk. This is not true; almost all studies are associated with one or a combination of risks.

1.5.7.2 Research Risks
Some of the potential risks that participants are exposed to in research include:

1.5.7.2.1 Privacy Risk
Participants may be concerned about the privacy of their responses, especially when sharing information about their personal experiences. While efforts will be made to ensure data confidentiality, there is always a risk that sensitive information could be unintentionally disclosed.

1.5.7.2.2 Emotional Discomfort

Discussing sensitive private issues may evoke negative emotions or discomfort among participants. Some may reflect on their practices and experiences, which could lead to feelings of guilt, embarrassment, or anxiety.

1.5.7.2.3 Data Security Risk

There is a potential risk of data breaches or unauthorized access to collected data, particularly when handling sensitive participants' information. Researchers must implement robust data security measures to mitigate this risk.

1.5.7.2.4 Stigmatization and Labelling

Participants who admit to some sensitive private issues (e.g., rape, abnormal sexual orientation, etc.) or diseases (e.g., HIV/AIDS, epilepsy, etc.) may fear stigmatization or negative labelling from the researchers or the broader community. This could affect their social relationships or self-esteem.

1.5.7.2.5 Psychological Discomfort

Questions related to mental health, job stress, professional burnout, or any form of abuse (physical, sexual, psychological, intimate partner violence, etc.) may trigger psychological discomfort or distress in some participants. Researchers should provide appropriate resources and support for participants who may experience emotional distress during or after the study.

1.5.7.2.6 Time and Participation Burden

The study may require participants to invest time in completing surveys and interviews. This could be difficult for some, particularly if they have busy work schedules or other commitments.

1.5.7.2.7 Unintended Consequences

The study's findings, if widely publicized, could have unintended consequences. For example, media coverage of the survey might sensationalize its results, potentially leading to misinformation or misunderstanding about the issues concerned in the research.

To mitigate these risks, researchers should ensure that participants fully understand the study's purpose, procedures, potential risks, and benefits before they agree to participate; safeguard participants' data and ensure that it cannot be linked to individual identities; and provide access to resources and support

for participants who may experience emotional distress during or after participation. In addition, researchers should frame questions and discussions to minimise discomfort or judgment for participants and adhere to ethical principles and guidelines for human research, including obtaining institutional review board (IRB) approval and addressing any ethical concerns that may arise.

Also, researchers should disseminate study findings accurately and responsibly to minimize potential negative consequences. By proactively addressing these risks and taking appropriate measures to protect participants, researchers can conduct the study ethically and responsibly while contributing valuable insights to the field.

1.6 Conclusion

This introductory chapter has examined research fundamentals, including its goals, methods, and moral foundations. The systematic pursuit of information, known as research, is the cornerstone of human progress, fostering creativity, ingenuity, and well-informed decision-making in various fields. We defined research as an organised, systematic investigation to solve the world's puzzles. It's a purposeful journey with a straightforward technique that's bringing us new knowledge and understanding.

The goal of research was made clear, emphasising its varied contributions to knowledge advancement, problem-solving in the actual world, innovation, and societal well-being. Research drives growth through scientific investigation, technical progress, and well-informed decision-making.

We then explored the research process, a dynamic series of actions that converts a research question into a corpus of information. Rigidity and purpose permeate every step of the process, from formulating the study topic to conducting a thorough literature review, developing the methodology, and analysing the data. Research projects are carried out precisely and ethically thanks to this methodical technique.

Research ethics have become a fundamental tenet. The principles of ethical research conduct include integrity and transparency, maximising benefits while minimising damage and respecting participant agency. Factors including justice, privacy, cultural sensitivity, and adherence to ethical norms must be considered to further preserve everyone's rights and well-being.

As we approach the end of this chapter, it is evident that research is a dynamic force that alters our understanding of the world and encourages positive change rather than merely being an academic pursuit. Acknowledging scientific principles, scientists embarked on an odyssey of discovery, augmenting the corpus of knowledge and profoundly impacting society.

We will go more deeply into the nuances of research design in the upcoming chapters, covering subjects like developing research questions and hypotheses, providing an overview of study designs, determining sample sizes, and sampling strategies. With a firm grasp of the principles presented here, readers will be well-positioned to handle the intricacies of research design and carry out influential studies in their disciplines. Let us take with us the understanding that research is a deep commitment to discovering truth, knowledge, societal improvement, and a process as we set out on our journey.

Exercises
1. What is the purpose of research?
2. Differentiate between the following:
   (a) Basic and applied research
   (b) Observational and experimental research
   (c) Quantitative and qualitative research
   (d) Empirical and non-empirical research
   (e) Research methodology and research design
3. Describe the steps involved in the research process.
4. What are the critical issues in ethical considerations?
5. Describe the benefits and risks of research to participants.