MINISTRY OF HEALTH

RESEARCH METHODOLOGY MANUAL 1ST EDITION

MARCH,2023

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FOREWORD

The Research Division (RD) in the Ministry of Health (MOH) has developed a research methodology manual which provides an overview of the key concepts and techniques used in health research, making it an invaluable resource for students and practitioners alike. The guideline has been developed in line with the Malawi National Health Research Policy (NHRP) with a core theme of capacity building.

The Ministry is committed to strengthen local capacity to carry out policy relevant health research in line with the National Health Policy, NHRP and National Health Research Agenda (NHRA). The districts are important in the healthcare system and they need to be incorporated in the production of research data. There is therefore a need to build the capacity of healthcare workers, particularly in the districts, to conduct locally relevant health research.

The research methodology manual is therefore a tool that will be used to implement efforts of data generation as we establish and enforce the practice of evidence informed decision making. This manual will enable healthcare workers at all levels of the health system to have a guide as they conduct health systems research. The Ministry hopes that this tool will lead to more research proposals, evidence generation amongst healthcare workers with the goal of informing health systems policies, strengthening health care provision in Malawi and hence contributing towards universal health coverage.

I hope that with financial support and mentorship from within the Ministry and partners, this research methodology manual will benefit all health research stakeholders and that the nation will benefit from improved quality of research for policy implementation.

Dr. Samson Mndolo
SECRETARY FOR HEALTH

PREFACE

Health research is defined as the generation of new knowledge using a scientific approach. It is a systematic scientific method aiming at identifying and solving health problems. Health research adds to the scientific knowledge and guide to provision of information needed as a base for planning and decision making, leading to improvement of community health both locally and nationwide.

People conduct research every day in both academic and non-academic institutions. But in most cases, very little attention is paid to an important dimension in research, which is the basic aspects of research methodology. This textbook provides readers with an understanding of the concepts and techniques of qualitative and quantitative research. This manual is intended only to provide the general guidelines in the conduct of research among researchers.

This book is ideal for those readers with minimal knowledge of research as well as those with intermediate knowledge who need a quick refresher regarding particular aspects of research design and methodology.

The document provides practical guidance for the various stages of the research process, including developing research questions and hypotheses, selecting appropriate research methods and sampling techniques, collecting and analysing data, and presenting research findings in a clear and concise manner. Whether you are a researcher, or health practitioner, this manual will serve as a valuable resource for your research journey.

Dr Collins Mitambo

HEAD OF RESEARCH

ACKNOWLEDGEMENTS

The development of the Research Methodology Manual is a product of selfless dedication and commitment of key stakeholders in the health sector particularly in the health research subsector.

The Research Division cannot express enough gratitude to the taskforce setup for the development of this manual which was led by the Chairperson Professor Balwani Mbakaya (MZUNI) and coordinated by Dr Clara Sambani Gondwe (MOH). Special recognition further goes to Mr Master Chisale (MZUNI), Dr Sibongile Kaphaizi (CHAM), Mr Moses Aron (PIH), Mr Tawonga Mwase-Vuma (UNIMA), Mr Manuel Mulwafu (PIH), Mr Saul Mwale (MZUNI), Dr Damson Kathyola (Innova TDC), Dr Cecilia Malwichi (KUHES), Dr Collins Mitambo (MOH), Dr Dzinkambani Kambalame (MOH), Mr Billy Nyambalo (MOH), Dr Amon Chirwa (MOH), Mr Victor Chikwapulo (MOH), Mr Clement Seven (MOH) and Mr Douglas Mhone as taskforce members who worked tirelessly with stakeholders to have the document refined and produced. The development of the manual was solely funded by the Ministry of Health.

The Research Division shares the conviction that the manual will provide a platform to achieve the goal of building health research capacity in Malawi.

ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
APA	American Psychological Association
ANOVA	Analysis of Variance
COMREC	College of Medicine Research & Ethics Committee
CI	Confidence Interval
COVID	Coronavirus Disease 2019
CINAHL	Cumulative Index to Nursing and Allied Health Literature
DHMT	District Health Management Team
EBM	Evidence Based Medicine
FGD	Focus group discussion
HIV	Human Immunodeficiency Virus
IPA	Interpretive Phenomenological Analysis
MZUNIREC	Mzuzu University Research Ethics Committee
NSO	National Statistics Office
NHRA	National Health Research Agenda
NHRP	National Health Research Policy
NHRS	National Health Research Systems
NHSRC	National Health Sciences Research Committee
NCD	Non-Communicable Diseases
H0	Null Hypothesis
Ha	Alternative Hypothesis
OR	Odds Ratio
QDA	Qualitative Data Analysis
SPSS	Statistical Package for the Social Sciences
TB	Tuberculosis
UNILIAREC	University of Livingstonia Research Ethics Committee
WHO	World Health Organisation

RATIONALE FOR THE HEALTH RESEARCH METHODOLOGY MANUAL

The research methodology manual has been developed with an ultimate goal of building health research capacity in Malawi. “Capacity building” is one of the themes in the Malawi National Health Research Policy (NHRP) which was launched in 2019 and stands on the pillar of the National Health Research Systems (NHRS). A functioning NHRS is needed to generate scientific knowledge and promote its use in the pursuit of universal health coverage. As stipulated in the Malawi National Health Policy, the government aims at strengthening capacity in health research and health information system management for evidence-based policy making. Thus, health information and research are expected to operate and support practice at all levels of the healthcare system.

Districts are undeniably a core part in the levels of the health system and they ought to be a foundation of local data development. Through the National Health Policy and the NHRP, the government is committed to strengthen local capacity to carry out policy relevant health research. The research methodology manual is therefore a tool that will be used to implement efforts of data generation as we establish and enforce the practice of evidence informed decision making. To be specific, this tool will advocate for local data development and respond greatly to the national research priorities as set in the National Health Research Agenda (NHRA).

According to a situation analysis done during the development of the NHRP, many studies are currently being conducted in Malawi, but there are some capacity development gaps which include but are not limited to the prevailing weak culture of research and inadequate relevant research skills base. As the NHRP indicates, it is therefore very important to initiate capacity building efforts for health research in Malawi in order to improve the capacity of individuals’ and institutions in their conduct of research. Therefore, this research methodology manual will be utilised by the Ministry of Health to guide its personnel about research development and implementation and promote the demand for research. The manual will focus its instructions on health systems research. It will be used by any individual and academic institutions that undertake health systems research, but will put more focus on health care workers in the system. A special emphasis must therefore be put to ensure there is adequate funding and mentorship for health research efforts within the Ministry.

In the era of Evidence Based Medicine (EBM), all decisions regarding investigations, diagnosis and treatment are taken on the basis of research. Health care workers/ practitioners learn basic

research training during their undergraduate studies. Advanced research training is undertaken at the postgraduate level (Masters/PhD), and one is required to submit a thesis/dissertation as a requirement for the postgraduate qualification. Experience from academic health institutions has shown that postgraduate students drawn from health practitioners struggle with research due to their limited capacity and experience. This manual comes at an appropriate time as it will equip these personnel with research skills. Medicine is dynamic; hence, novel approaches are certainly required, case by case scenarios providing the need for conducting research even for consultants in the field. It is therefore clear that anyone who is related to medical science and related fields need to understand research: from initiation through implementation and ultimately incorporation of results into policies.

Research is undoubtedly of paramount importance for all health workers without any exception. The authors of this manual have ensured that it is simple to use so that every health care worker can ably use it. The contents of this manual will provide a quick guide for conducting health systems research and knowledge translation. We hope that with this research methodology manual, the targeted personnel will be able to develop research proposals and implement them, to contribute to evidence generation, inform health systems policies and strengthen health care provision in Malawi and hence contribute towards universal health coverage.

This document is not a training manual but rather an instructional step by step manual for quick reference. As such, for any detailed information which is not covered in this document, a reference guide will further be provided to the targeted audience. For the utmost potential of this manual, it is recommended that health workers should have to undergo research methodology training (using the WHO training tools). The Ministry must therefore invest in training and mentorship programs in health research to improve the research culture in the health system.

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CHAPTER ONE: INTRODUCTION TO HEALTH RESEARCH

CHAPTER 1: INTRODUCTION TO HEALTH RESEARCH

1.1 Definition of Research

Research is a scientific and systematic way of acquiring/learning new knowledge with the main aim of solving problems or answering a specific question. The process focuses on gathering, analysing and interpreting data around the specific question/problem.

Research requires a **clear** problem with a well laid out **plan** to build on **available data/knowledge** to generate solutions to the existing problem.

Note: Refer to the World Health Organization training tools for further information on introduction to health research.

1.1.1 Types of Research

1. **Basic vs applied:** basic research focuses on generating new ideas/technologies/inventions to deal with unresolved problems while applied research identifies priority problems from existing ones and seeks to improve practice using available resources.
2. **Quantitative vs Qualitative:** Quantitative research entails an objective assessment on *measurable* data. Repetition of the same assessment using the same methodology is bound to yield similar results. On the other hand, Qualitative research encompasses opinion-based research on human behaviour and the social world. It seeks to answer the "why" and "how" in the interactive world.

1.1.2 The Steps Involved in Research

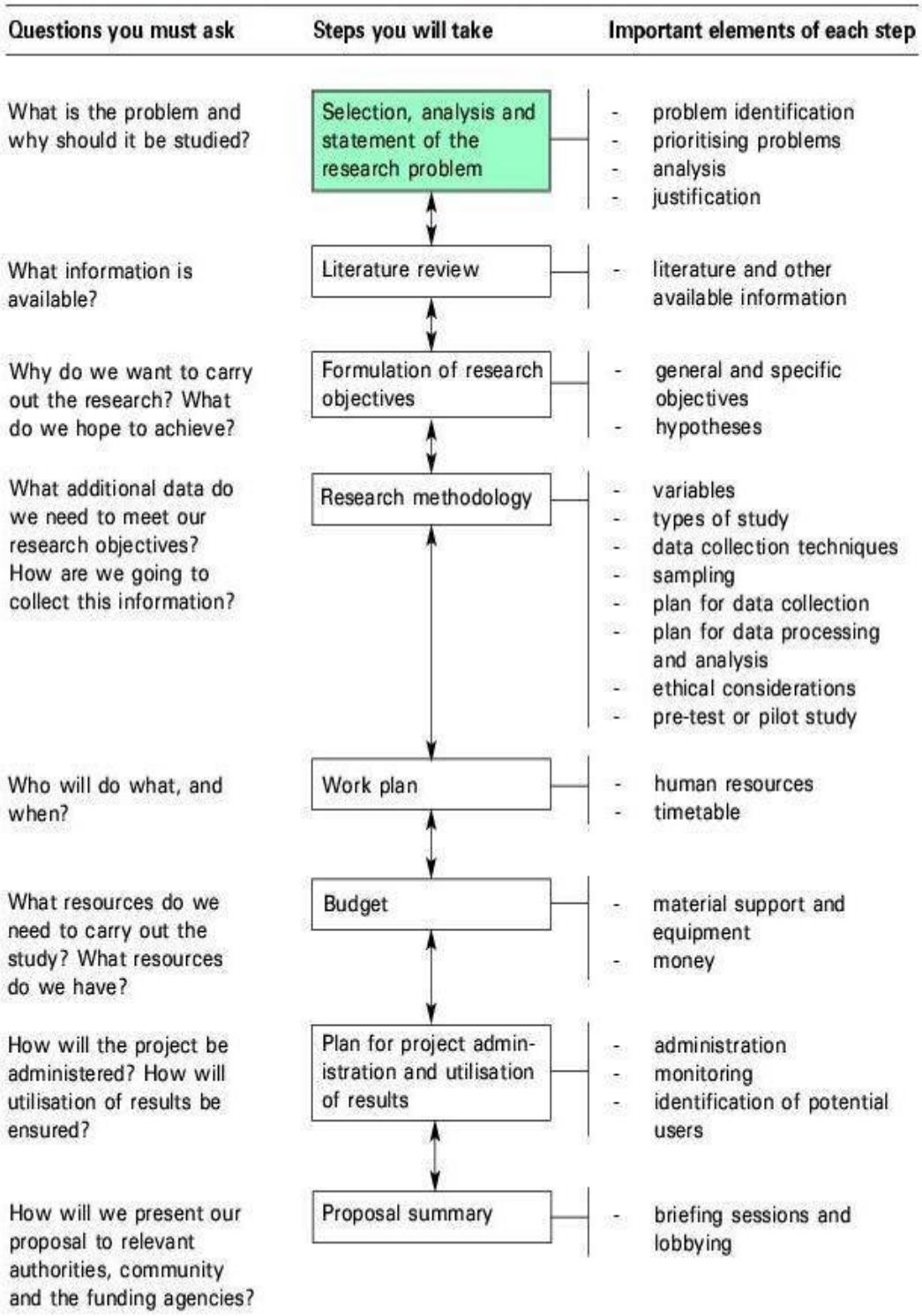

Figure 1.1: Summary of Steps Taken in Health Research

1.2 Identification of a Research Problem

This is the first step that is undertaken when conducting research. It involves problem identification, prioritisation, analysis and justification. The identification of a research question requires the following:

- A perceived discrepancy between what is available on the ground and the ideal desired scenario.
- This difference should be unclear
- There should be more than one possible solution/answer to this identified problem.

An identified research problem needs to be assessed in terms of the following criteria to make sure it is a really valuable question to be addressed:

- *Relevanc*e: some of the questions to be asked include: who is affected; how widespread or large is the problem; who considers it to be a problem; how severe is the problem
- *Avoidance of duplication:* check if a similar problem has been investigated before. However, it is possible to replicate a study conducted elsewhere to contextualise the findings as well as allow for cross-cultural comparison
- *Urgency of data needed (timeliness)*: questions that should be asked include which research should be done first and which one should be done later; how urgent are the results needed for decision(s) to be made
- *Political acceptability*: consider political environment in which the study will be undertaken and the potential barriers that can be faced in terms of undertaking the research and implementing the recommendations
- *Feasibility of study:* questions that should be asked include what resources will be needed to undertake the research; is there enough time available; how complicated is the problem; will there be any person that will be willing to fund the research; are there any people available to provide technical assistance
- *Applicability:* question to be asked should be if the recommendations emanating from the research will be applied
- *Ethical acceptability:* to determine this, one needs to ask if there is any possibility of inflicting harm on other people while undertaking the research

After identifying the problem to be researched on, the first chapter of a research proposal can include the format outlined below:

1.2.1 Background to the Study

The background section outlines the history of the subject matter under investigation; the evolution of the research problem; and how the researcher became captivated with the problem. The section goes on to describe the specific situation surrounding the research problem, using facts from literature to support various arguments., The researcher tries to ascertain the appropriateness and practicality of the study, concluding from the sufficient evidence drawn from the previous literature. The background should start from general summaries/description of the problem/situation and narrow down to the specific problem in question.

In a nutshell, this is where the researcher initiates the subject of his/her investigation using all available evidence and figures to establish its groundwork. Every sentence presenting facts must be cited quoting relevant literature. The paragraphs must be a summary of unresolved issues, conflicting findings, social concerns, educational, national or international issues, and this should lead to the next section, the statement of the problem.

1.2.2 Problem Statement

The Problem Statement is the reasonable summary of the problems/issues raised in the background to the study. The idea is that while the background to the study offers a wider or global perspective/standpoint to the subject matter of the research, the problem statement makes assumptions from there and concludes on the specifics as they relate to the specific investigation being conducted.

The Problem Statement is expected to flow logically, from the background to the study and it must be stated reasonably brief and very clearly. The idea is that the shorter, the clearer; and the clearer the better for the whole process of investigation.

A satisfactory statement of the research problem is the most important component of a research process and it is typically related to some of the following issues:

- A missing link

- A need
- One-sidedness
- An unanswered question.
- An unsatisfactory state of arrangements

A problem statement enables you to systematically point out why the proposed research on the problem should be undertaken and what you hope to achieve with the study results. This is important to highlight when you present your project to community members, health staff, relevant ministries and donor agencies who need to support your study or give their consent.

1.2.2.1 The Information Included in The Statement of The Problem Should Include:

- A brief description of a problem, and include a few illustrative statistics, if available, to help describe the **context** in which the problem occurs (e.g., where relevant, include social economics and cultural characteristics and an overview of health status and the health-care system in the country/district/.
- **Nature of the problem, size and distribution;** (try to answer place, person and time) and **major factors that may influence the problem** and why the investigation is needed.

1.2.3 Rationale/Justification of The Study

This section explains "why" the problem needs to be addressed by answering the following questions:

- How does the research relate to the priorities of the region and the country?
- What knowledge and information will be obtained?
- What is the overall purpose that the knowledge obtained from the study will serve?

All research contributes to the generation of new knowledge as the ultimate purpose. This section clearly defines the possible benefits of the research and intended beneficiaries. The more logically sensible benefits a study has, the more relevant it is to conduct it. The contribution to the body of knowledge is described, and summarizes who will be able to use the knowledge to make better decisions, improve policy, advance science, or other uses of the new information. This section tries to answer why it is important to determine the answer to the gap in the knowledge, and is related to improving the human condition. It can be arranged sequentially or itemized or paraphrased depending on the person's method of writing.

1.2.4 Objectives {Purpose} of the Study

Objectives summarise what the study will achieve or try to answer and they are framed from the research problem.

The general/main objective gives the overall goal of the study while the specific objectives break the overall aim into smaller goals that will contribute towards achieving the main objective. Specific objectives should systematically address the various aspects of the problem as defined under 'Statement of the Problem' and the key factors that are assumed to influence or cause the problem. They should specify what you will do in your study, where and for what purpose. The Research Questions usually take the form of interrogative statements while the Objectives present the same thing, but in the statement form.

The formulation of objectives will help you to:

- Focus the study (narrowing it down to essentials);
- Avoid the collection of data which is not strictly necessary for understanding and solving the problem you have identified; and
- Organise the study in clearly defined achievable steps. Specific objectives help guide and frame the methodology, data collection tools, type of analyses, interpretation

Properly formulated, specific objectives will facilitate the development of your research methodology and will help you to orient the collection, analysis, interpretation and utilisation of data.

1.2.4.1 Formulation of Study Objectives

Objectives need to be SMART i.e., Specific, Measurable, Achievable, Relevant and Time bound. When stating the objectives, ensure the following:

- The objectives should cover the different aspects of the problem and its contributing factors in a coherent way and in a logical sequence;
- The objectives should beclearly phrased in operational terms, specifying exactly what you are going to do, where, and for what purpose;
- Use action verbs that are specific enough to be evaluated. Examples of action verbs are: to determine, to compare, to verify, to calculate, to describe, and to establish.
- Avoid the use of vague non-action verbs such as: to appreciate, to understand, or to study.

Keep in mind that when the project is evaluated, the results will be compared to the objectives. If the objectives have not been spelled out clearly, the project cannot be evaluated.

1.2.4.2 Title of the Study

The title is but not always recommended to be formulated after study objectives. The title should be in line with the general objective, explicit enough on the what, where of the study. Example of a good title: “A study on cost and quality of community home based care for diabetic patients and their communities in Mwanza ". Bad title “A study of home-based care”

1.2.5 Research Questions and/or Hypotheses

Typically, these come immediately after the Research objectives because of their strong relationship. They do not just seek to change the declarative statement of the objectives into questioning form, but further break down the major problems compressed in the research objectives. Research Questions are presented just like interrogations seeking to create specific relations among the main variables of investigation.

The research questions usually serve as the foundation from where the questionnaire items/questions would eventually be derived. The difference between the two is that the items in the questionnaire offer a further breakdown of each of the research questions to a greater specification. The primary research question is the basis for data collection and arises from the purpose of the study.

Hypotheses are different from research questions even though they are sometimes used to substitute each other. Since they are not the same, they are not expected to replace each other. If they stand to do that, then one should be retained and the other disposed of. By this piece of information, one can easily know that it is not necessary that a project should have both; particularly at the elementary level, where in most of the times, the research questions would be okay. Generally, Hypotheses are commonly used in quantitative studies due to statistical methods required for testing. In a qualitative study, the hypotheses are replaced with the primary research questions.

A hypothesis is a prediction of a relationship between one or more factors and the problem under study that can be tested. Research Hypothesis is a clear, specific statement whose validity and work ability can be tested by means of scientific method. A hypothesis is a *testable prediction* for an observed phenomenon, namely, the gap in the knowledge. Being a declarative statement of prediction, it tries to determine the relationship or difference that exists between one variable and the other; and to what degree. It is a form of clever guess or supposition

regularly derived from the results of previous studies and/or theories originating from the literature. Hypotheses are formulated on the core of any of the areas and objectives listed below:

- To merely describe an occurrence or a statement of fact
- To compare two or more concepts, individuals and places
- To reveal the relationship between variable
- To reveal a cause/ effect situation between variables.

There are two types of hypotheses namely the Null and the Alternative hypothesis. The Null hypothesis is frequently stated in the negative form of “No Significant Relationship" or “No Significant Difference” etc. while the alternative hypothesis takes the positive form of statement; such as “There is a Significant Relationship”, “There is a Significant Difference” etc.

The Alternative Hypothesis (Ha) states that there exists a difference between groups or that a real association exists between variables.

Examples of null hypotheses are:

- There is no difference in the incidence of measles between vaccinated and unvaccinated children.
- Males do not drink more alcohol than females.
- There is no association between families’ income and malnutrition in their children.

Note:

If the result is statistically significant, we reject the **null hypothesis (H0)** and accept the **alternative hypothesis (Ha)** that there *is* real difference between two groups, or a real association between two variables.

Examples of alternative hypotheses are:

- There is a difference in the incidence of measles between vaccinated and unvaccinated children.
- Males drink more alcohol than females.
- There is an association between families’ income and malnutrition in their children.

The Research Hypotheses specify the fundamental issues relating to the data to be gathered in the process of conducting the study. They serve as a theoretical conceptualization of what the researcher anticipates as possible results. These help him/her to test and verify his concepts on the basis of which he makes very tangible and reliable conclusions and generalizations. They also assist in sharpening researcher’s focus on the research problem with a view to determining the direction where to find the solution. Therefore, a good hypothesis should be:

- sensible {i.e., clever guesses}
- in line with known facts or theories.
- constructed in such a manner that it is testable and found to be probably true
    - or false. simple, unambiguous terms/ clear.
- directly connected to the problem of research.
- involve very few variables at a time.
- quantifiable {i.e., operationally formulated}.

1.2.6 Operational Definition of Terms

This section of the Chapter one (Introduction) is used to offer a kind of working definition to all the concepts, which would be operationally used in the course of the research. The notion is that there are some terminologies, which have been "adapted" and so utilized restrictively for the purpose of the research project.

This implies that such terminologies would mean something somewhat different from the one adopted under a different circumstance; therefore, the name Operational Definition of Terms. In defining terms operationally, individual concepts/words to be so defined are recognized and then itemized. Thus, operational definitions are typically given in such a manner that will imply that they are not usually accepted as standard definitions but those peculiar to the study in specific. This section typically comes last in the introductory chapter.

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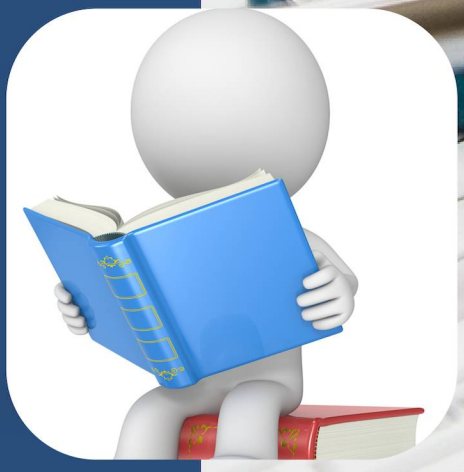
02

CHAPTER TWO: LITERATURE REVIEW



CHAPTER 2: LITERATURE REVIEW

Conducting a literature review is an important step of conducting research in any field and needs to be done from the outset and presented as a report (often included in the introduction/background section of a research paper). It provides, in a systematic way, a general summary of the literature that is available on the topic or problem under study.

2.1 Purpose of Literature Review

Generally, there are five main purposes of literature review.:

1. It helps you to find out whether the proposed study has already been done to avoid duplication.
2. It helps you to learn more about the problem you want to study and the work that has already been done on the topic. This may assist you in refining the purpose and intent of your research.
3. It helps you to gain a better understanding of the research methods and techniques which others have previously used on the topic, which may assist you on how to use them in your own research.
4. To become more familiar with the styles of presenting and discussing the findings on the topic being studied which might be useful in reporting your research.
5. It helps to highlight the gaps [Areas that have not been researched in detail] about the topic in the existing literature and justify why your research project is needed.

2.2 Sources of Information

We use print and electronic sources to discover new information about a particular topic or problem. These can be in the form of books, journal articles, reports and other documents obtained from the internet. Sometimes, it includes personal communication from experts in related fields. Goyal (2013) provides details about the various information sources, but the most often, common sources of information include the following:

1. Statistical data collected at the national, district, or departmental levels (e.g., statistics on the COVID-19 pandemic, antenatal attendance, data from National Statistics Office (NSO), etc.).

2. Published information (textbooks, monograms, journal articles, conference proceedings, policy documents, etc.)
3. Unpublished documents (studies in related fields, reports, etc.)
4. Computer based literature searches using search engines (e.g., Google Scholar, Google [A simple search on Google may provide a limited information on the subject matter and is therefore not recommended but may be used as a starting point.], etc.) and databases such as Medline, PubMed, CINAHL, Cochrane, etc.
5. Expert opinions and, beliefs of key persons
6. Dissertations submitted for an academic degree or professional qualification.
7. Newspaper or magazines which may contain current events
8. Documents from government and non-governmental organisations (e.g., policy documents, strategies, reports, etc.)

Evaluating sources is an important step in your literature review as you only need to include sources relevant to your research. Start by reading the title and then abstract to decide which sources to include in the review. You may also scan the introduction and conclusion. For books, reading the title and tables of contents would help you decide whether to include it or not. It is important to use multiple sources both published and unpublished within 10 years as most relevant information may be scattered. When searching information from online sources, always remember to keep the following in mind:

- Choose keywords to use in your search to help retrieve relevant results.
- Trying the obvious keywords first would save you time.
- The keywords should be as specific to the problem or topic under study as possible. For example, use “teenage pregnancy” instead of “pregnancy” in general if you are investigating “factors associated with early pregnancy”.

2.3 Structure of a Literature Review

A literature review forms an important aspect of any research project. It is important to;

- organise this section thematically with main points relating to the topic or problem being studied.
- demonstrate how the identified sources relate to each other and contribute to a better understanding of the topic or problem.
- evaluative and be critical about the studies or ideas included in the summaries or write up.

For example, think about the important aspects you are investigating which the other investigators did not focus on, any gaps or weaknesses in the methods used in the previous study (e.g., small sample size, representativeness of the sample, etc.), or unsubstantiated conclusions. In short, a literature review should be argumentative in nature rather than just a mere summary of previous research without being critical. Refer to Morley (2014) for phrases used to build arguments in academic writing.

Generally, a literature review is structured with three basic elements: introduction, body, and conclusion.

- The introduction section provides the context to help the reader understand the argument you will address in your review. This would also include providing the criteria used in your literature search as well as the general organization of your literature review section.
- The body is where you discuss different bodies of literature and demonstrate how they are relevant and connected to your research. Most often, you move from what is broadly known about the problem or topic under study and narrows down to more specific issues which link to your research gap. For example, broad issues may include literature on the importance of the topic, number and type of people affected, and seriousness of the impact (which may include health, socioeconomic, physical and psychological impacts).

Please refer to the illustration below:

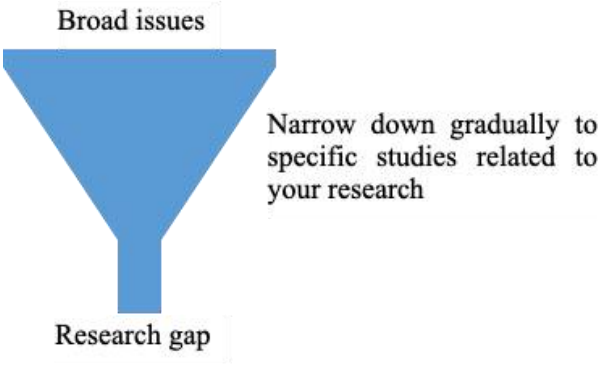


Figure 2.1: 'The Funnel' approach to literature review

The body follows a logical progression of ideas which can take any of the following approaches:

- Chronological: This refers to instances where you present earliest research to most recent research related to your problem or topic under study. For example, presenting the trends in the prevalence of a particular disease or condition under study over a period of time.

- Distant to close: This is where you present literature distantly related to your research to a literature more closely related to your research. For example, literature on obesity in general to more closely literature on obesity in under-fives. Another example is presenting literature about the problem or topic under study from the global perspective, narrowing down to regional (i.e., Africa), then national/local level.
- Compare and contrast: this could be comparing valid approaches or characteristics of published studies, starting with the first approach, then second, followed by third, etc.

In the conclusion section, you should provide a summary of the review by highlighting the most important studies, the implications of the studies included in the review, and suggesting why we need more research on the problem or topic under study.

It is important to acknowledge any sources used in your literature review, including your research overall. Acknowledging the work of other authors helps to protect you from possible accusations of plagiarism as well as to help others to evaluate the quality of your work. In general, every in-text citation **must** have a corresponding listing in the references.

There are different styles of referring to other sources and these vary across disciplines. The most common referencing styles in the health field are Vancouver, Harvard, and American Psychological Association (APA). **Guide to each of the referencing styles is beyond the scope of this manua**l. Further reading can be done from the links provided at the end of this chapter. Various reference management software packages are available to help you organise and format your citations and references, and their functionality would allow you to switch between referencing styles. The most common reference managers include Mendeley, EndNote, and Zotero. Unlike Mendeley and Zotero, EndNote is not for free but has a free 30-days trial and EndNote Basic is available for free to everyone. However, EndNote Basic has reduced functionality than Mendeley and Zotero.

2.4 Theoretical/ Conceptual Framework

The theoretical framework is the foundational theory that is used to provide a perspective upon which the study is based. In other words, it can be defined as an abstract logical structure of meaning that guides the development of the study and enables the researcher to link the findings to a professional body of knowledge. A study framework can be expressed as a map or a diagram of the relationships that provide the basis for a study OR can be presented in narrative format.

They consist of concepts and existing theory (or theories) relevant to your research problem or topic. While the term "theoretical framework" is used interchangeably with the term "conceptual framework", the two are different as the former is based on existing and acceptable theory (or theories) that has / have been tested and validated by others while in accordance with Jabareen 2009, conceptual framework refers to 'a network of interlinked concepts that together provide a comprehensive understanding of a phenomenon or phenomena'. In quantitative designs, a theoretical framework is developed before data collection. While a qualitative design may start with a less structured framework which is then finalized in the course of data analysis.

There are hundreds of theories in literature and selecting an appropriate theoretical framework requires a thorough understanding of the problem or topic under study, purpose and significance of the study, and the research questions you want to address. For instance, research about new species that may have evolved from older, extinct species would be based on the theory of evolution pioneered by Darwin.

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03

CHAPTER THREE: METHODS

CHAPTER 3: METHODS

3.1 Research Approaches

There are three widely recognised research approaches: quantitative, qualitative, and mix-methods. Quantitative research focuses on numerical data (such as statistics) to determine the *extent* of a problem or test hypothesis. For example, we use quantitative research to determine the prevalence (or proportion) of polio vaccination among the Under 5s in Malawi. Qualitative research methods, on the other hand, focuses on non-numerical data (such as words) to get an in-depth understanding of the problem or condition under study. For example, we use qualitative research to understand attitudes associated with polio vaccination in Malawi. In mixed-methods research, the researcher uses both quantitative and qualitative methods to complement each other due to their limitations when used separately. Mixed -method research is now well established and widely used in evaluation of programmes or interventions. This chapter will focus on study designs used in quantitative and qualitative research.

3.2 Types of Qualitative Study Designs

A study design is the process that guides researchers on how to collect, analyse and interpret data. It is a logical model that guides the researcher in the various stages of the research. Several classifications of study types are possible, depending on what research strategies are used. These include:

1. Observational (non-interventional) studies in which the researcher just observes and analyses re searchable objects or situations but does not intervene;

2. Experimental (interventional)studies in which the researcher manipulates objects or situations and measures the outcome of his manipulations (e.g., by implementing intensive health education and measuring the improvement in immunisation rates.)

For the purposes of this manual, emphasis will be made on the Observational study designs. These study designs could be descriptive and analytical;

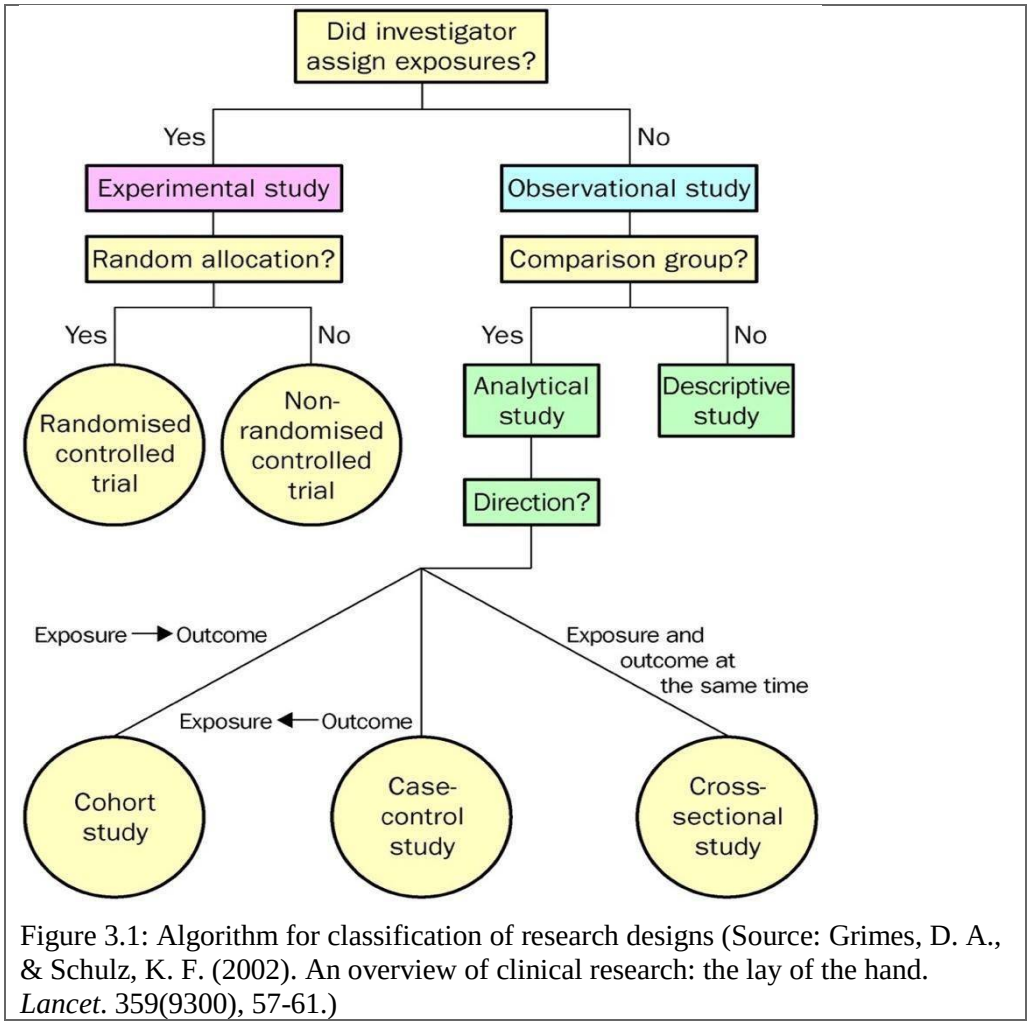

Figure 3.1: Algorithm for classification of research designs (Source: Grimes, D. A., & Schulz, K. F. (2002). An overview of clinical research: the lay of the hand. *Lancet*. 359(9300), 57-61.)

3.2.1 Observational studies (non-interventional studies)

3.2.1.1. Descriptive Studies

A descriptive study is a study that describes the patterns of disease occurrence and other health-related conditions by person, place and time (who, where and when). These studies provide the first important clues about possible determinants of a disease (useful for the formulation of hypotheses)

3.2.1.2 Types of Descriptive Studies

a) Case reports and case series

Case report: This is a careful, detailed report by one or more clinicians of the profile of a single patient. The individual case report can be expanded to a case series, which describes characteristics of a number of patients with a given disease.

b) Cross-sectional studies:

A cross-sectional (prevalence) study provides information concerning the situation at a given time. In this type of study, the status of an individual with respect to the presence or absence of both exposure and disease is assessed at the same point in time.

3.2.1.3. Analytical Studies

Analytic studies may be defined as studies used to test hypotheses concerning the relationship between a suspected risk factor and an outcome and to measure the magnitude of the association and its statistical significance.

a. Cohort studies: Study groups identified by exposure status prior to ascertainment of their disease status and both exposed and unexposed groups followed in identical manner until they develop the disease under study, they die, the study ends, or they are lost to follow-up.

b. Case-control studies: Group of subjects with the disease (cases) and group of subjects without the disease (controls) are identified. Information about previous exposures is obtained for cases and controls, and frequency of exposure compared for the two groups.

3.2.2 Intervention Studies (experimental studies)

In intervention studies, the researcher manipulates a situation and measures the effects of this manipulation. Usually (but not always) two groups are compared, one group in which the intervention takes place (e.g., treatment with a certain drug) and another group that remains 'untouched' (e.g., treatment with a placebo). There are two categories of intervention studies, and these are described below;

a) Randomized controlled trial (Experimental studies)

An experimental design is a study design that gives the most reliable proof for causation. In an experimental study, individuals are randomly allocated to at least two groups. One group is subject to an intervention, or experiment, while the other group(s) is not. The outcome of the intervention (effect of the intervention on the dependent variable/problem) is obtained by comparing the two groups. A number of experimental study designs have been developed.

These are widely used in laboratory settings and in clinical settings. For ethical reasons, the opportunities for experiments involving human subjects are restricted. However, randomised control trials of new drugs are common.

b) Non-randomized controlled trial (Quasi-experimental studies)

In a quasi-experimental study, one characteristic of a true experiment is missing, either randomisation or the use of a separate control group. A quasi-experimental study, however, always includes the manipulation of an independent variable which is the intervention. One of the most common quasi-experimental designs uses two (or more) groups, one of which serves as a control group in which no intervention takes place. Both groups are observed before as well as after the intervention, to test if the intervention has made any difference. This quasi-experimental design is called the 'non-equivalent control group design' because the subjects in the two groups (study and control groups) have not been randomly assigned.

3.3. Types of Qualitative Study Designs

In qualitative research, there are 5 main designs that can be considered. These five designs are not exhaustive; please read Creswell for more details and study designs. However, it should be noted that when writing/developing your study design, state the analytic framework you have opted to use and then the design your study will take (i.e., Grounded theory, Narrative, Phenomenological, Ethnographic, or Case Study). You will then go ahead to relate your study design to the research question at hand to elaborate. It is advised to seek an expert qualitative researcher when designing your study.

3.3.1 Grounded Theory

Grounded theory allows researchers to develop a theory from data that explains a specific phenomenon. Developed by Glaser and Strauss, Grounded theory is used to conceptualize phenomena using research; grounded theory is not seen as a descriptive method and originates from sociology. The unit of analysis in grounded theory is a specific phenomenon or incident, not individual behaviours. The primary data collection method is through interviews of approximately 20 – 30 participants or until data achieves saturation.

3.3.2 Ethnographic Studies

Ethnographic studies are qualitative procedures utilized to describe, analyse and interpret characteristics of a particular culture. Ethnography was developed in the 19th and 20th centuries and used by anthropologists to explore primitive cultures different from their own; it

originated from Anthropology. Ethnography is used when a researcher wants to study a group of people to gain a larger understanding of their lives or specific aspects of their lives (e.g., language, patterns of behaviours or actions). The primary data collection method is through observation over an extended period of time. It would also be appropriate to interview others who have studied the same cultures.

3.3.3 Phenomenological Studies

Phenomenology is used to identify phenomena and focuses on subjective experiences and understanding the structure of those lived experiences. It was founded in the early 20th century by Edmund Husserl and Martin Heidegger and originated from philosophy. Phenomenology is used to describe, in depth, the common characteristics of the phenomena that has occurred. The primary data collection method is through in-depth interviews.

3.3.4 Case Studies

Case studies are believed to have originated in 1829 by Frederic Le Play. Case studies are rooted in several disciplines, including science, education, medicine, and law. Case studies are to be used when (1) the researcher wants to focus on how and why, (2) the behaviour is to be observed, not manipulated, (3) to further understand a given phenomenon, and (4) if the boundaries between the context and phenomena are not clear. Multiple methods can be used to gather data, including interviews, observation, and historical documentation.

3.4 Study Population

At an early stage in the planning of any investigation, decisions must be made concerning the study population. That is, concerning the population of individual units (whether they are persons, households, etc.) to be investigated. The population under consideration should be clearly and explicitly defined in terms of place, time, and other relevant criteria. If the study population comprises cases of a disease, the procedures to be used for case identification should be stated. If controls are to be chosen, their method of selection should be stated.

Often the investigator will have implicitly chosen his study population when he defined the topic of his investigation, by reason of his interest in a specific community or a specific health program. In other instances, particularly when an analytic survey or an experiment is being

planned, the investigator may be required to purposely select a study population. Study populations under qualitative research bear similar considerations.

3.5 Variables

A variable is a characteristic of a person, object, or phenomenon that can take on different values. A simple example of a variable is a person's age. The variable can take on different values, such as, 20 years old, 30 years old, and so on. Other examples of variables are:

a. weight in kilograms
b. monthly income in kwacha
c. marital status (single, married, divorced and widowed)
d. occupation (civil servant, farmer, student, etc.)
e. disease condition (presence or absence of a disease)

The first two variables (a and b) are numerical variables because they are expressed in numbers (metric data). Since the values of the remaining three variables (c to e) are expressed in categories, they are called categorical variables.

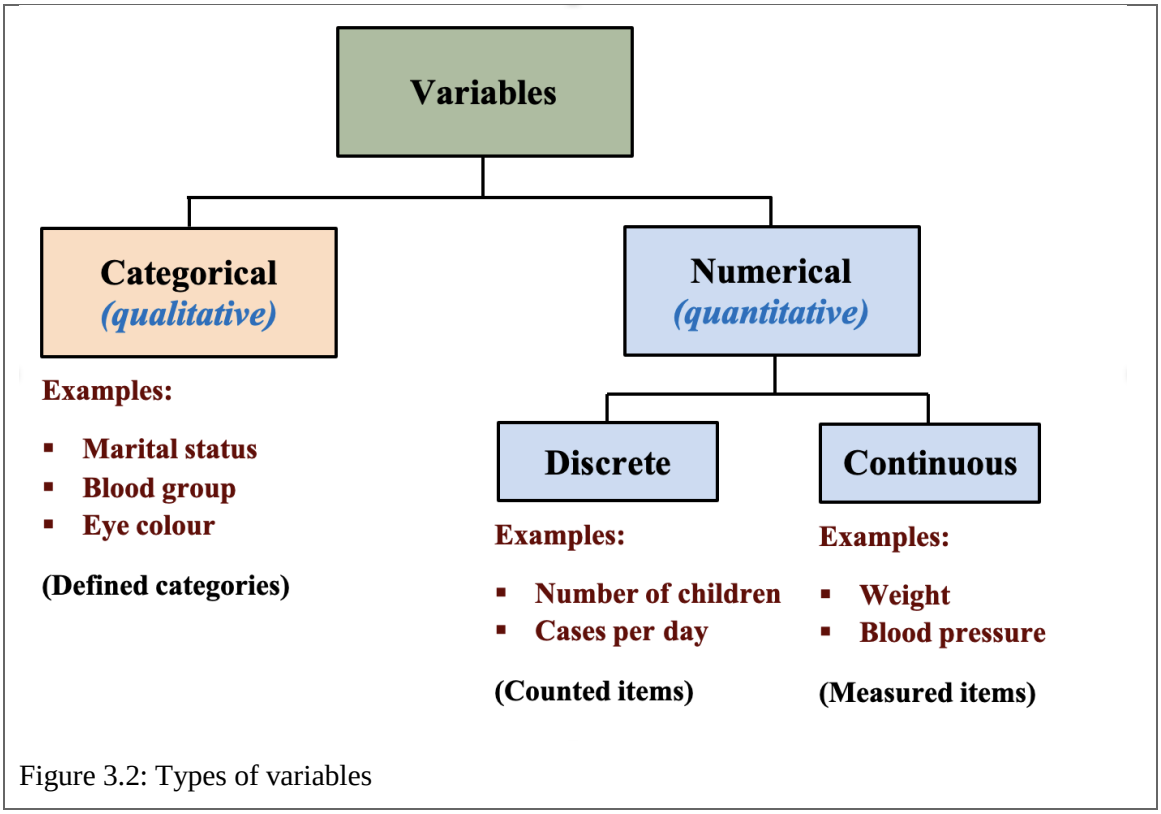

Figure 3.2: Types of variables

3.5.1 Dependent and Independent Variables:

The variable that is used to describe or measure the problem under study is called the dependent variable. The variables that are used to describe or measure the factors that are assumed to influence (or cause) the problem are called independent variables.

For example, in a study of relationship between smoking and lung cancer, "suffering from lung cancer" (with the values yes, no) would be the dependent variable and "smoking" (with the values no, less than a packet/day, 1 to 2 packets/day, more than 2 packets/day) would be the independent variable.

3.5.2 Confounding Variable:

A variable that is associated with both the problem and with a possible cause of the problem is a potential confounding variable. This type of variable may either strengthen or weaken the apparent relationship between the problem and a possible cause. In other words, we cannot be certain what is leading or causing the other event. Broadly speaking, any known risk factor of a disease or problem is a potential confounder, and one can ascertain this from general knowledge and previous research findings. As such, a researcher should consider collection information on all potential confounders where possible.

3.5.3 Defining Variables and Indicators of Variables

To ensure that everyone (the researcher, data collectors, and eventually the reader of the research report) understands exactly what has been measured and to ensure that there will be consistency in the measurement, it is necessary to clearly define the variables (and indicators of variables). For example, to define the indicator “waiting time” it is necessary to decide what will be considered the starting point of the “waiting period” e.g. Is it when the patient enters the front door, or when he has been registered and obtained his card?

For certain variables, it may not be possible to adequately define the variable or the indicator immediately because further information may be needed for this purpose. The researcher may need to review the literature to find out what definitions have been used by other researchers, so that he can standardize his definitions and thus be able later to easily compare his findings with those of the other studies. In some cases, the opinions of “experts” or of community members of health care providers may be needed to define the variable or indicator.

3.5.3.1 Scales of Measurement

As part of the process of clarifying each of the variables to be studied, its scale of measurement should be specified. There are four types of scales of measurement: Nominal, Ordinal, Interval and Ratio. They are listed in ascending order of power and preference.

1. Nominal Scale: This consists of two or more named categories (classes) which are qualitatively different from each other E.g., Sex: male (1); female (2)

2. Ordinal scale: This has the additional quality that the categories are ranked and have implied order. However, the intervals between classes are not necessarily equal e.g., education level: no education, primary, secondary, tertiary or higher.

3. Interval scale: This has the additional quality that the variable is measured along a numerical scale and the intervals between classes are equal e.g., Temperature (in Celsius), where the interval between 20 and 25 degrees Celsius is exactly the same as the interval between 30 and 35 degrees Celsius.

4. Ratio scale: This is exactly the same as interval scale; however, a ratio scale has "zero" value that indicates absence of the attribute. As a result, the ratio between numbers in the scale is the same as that between the amounts of the attribute being measured. e.g., Weight measured in kilograms, height in centimetres, etc.

3.6 Sampling and Sampling Techniques

3.6.1 Sample

A sample literally means "a small part or quantity intended to show what the whole is like". In research, a sample means a group of people, objects, or items that are taken or selected from a larger population for measurement. The process of selecting or choosing a subset of a population for observation or study is known as sampling.

3.6.1.1 Reason for Sampling

Sampling is basically done to make an inference or generalization to a population. There are a number of reasons why a sample is preferred or chosen than the entire population and these include; resource challenges, time limitations and difficult to find populations.

3.6.1.2 Sampling Frame

A sampling frame comprises a complete list of all elements (units) or items in a population of interest. It is a complete list of everyone or everything you want to study for example; a list of people in a register, or a list of people with a specific disease or condition.

3.6.1.3 Sample Size Determination

Sample size determination is a mathematical or analytical process of deciding, before a study begins, how many subjects should be studied. The choice of an appropriate size of the sample to use in a study is dependent on the purpose of the study, study design, variables of study, as well as, the accuracy that is desired for the study, but has statistical and ethical implications. There are various methods of determining or calculating a sample size. These include for example; using an online sample size calculator (e.g., https://www.calculator.net/sample-size-calculator.html), seeking guidance from a statistician, and using validated studies

3.6.2 Sampling Techniques

Sampling techniques are grouped into two namely; probability sampling and non-probability sampling. The following section discusses the most commonly used sampling techniques.

3.6.2.1 Probability Sampling

This sampling technique uses randomization to ensure that every element of the population gets an equal chance of being picked as part of the sample. This sampling technique is mostly used in quantitative research. Since the selected sample is assumed to be representative of the population, findings are mostly generalizable to the target population. That is why most official statistics globally, including the those by the National Statistical Office in Malawi, prefer to use probability sampling techniques to meet information needs of the population of interest.

There are several types of probability sampling, and the most used include:

1. **Simple Random Sampling**

In this method, every subject has an equal chance of being selected to be a part of the sample. To select a sample in this method, a researcher could use a random number table, computer program (e.g., Microsoft Excel), or rotary method by putting the names of people in a hat or container and selecting the appropriate number of names blindly. This method is commonly used in (small scale) studies where the researcher has access to a list of the target population (e.g., programme beneficiaries, antenatal register, etc.). In studies with larger population, it may be difficult to access the list (if at all it is available) and therefore not a desirable sampling method.

2. **Stratified Sampling**

This method divides the elements in a population into small subgroups (strata) based on common characteristics such as residence (urban/rural), sex (male/female) making elements within a group homogeneous and heterogeneous among other strata. Random sampling is then applied to select elements from each stratum. Prior information about the population should be

available for easy creation of subgroups. Most surveys conducted in Malawi uses population information from the recent Population and Housing Census.

3. **Cluster Sampling**

In cluster sampling, researchers divide a population into smaller or multiple groups called clusters. The researcher randomly selects the entire cluster and includes all units (e.g., households) within the selected cluster in the sample. The method usually is good with a large population that is widely geographically dispersed. Refer to Figure 3.3 illustrating key differences between stratified and cluster sampling methods.

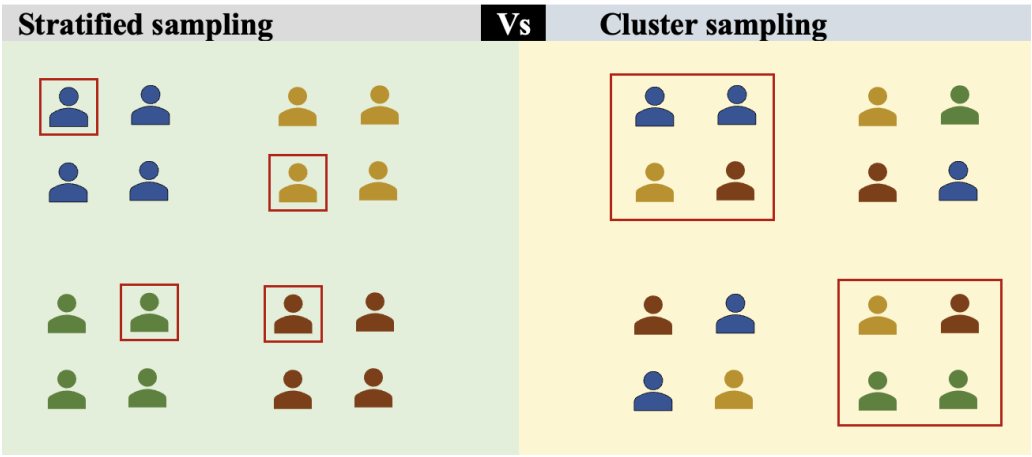

Figure 3.3: Key differences between stratified and cluster sampling

4. **Systematic Sampling**

In this method, elements of a sample are selected at regular intervals of the population. For example, every 5th household in the community or every 10th woman in the antenatal register. In the latter example, systematic sampling is used when the names in the register are **not** arranged in a particular order (e.g., alphabetical order) to avoid bias.

5. **Multistage Cluster Sampling**

Multistage is a more complex form of cluster sampling which contains two or more stages in sample selection. In short, large clusters of a population are divided into smaller clusters in several stages for the purpose of making data collection more manageable. This method is used in most (large scale) surveys/studies, e.g., the Malawi Demographic and Health Survey conducted by the National Statistics Office.

3.6.2.2 Non-Probability Sampling

This sampling technique uses subjective (i.e., non-random) method of selecting participants to participate in a study. This is the fastest way of selecting study participants as it does not require a complete list (or frame) from the population. Since non-random selection is use, the sample is usually non-representative, and the findings **may not** generalizable. Non-probability sampling is mostly used in qualitative research, but sometimes it is also used in quantitative research where generalization of findings is not the primary focus of the research, e.g., in validation studies (see Mwase-Vuma, Janssen, Okely, Tremblay et al. (2022) from https://doi.org/10.1016/j.jsams.2022.10.003).

There are several types of non-probability sampling, and the most used include:

1. **Convenience**

This type of sampling technique uses participants obtained at the nearest convenience of the researcher. This means that you can find your sample anywhere — for example, people in a mall, on the street, in the workplace or in an online community — at any time.

2. **Purposive**

This strategy groups participants according to preselected criteria relevant to a particular research question (for example, HIV-positive women in Capital City). This means that the researcher selects individuals and sites for study because they can purposefully inform an understanding of the research problem and central phenomenon in the study.

3. **Quota**

In quota sampling, we decide while designing the study how many people with which characteristics to include as participants. Characteristics might include age, place of residence, gender, class, profession, marital status, use of a particular contraceptive method, HIV status, etc. The criteria we choose allow us to focus on people we think would be most likely to experience, know about, or have insights into the research topic.

4. **Snowball**

In this method, participants or informants with whom contact has already been made use their social networks to refer the researcher to other people who could potentially participate in or contribute to the study. Snowball sampling is often used to find and recruit "hidden populations," that is, groups not easily accessible to researchers through other sampling strategies. For example, persons with albinism, key populations, etc.

3.7 Qualitative Sampling

As highlighted above, we use non-probability sampling techniques in qualitative research. However, it is important to carefully consider the following two items in sampling for qualitative research designs:
Be explicit about evaluations of your sample size sufficiency. You should contextualize this within the larger and more encompassing assessments of data adequacy. In simple terms, you should outline clearly how the number of interviewees for example will provide sufficient/adequate data.

Consider how data saturation/information redundancy parameters found in prior methodological studies and sample size community norms might guide you, and be applicable to, your own study/project. You should also note that data adequacy is best assessed with reference to features that are intrinsic to the study at hand.

Note: *Data saturation* is a point where there is adequate data to draw necessary conclusions such that any new data does not produce any new insights.

Generally, the choice of sampling technique is determined based on the study objectives, research methods and/or study design, and the characteristics of the study population (such as size and diversity).

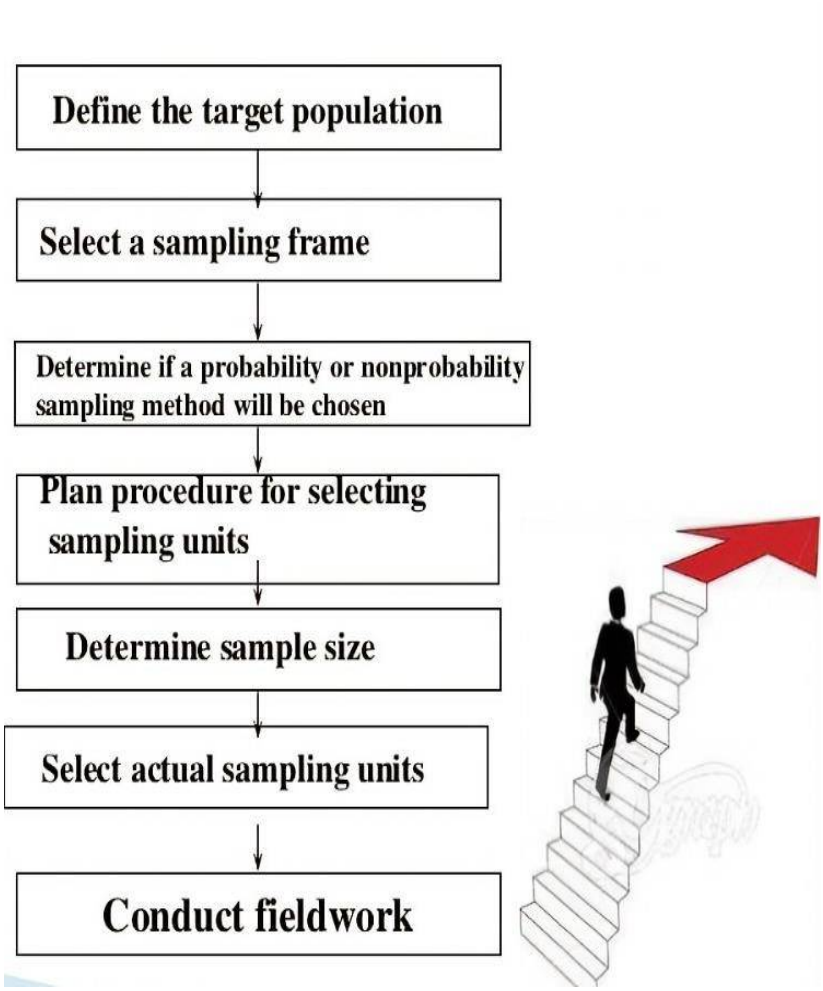

Figure 3.3: Steps in sampling process (*Source: H. Hajiimia, Research methodology sampling,2014*)

3.8 Data Collection

Data collection is an important phase in the planning and implementation of a study. Different data collection techniques may be combined to allow for in-depth understanding of the problem at hand (triangulation). The data collection techniques that may be used include;

1. Using available information i.e., key informant
2. Observing (participant and non-participant observation)
3. Interviewing (face-to-face)
4. Administering written questionnaires
5. Focus group discussions
6. Projective techniques, mapping, scaling

Table 3.1: data collection techniques and tools

Data collection techniques	Data collection tools
Using available information	**Checklist; data compilation forms**
Observing	**Eyes and other senses, pen/paper, watches, scales, etc**
Interviewing	**Interview guide, checklist, questionnaires, tape recorder**
Administering written questionnaires	**Questionnaires**

3.8.1 Quantitative Data Collection Techniques

Quantitative data collection techniques include; Experiments/clinical trials, Questionnaires (Surveys), structured interviews, observation**.**

3.8.2 Qualitative Data Collection Techniques

Qualitative data collection methods include; in-depth interviews, focus group discussion, document review, observation.

3.8.3 Inclusion and exclusion criteria

Inclusion criteria are characteristics that the prospective subjects or respondents must have to be part of the study while exclusion criteria are those characteristics that disqualify prospective respondents from being included in the study. Examples of inclusion and exclusion criteria are gender, age, ethnicity, race and others.

3.9 Data Management

The data collected by the researcher must be kept secured. Paper documents such as questionnaires, consent forms must be kept in lockable stores when not in use. They must be handled by researchers only during research implementation. Data in portable storage such as flash disks, hard disks etc. must be kept in a safe place and handled by researchers only. Computers which store the research data must be protected with a password. The password must not be shared with unauthorized personnel and the password should be difficult to determine.

In preparation for data analysis data cleaning, and manipulation and preparation of a codebook should be done. In data cleaning the researcher checks the data for errors e.g., by running frequency tables and charts. In data manipulation the researcher converts numerical variables

to categorical variables, collapses categories of categorical variables into few categories, calculates total scores, and transforms variables using mathematical equations e.g., logarithm.

Creating a codebook to describe all your data variables and a simple method of creating a codebook is to copy your questionnaire, write variable names for each question, and enter numerical codes in the category of your categorical variables and add statistical information for each variable e.g., distribution, means, standard deviation etc.

3.10 Quantitative Data Analysis

In data analysis the researcher analyses the data to answer the research questions/objectives or test hypothesis. Data analysis helps researchers to identify trends and patterns of relationships. There are several data analysis techniques which have been developed in literature. These techniques allow researchers to summarise, organise, interpret and communicate quantitative data. The kind of analysis to use in one's study depends on the study objectives.

3.10.1 Descriptive Statistics

Descriptive statistics are techniques that are used to summarize and present quantitative data. These are measures of average and spread for continuous and categorical variables. Descriptive statistics help to identify outliers and patterns. Continuous variable which is normally distributed use means and standard deviation otherwise use median and interquartile range for skewed distributed data. The figure 1 below describes how one can choose which summary measure to use if the data is continuous (scale) or categorical (ordinal/nominal).

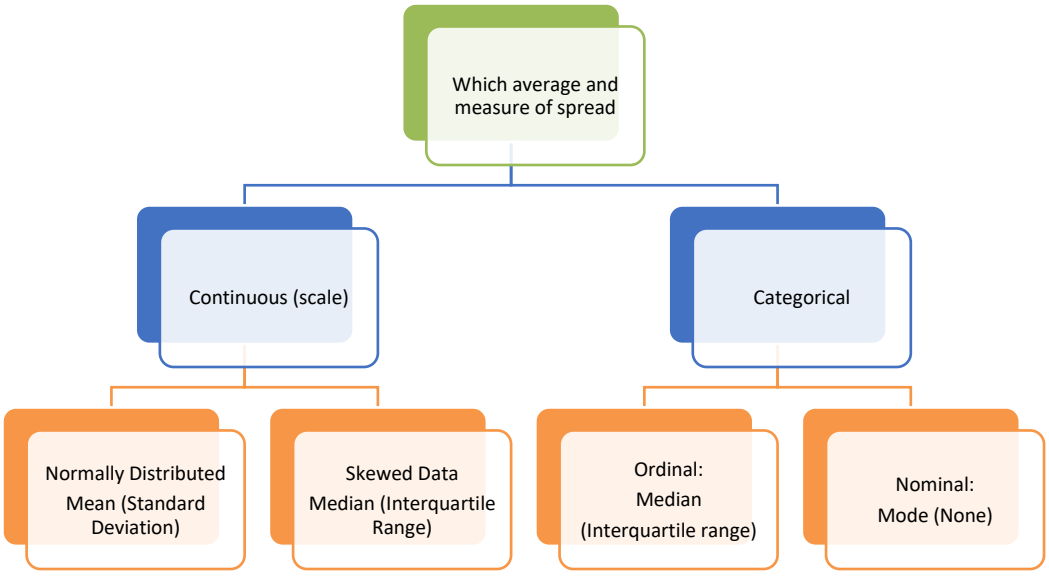

Figure 3.5: Summary of measures

Charts help to visually present data, identify outliers and distribution of the data. The choice of the chart in data analysis depends on the variable type and purpose of the chart. The table below describes in brief some of the charts commonly used in research.

Table 3.2: Commonly used charts in research

Chart	Variable type	Purpose	Summary Statistics
Pie Chart or bar chart	One Categorical	Shows frequencies/ proportions/percentages	Class percentages
Stacked / multiple bar	Two categorical	Compares proportions within groups	Percentages within groups
Histogram	One scale	Shows distribution of results	Mean and Standard deviation
Scatter graph	Two scale	Shows relationship between two variables and helps detect outliers	Correlation coefficient
Boxplot	One scale/ one categorical	Compares spread of values	Median and Interquartile range
Line Chart	Scale by time	Displays changes over time Comparison of groups	Means by time point

Tables visually present data in rows and columns for example Table 3 and Table 4. They present frequency, percentages and cumulative frequencies.

Table 3.3 of one variable (patient gender)

Patient gender	Freq.	Percent	Cum.
Female	4695	25.85	25.85
Male	13467	74.15	100.00

Table 3.4: cross tabulation of two variables (patient gender and road user type). First row has frequencies and second row has column percentage

Patient gender	**Road use user type**			
	Pedestrian	Cyclist	Driver/Passenger	Oxcart
Female	1215	1471	1878	58
	30.59	17.68	35.21	18.95

Male	2757	6850	3456	248
	69.41	82.32	64.79	81.05

3.10.2 Inferential Statistics

Use table 4 in deciding on which inferential statistical technique when you are investigating the difference in means between independent samples or matched samples. Use table 5 to decide on which inferential statistical technique when testing relationship/association between variables. In summary, it is strongly advisable to consult a statistician / similar research papers when you want to apply these statistical techniques in your research. Statistical analysis is implemented in software such as SPSS, Stata, Excel, SAS, and R.

Table 3.5: Comparisons of means between independent samples and matched samples for two or more groups

Comparing:	Dependent (outcome) variable	Independent (explanatory) variable	Parametric test (Data is normally distributed)	Non-parametric test (ordinal/ skewed data)
The averages of two independent groups	Scale	Nominal (Binary)	Independent t test	Mann-Whitney test/ Wilcoxon rank sum
The averages of 3+ independent groups	Scale	Nominal	One-way ANOVA	Kruskal-Wallis test
The average difference between paired (matched) samples e.g., weight before and after a diet	Scale	Time/ Condition variable	Paired t-test	Wilcoxon signed rank test
The 3+ measurements on the same subject	Scale	Time/ condition variable	Repeated measures ANOVA	Friedman test

Table 3.6: Relationship/association between two or more variables

Comparing:	Dependent (outcome) variable	Independent (explanatory) variable	Parametric test (Data is normally distributed)	Non-parametric test (ordinal/ skewed data)
Relationship between 2 continuous variables	Scale	Scale	Pearson's Correlation Coefficient	Spearman's Correlation Coefficient
Predicting the value of one variable from the value of a predictor variable or looking for significant relationships	Scale	Any	Simple Linear Regression	Transform the data
	Nominal (Binary)	Any	Logistic regression	
Assessing the relationship between two categorical variables	Categorical	Categorical		Chi-squared test

3.10.3 Hypothesis testing

Hypothesis testing uses evidence from the sample to make conclusions about the population parameter. In hypothesis testing the researcher formulates a research question, and null hypothesis. The researcher should decide whether the tests will be one or two tailed tests. The following points summarize hypothesis testing procedure

- Make statement of the question to be answered by the study
- Formulate the null and alternative hypotheses.
- Make a decision for a suitable statistical test
- Specify the level of significance (e.g., 0.05)
- Conduct statistical test to find p-value
- Make statistical decision: fail to reject null hypothesis if p-value >0.05 or reject null hypothesis if p-value ≤ 0.05

3.10.4 Confidence interval

Confidence interval (CI) is the range of values that are plausible for the point estimate calculated from the sample. The wider the CI the lower the precision of the estimate. Larger

sample size narrows the CI. The CI is calculated using the formula $[Point\ estimate] \mp [coefficient]\ X\ [standard\ error]$.

Table 3.7 Common CI level and coefficients

Confidence level	coefficient
90%	1.645
95%	1.96
99%	2.576

Example of CI calculation: Given the body weight measurements in kg of a child: 8.4, 10.0, 11.5, 11.8, 13.2, 13.9, 14.2, 15.0, 17.5, and 18.2. Mean is 13.4 Standard error is 3.1. Calculate 95% CI for the data. 95% CI is (13.4 ± 1.96 x 0.98) = (11.5, 15.3). This means that the child weight measurement is between 11.5 and 15.3.

3.10.5 Details of some common statistical test

3.10.5.1 Odds ratio

The odds ratio (OR) measures the effect size of association/non dependence between two binary variables e.g., presence of disease and exposure. Using table 7 the OR=$\frac{a\ X\ d}{b\ X\ c}$. If OR=1 the odds of the presence of disease between the exposed and not exposed groups is the same. OR>1 means the presence of the disease is more likely found in the exposed group than not exposed group while OR<1 means the presence of the disease less likely in the exposed group than not exposed group

Table 3.8: 2 by 2 table of exposure and disease

Presence of disease	Exposed	Not exposed
Yes	a	b
No	c	d

3.10.5.2 Chi-squared test

Chi-square test measures association between two binary variables (independent and dependent). It compares the observed frequencies in each category to the frequencies we would expect to see if the null hypothesis is true. The null hypothesis states that there is no association between the two binary variables. Chi-square test assumes that 80% of the cell counts and all expected cell counts ≠ 1. If these assumptions are violated use fisher's exact test. Interpretation of chi-square test: If $p<0.05$ reject the null hypothesis and conclude that there is significant association between the two binary variables.

3.11 Qualitative Data Analysis

Qualitative data will refer to any data that is not numbers; it is not something you can measure using a fixed scale or complex statistics or mathematics. Qualitative data can and often takes the form of interview transcript documents, open-ended survey responses, and documents. It can also involve the interpretation of images and videos.

Qualitative data focuses on words, descriptions, concepts or ideas and can be challenging and time-consuming to analyse and interpret. At the end of a data collection phase, you will likely have pages and pages of transcripts or hours of audio recorded data. You also may have subtle nuances of discussions in your mind or that you have written down in your field notes. Making sense of all of this is no small task. Software packages for qualitative data analysis include NVivo. We will now explore Qualitative Data Analysis (QDA) methods which can be used on primary or secondary data[1].

The six most popular QDA methods are:

1. Content analysis
2. Narrative analysis
3. Discourse analysis
4. Thematic analysis
5. Grounded theory
6. Interpretive Phenomenological Analysis (IPA)

1. Content analysis is possibly the most common and straightforward QDA method. Content analysis evaluates patterns within one or more pieces of content – words, phrases or images or across multiple pieces of content or sources of communication. These can be a collection of newspapers, articles or political speeches. With this method, you could identify the frequency with which an idea is shared or spoken about – like the number of times 'tourism' is mentioned in a given newspaper. Alternatively, you can identify patterns of deeper underlying interpretations. For example, identifying words or phrases in a magazine that highlight Malawi as a tourist destination. Now, because this method can be used in a variety of ways, it is important to go into your analysis with a very specific question or goal or you will get lost in

[1]*Qualitative Data Analysis 101 Tutorial: 6 Analysis Methods + Examples*. 2022. [video] Grad Coach: YouTube.

the material. With this method, you will group large amounts of text into codes, summarize them into categories and possibly even tabulate the data to calculate the frequency of certain concepts or variables. Owing to this, content analysis provides a small amount of quantitative within qualitative methods. The drawbacks are that it is time consuming, may lose certain nuances in communication and doesn't take into account what happened before or after that timeline.

2. Narrative analysis is about the analysis of people's stories to derive meaning. Stories serve a functional purpose by helping us make sense of the world. We can gain ways of how people deal with and make sense of reality by analysing their stories and how they are told. You can use this method to explore whether how something is being said is important. For example, the narrative of a prisoner trying to justify their crime would provide insight into their view of the work and the justice system. Similarly, we could look at how small and medium entrepreneurs talk about their struggles in the business. We can also look at palliative care patients' stories of hope which can provide insights into their mindsets and perspectives. It is about paying attention to the stories people tell and more importantly, the way they tell them. Drawbacks are that the sample sizes are quite small and difficult to reproduce.

3. Discourse (written or spoken language) analysis is about analysing language within its social context, that is, analysing a speech or conversation within a culture. For example, you could analyse how a hospital support staff member such as a cleaner speaks to a hospital director or how politicians speak about mandatory vaccinations. To truly understand these conversations, the history or culture of those involved is important. For example, a cleaner may speak more casually with a CEO in an organization that emphasizes equality among workers. Similarly, a politician may speak more about nationwide vaccinations if there was a pandemic more recently in the country. You can identify how culture history or power dynamics to name a few have an effect on how concepts are spoken about. So, if your research aims and objectives involve understanding culture or power dynamics, discourse analysis can be a powerful method. Because there are many social influences on how we speak to each other, the potential use of discourse analysis is vast. This also means we need to have a very specific research question in mind for analysing your data. Time consuming because you need to sample the data to the point of saturation or no new information or insights emerge.

4. Thematic analysis focuses on themes and patterns. It looks at patterns of meaning in a data set. For example, a set of interviews or FGD transcripts. It takes bodies of data and groups them according to similarities or themes. These themes help us make sense and derive meaning. With

thematic analysis you can use 100 reviews of service reviews at a clinic to derive meaning about people's experiences, views and experiences. If your research aims are to explore people's views or experiences, then thematic analysis is a great choice. It is an exploratory process. It is not unusual for your questions to change as you undertake analysis. It can be time consuming but for a good reason – unexpected adjustments. The six stages involved in thematic analysis are:

1. Familiarising yourself with your data,
2. Generating initial codes,
3. Searching for themes,
4. Reviewing themes,
5. Defining and naming themes and
6. Producing report.

5. Grounded theory. The intent is to create a new theory or theories using the data at hand through tests and revisions. For example, you could test what factors influence NCD patients in a rural setting to adhere to dietary restrictions. The important thing about grounded theory is that you go into the analysis with an open mind and let the data speak for itself rather than drag in an existing hypothesis or theory into the analysis. Your theory is started from the ground up, hence the name. You start with a general overarching question about a given population for example NCD patients. You sample a small group, representative of the population. And then you analyse what factors led them to adhere to dietary restrictions. From there you move and look into another small sample and adapt your theory accordingly. And then you move onto another group. As this process develops, you revise your theory accordingly and a theory develops. For it to work, you should know very little about your research question and population. This helps to reduce the amount of bias in your interpretation. However, in many circumstances, it is thought to be unwise to approach your research question without knowledge of the current literature. Regardless this method remains a popular and powerful option if the topic is completely new or has very little existing research about it.

6. Interpretive Phenomenological Analysis (IPA)

IPA is designed to help you understand the personal experiences of a subject for example a person or group of people concerning a major life event, an experience of a situation. This event or experience is the phenomenon or phenomena which may range from relatively common experiences such as motherhood or car injuries to personal experience in a refugee camp. It is great to analyse people's experiences and is subject centred, focused on the experiencer. While

you may use codes, it is important not to lose depth of the experience. Since your sample size will generally be small with IPA, you will not be able to draw broad conclusions with your findings. Beware of personal bias using this method. Self-awareness is critically important as it may have an effect on the findings.

The qualitative research has to demonstrate trustworthiness in providing rigor and strength to the study validity in all stages including data collection, data analysis and description (Vivar, McQueen, Whyle & Armyer, 2007). The trustworthiness approaches to be demonstrated are:

1. Credibility,
2. Confirmability,
3. Dependability and
4. Transferability

3.12 Ethics

3.12.1 Ethics review

There is uncertainty in research because the outcome of testing the principle/supposition is unknown. This demands for ethics to protect participants from harm. Therefore, when designing the study, the researcher must take into account the issues as described in the table 8 below. The researcher must submit the protocol to a research ethics committee for review regardless of whether the researcher will use primary or secondary data. The committee checks whether the protocol design has addressed scientific and ethical issues.

Examples of ethics committees in Malawi include National Health Sciences Research Committee (NHSRC), National Committee on Research in Social Sciences and Humanities, COMREC, Mzuzu University Research Ethics Committee (MZUNIREC), and University of Livingstonia Research Ethics Committee (UNILIAREC), Malawi University of Science and Technology Research Ethics Committee (MUSTREC). Depending on your affiliation, you can submit to any of the listed ethical committees, following their prescribed guidelines.

3.12.2 Informed consent

When the study has been approved by the ethical committee, you are required to get an informed consent from all your participants before data collection. The consent should have information on what the study is all about, the risk and benefits, timeline of the study, permission from the ethics review board. You must assure your participants that their personal information will be kept confidential and they are free to withdraw from the study at any time.

Table 3.9: Table of ethical issues to consider in designing your study

Ethical issue	Meaning
Voluntary participation	participants have the right to leave the study at any stage of the study
Informed consent	Participants should know the objective, significance, risks, and funders of the study before making a decision to participate in the study.
Anonymity	Participant's identification is not known. the researcher does not collect personal identifiable data
Confidentiality	The researcher knows the subjects but keeps the information from anyone else. personal identifiable data is anonymised e.g., using id
Possible harm	Any form of harm is kept to a very minimal
Results communication	Researchers should ensure that your results are free from plagiarism, research misconduct and the results accurately presented.

3.13 Work Plan

This is the schedule of activities. It provides a summary of the planned activities, the responsible person and specifies the duration for each activity usually in a table format.

A Gantt chart which is a type of bar chart has been widely used to show work plans and easily plan around deadlines. Unlike other types of charts, a Gantt chart makes it easy to understand, schedule the tasks and clearly visualize representation of the time frames. Every Gannt chart needs to have:

- The list of specific tasks for the project
- The timelines: start and end date for each activity
- The responsible persons for each task
- Sometimes the progress made once implementation has started

An example of a Gantt chart:

Key Milestones/ Activity	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	**Resp Officer**

Proposal writing and submission for funding								
Application for ethical approval								
Training of data collectors								
Data collection								
Data analysis								
Report writing								
Manuscript writing								
Dissemination								

An excellent work plan should be:

- Simple
- Realistic
- Well elaborated for easy understanding by those carrying out the tasks.
- Cover all the steps involved in the research process from development down to dissemination of results with specific task allocation depending on expertise.

3.14 Budget and Justification

The budget details the resources needed to implement the research. This section accounts for the available resources and also additional ones that may be required. It specifically costs each slotted activity providing unit and total cost. There is often an overall need to be cost effective in this planning to avoid excessive unnecessary spending. It is also wise to be realistic when formulating a budget considering resource availability and market costs/fluctuations.

The format of the budget largely depends on where it will be submitted as most funders specify on how it should be detailed.

3.14.1 Budget justification

This explains more on the budget providing clarification on why the specified items are required in such amounts for such periods of time. This section relates back to the context of the

proposal. It tries to answer why some questionable costs have to be made. It also details how some complicated expenses have been calculated. In essence, the overall aim of the justification is to convince an independent reviewer of how the costs of the budget have to be as they are.

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04 CHAPTER FOUR: RESULTS

PART 2

CHAPTER 4: RESULTS

Results section should be informed by the chosen study methodology and should be arranged in a logical sequence. The results need to be concise and answer the research question or study objectives.

When writing the results section, you should observe the following:

- Introduce the context for easy understanding of the results by restating the research problem of your study or research.
- Consider including non-textual elements, such as, figures, charts, photos, maps, tables, etc. to further illustrate key findings, if appropriate.
- Include a systematic description of your results, highlighting (for the reader) observations that are most relevant to the topic under investigation.
- The page length of your results section is guided by the amount and types of data to be reported.
- Provide a short paragraph that concludes the results section by synthesizing the key findings of the study.
- Do not discuss or interpret your results.
- Do not report background information or attempt to explain your findings,
- Do not ignore negative results, including raw data or intermediate calculations.
- Do not present the same data or repeat the same information more than once and provide confusing figures with tables.

4.1 Quantitative results

Quantitative results are presented as numbers mostly in tables, charts and maps. Variables are either categorical or continuous

- For categorical or discrete variables, they are mostly presented as counts (n), proportion/percentage (%) and as pie chart, column or clustered bar chart and other forms of charts – this will depend on the methods proposed and the objectives of the research.
- For the continuous variables, they are presented as mean, median, mode and standard deviation and mostly histogram as a chart.

- However, depending on the level of the analysis proposed, the results can have more tables such as cross tabulation, linear or logistic tables, etc.

4.1.1 Characteristics of a good table

- Tables should be self-explanatory
- For any abbreviations or symbols, should be explained in detail in a footnote.
- Each row and each column should be labelled concisely and clearly.
- The specific units of measure for the data should be given. E.g., *Age in months*
- The title should be clear, concise, and to the point and should be answering these (what? when? where?) e.g., *"Distribution of asphyxia babies in Neno District between 2020 and 2022"*
- Total should be shown, however without anomalies such as percentages which do not add up to 100 percent
- Avoid putting more than two decimal places
- The Tables should be numbered e.g., "Table 1"

4.1.2 Characteristic of a Good Graph / Chart

- The simplest graphs are the most effective. No more lines or symbols should be used in a single graph than the eye can easily follow.
- Every graph should be self-explanatory.
- The title may be placed either at the top or bottom of the graph. When more than one variable is shown on a graph, each should be clearly differentiated by means of legends or keys.
- Lines of the graph itself should be heavier than other coordinate lines.
- Frequency is usually represented on the vertical scale and method of classification on the horizontal scale.
- On an arithmetic scale, equal increments on the scale must represent equal numerical units.
- Scale divisions should be clearly indicated as well as the units into which the scale is divided.
- The graph or chart should be labelled e.g., "Figure 1"

If appropriate statistical tests are used, the results should be included. P-values alone are not very helpful. Confidence intervals and the type of tests used should be indicated.

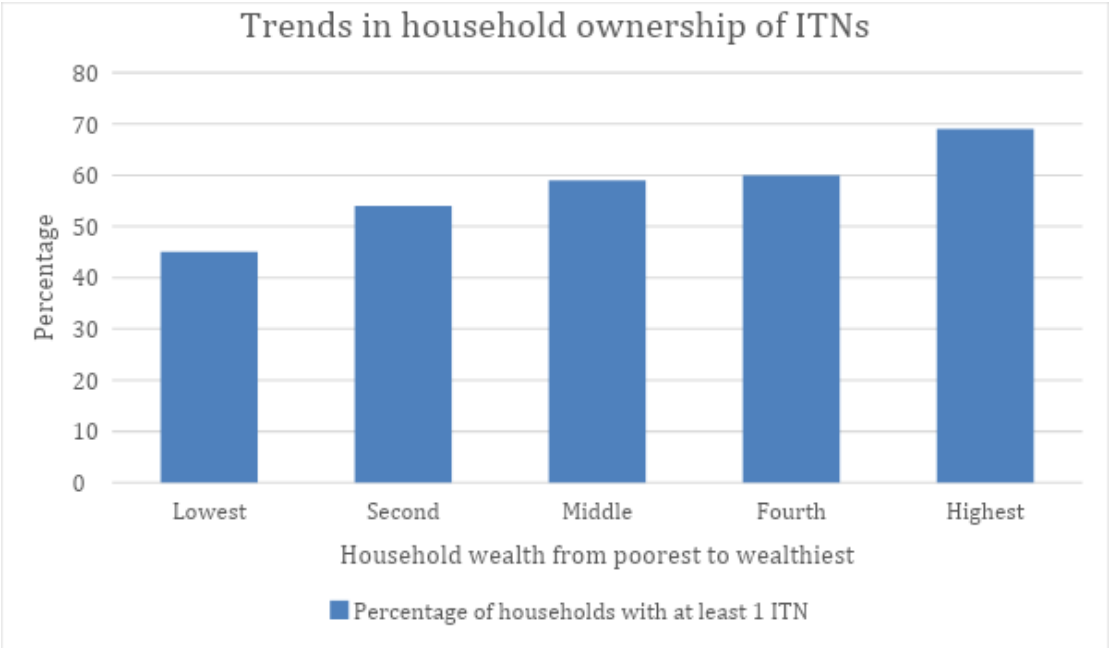


Figure 4.1: Example of a good graph (source: National Statistical Office - NSO/Malawi and ICF. 2017. Malawi Demographic and Health Survey 2015-16. Zomba, Malawi: NSO and ICF.)

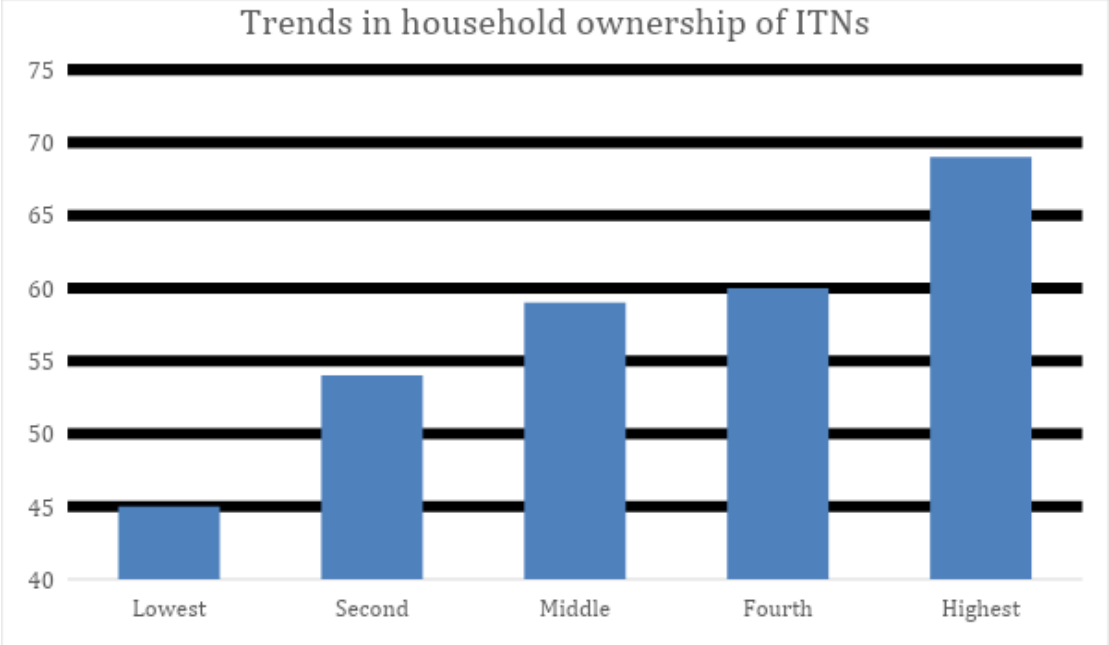


Figure 4.2: Example of a bag graph. Adapted from Malawi Demographic and Health Survey 2015-16 (National Statistical Office - NSO/Malawi and ICF. 2017. Malawi Demographic and Health Survey 2015-16. Zomba, Malawi: NSO and ICF).

4.2 Qualitative Results

In the results section for a qualitative study is where you present your data and tell the reader what it all means. In synthesis and writing, you need to:

- Have a clear analytic story
- Determine which parts of the story are crucial to convey (avoid getting lost in all the details)
- Have a detailed outline and logic flow
- Have ample textual support to justify each main point

Be mindful that we use qualitative research to:

- Form a new theory or hypothesis
- Understand diverse perspectives
- Help explain quantitative findings: why did (or didn't) an intervention achieve certain results?

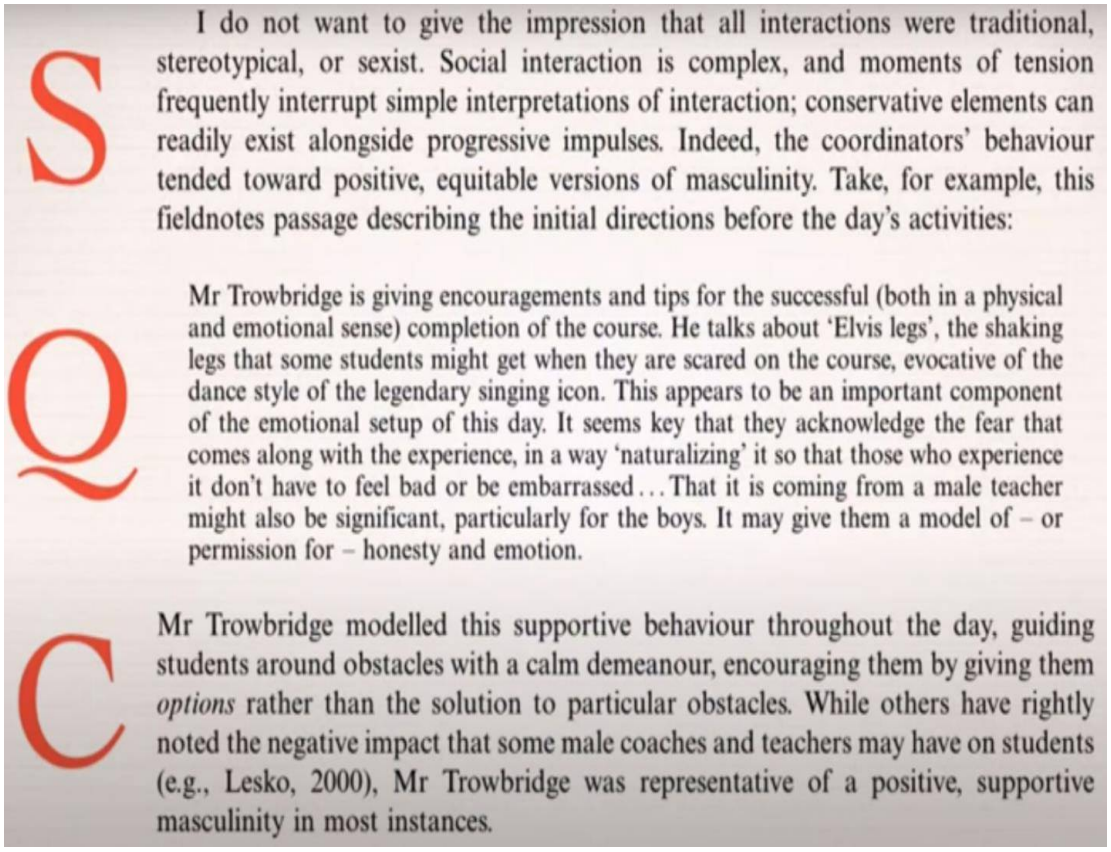
In writing your qualitative results, the first sentence of the paragraph is critical. It states the theme and plays a transitory role from the previous paragraph (if any). Subsequent sentences may support the theme and either present some context or literature. A setup for a quotation states the participant and the context for the quotation (question, topic, etc). This is the *Setup-Quote-Comment* model for writing qualitative findings paragraphs in research reports.

A block quotation is best used for passages with more than 40 words, indent half an inch. Pick the one or two most vivid quotations. Small quotes throughout as opposed to a big quote is also acceptable.

Always have one sentence following a quotation, that is, avoid ending a paragraph on a quote. Comment sentences should be used to stress important parts of the quote – either by tying it back to the theme or moving towards the next paragraph.

Setup: Has the thesis and where the speaker (e.g., participant) and context is introduced.
Quote: Raw data, it could be an interview, segment of image data, or passage from field notes.
Comment: You are commenting on what was in the quote, either by explaining it or giving some extra information about the thesis or themes and then transitioning to what is in the next paragraph.

An example is provided below for reference taken from Oatmeal facials and sock wrestling: the perils and promises of extra-curricular strategies for ‘fixing’ boys' education.



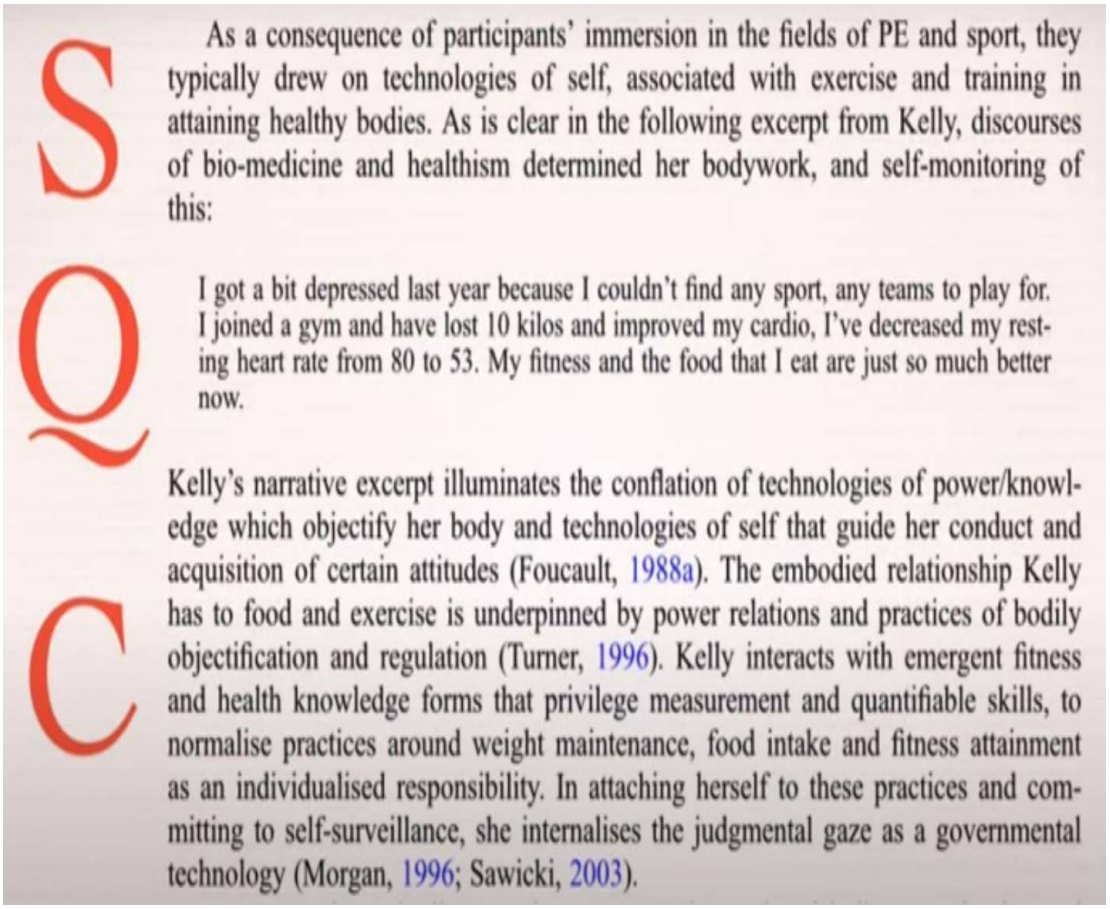
I do not want to give the impression that all interactions were traditional, stereotypical, or sexist. Social interaction is complex, and moments of tension frequently interrupt simple interpretations of interaction; conservative elements can readily exist alongside progressive impulses. Indeed, the coordinators' behaviour tended toward positive, equitable versions of masculinity. Take, for example, this fieldnotes passage describing the initial directions before the day's activities:

> Mr Trowbridge is giving encouragements and tips for the successful (both in a physical and emotional sense) completion of the course. He talks about 'Elvis legs', the shaking legs that some students might get when they are scared on the course, evocative of the dance style of the legendary singing icon. This appears to be an important component of the emotional setup of this day. It seems key that they acknowledge the fear that comes along with the experience, in a way 'naturalizing' it so that those who experience it don't have to feel bad or be embarrassed . . . That it is coming from a male teacher might also be significant, particularly for the boys. It may give them a model of – or permission for – honesty and emotion.

Mr Trowbridge modelled this supportive behaviour throughout the day, guiding students around obstacles with a calm demeanour, encouraging them by giving them *options* rather than the solution to particular obstacles. While others have rightly noted the negative impact that some male coaches and teachers may have on students (e.g., Lesko, 2000), Mr Trowbridge was representative of a positive, supportive masculinity in most instances.

In the setup passage, the author is responding to things that were said earlier and then moves on to the thesis about how social interactions are complex. The author then goes on to show how that goes on. Now, notice the last sentence before the field notes passage; it gives an idea about who is involved in this particular incident and provides the context. This sentence is setting up what the reader is about to hear from the participant. After the quote section, in the comment section you can see that the author is speaking about what is important in the quote and linking it back to the thesis.

Another example is shown below.



S As a consequence of participants' immersion in the fields of PE and sport, they typically drew on technologies of self, associated with exercise and training in attaining healthy bodies. As is clear in the following excerpt from Kelly, discourses of bio-medicine and healthism determined her bodywork, and self-monitoring of this:

Q I got a bit depressed last year because I couldn't find any sport, any teams to play for. I joined a gym and have lost 10 kilos and improved my cardio, I've decreased my resting heart rate from 80 to 53. My fitness and the food that I eat are just so much better now.

C Kelly's narrative excerpt illuminates the conflation of technologies of power/knowledge which objectify her body and technologies of self that guide her conduct and acquisition of certain attitudes (Foucault, 1988a). The embodied relationship Kelly has to food and exercise is underpinned by power relations and practices of bodily objectification and regulation (Turner, 1996). Kelly interacts with emergent fitness and health knowledge forms that privilege measurement and quantifiable skills, to normalise practices around weight maintenance, food intake and fitness attainment as an individualised responsibility. In attaching herself to these practices and committing to self-surveillance, she internalises the judgmental gaze as a governmental technology (Morgan, 1996; Sawicki, 2003).

As you can see, the very first sentence is setting up the thesis. And then there is a sentence that sets up the quote. It gives the context about what she is talking about. In the comment part, they are explaining what is going on in the quotation and how it fits into this larger notion about technologies that have to do with measuring oneself and internalizing self within this teacher dynamic. It is an effective way of writing these findings and this conforms very well with this SQC model.

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05

CHAPTER FIVE: DISCUSSION AND CONCLUSION

CHAPTER 5: DISCUSSION AND CONCLUSION

The discussion section reviews the findings and puts them into the context of the overall research. It brings together all the sections that came before it and allows a reader to see the connections between each part of the research study. In a discussion section, the author engages in three necessary steps: interpretation, analysis, and explanation.

An effective discussion section will tell a reader why the research results are important and where they fit in the current literature, while also being self-critical and sincere about the shortcomings of the study. The author reviews the findings and provides interpretation, analysis, and explanation using current literature, while highlighting why the research results are important.

The following section illustrates the difference between Discussion Section and Conclusion:

5.1 Attributes of Discussion Section

- Thorough and rigorous examination of the results
- Looks at *how* or *why* results are the way they are
- Author acknowledges the limits of the research
- Identifies gaps for future research
- Investigates the implications of the research based on the findings and results
- It draws meaningful conclusions from those implications.
- Is much longer and more detailed

5.2 Attributes of Conclusion Section

- Summarizes parts of the research study
- Is brief and touches on the main points of the study report

5.3 Structure of a Discussion Section

Each discussion section will vary based on the discipline and the subject of the paper. However, six basic rules can be applied to every discussion section to create a framework. These are;

1. summarising the ***key findings*** links them to the research question.
2. place the findings in ***context*** by referring back to the literature review section and analysing how the results fit in with previous research.
3. mention and discuss ***any unexpected results*** by describing the results and providing a reasonable interpretation of why they may have appeared. Additionally, if an unexpected result is significant to the research question, be sure to explain that connection.
4. address ***limitations or weaknesses in the research***. Addressing limitations helps build your credibility as a writer, because the reader sees that you have thought critically about what your study does and does not cover.
5. provide a brief look at ***potential follow-up research studies***. Recommend a few areas where further investigation may be crucial. However, do not go overboard with the suggestions, as they can leave a reader thinking more about the gaps in the paper rather than the actual findings.
6. conclude with a ***restatement*** of the most significant findings and their implications. Explain why the research is important and remind readers of the connections it has to outside material, such as existing literature or an aspect of the field that is affected by the study.

5.3.1 An example of a Discussion Section

[Key finding] Our 20-year analysis of snakebites in California showed a well-correlated inverse relationship between snakebite incidence and severe drought phases, with a predictable increase of snakebites following precipitation. *[Placing findings in context]* This is in contrast to popular press reports of increased snake bites with drought conditions [29,30], and Central

American research that reported increased incidence of snakebite during high temperatures of El Niño Southern Oscillation (ELSO) [9]. This study also analysed the effect of altitude and precipitation on the periodicity of regional snakebites, and *[Key finding]* found that while climate changes had a predictable effect on incidence, snake bites clustered in regions with the highest precipitation [9] [...] After accounting for seasonal trends, *[Restating a key finding]* we observed that prior precipitation was a strong predictor of snakebites, with incidence peaks following the heavy precipitation years of 2006 and 2011 […] *[Limitation]* We cannot exclude the possibility that changes in the medical culture or technology of snakebite reporting may be a confounding variable. *[Recommendation for follow-up research]* While we believe these limitations have not impacted the primary outcome of the study, future work could seek to include additional controls.

Source: Phillips et al., "Snakebites and climate change in California, 1997-2017," *Clinical Toxicology*, 2019.

The above discussion section was split between a dedicated "Discussion" section and a section exclusively covering "Limitations." The authors presented their key findings and placed them into the context of pre-existing literature and research. They restated those findings and then discussed the limitations of their study, followed by recommendations for future research that could possibly address or overcome those limitations.

The limitation of the study represents things and issues that constituted challenges in the process of investigations. Limitations of a study are those things over which the research has no control. Evident limitations are potential weaknesses of a study. Researcher biases and perceptual misrepresentations are potential limitations in a qualitative study; while in a quantitative study a limitation may be the capability of an instrument to accurately record data. Limitations must be related to study designs or the entire methodology. It is important to mention that financial challenges are not acceptable to be indicated under study limitations. Limitations should generally be considered at the end of the study; so, a researcher should try to address any things/issues identified before the study implementation to ensure robustness and credibility of their research.

5.3.2 Common Errors Committed in Discussion Section

A discussion section has a few possible pitfalls, but these issues can be navigated easily by remaining aware of what not to do.

- **Do not rewrite the results section:** A discussion section does go over the most significant results, but it also must provide *interpretation and analysis* instead of a simple summary of the findings.
- **Do not draw conclusions from the findings without support:** All the explanations of the key results should be firmly backed up by evidence found in the paper's data or references. Remember to stay within the bounds of the study; do not speculate and wander into another discipline without support.
- **Do not bring up new information:** The discussion is about examining the information already presented earlier in the paper. Adding new information in this section will confuse a reader and derail the flow of ideas. If new information does come up, put it in the results section.
- **Do not cherry-pick the results to analyse:** Some results and findings will not answer the research question, will not answer it the way they were expected to, or will be

simply unexpected. That's perfectly fine—a discussion section is simply the place to write about why or how this may have happened. Avoid ignoring those results in favour of only the ones that support your research question(s).

5.4 Conclusion

The conclusions as well as the recommendations should follow logically from the discussion of the findings. Conclusions can be short, as they have already been elaborately discussed in the discussion. As the discussion will follow the sequence in which the findings have been presented (which in turn depends on your objectives) the conclusions should logically follow the same order.

In other words, the order set in the specific objectives should be the same in the findings, discussion, conclusion and recommendations.

5.4.1 Recommendations

For easy reading, the recommendations should again be placed in roughly the same sequence as the conclusions. However, the recommendations may at the same time be summarized according to the groups towards which they are directed, for example:

- policy-makers,
- health and health-related managers at district or lower level,
- health and health-related staff who could implement the activities,
- potential clients, and
- the community at large.

Note

Remember that action-oriented groups are most interested in this section. In making recommendations, use not only the findings of your study, but also supportive information from other sources. Always consider the local characteristics of the health system, constraints, feasibility and usefulness of the proposed solutions. They should be discussed with all concerned before they are finalized. If recommendations are short i.e., roughly one page, one may include them all in the summary and omit them as a separate section in order to avoid repetition.

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06

CHAPTER SIX: DISSEMINATION OF RESULTS

CHAPTER 6: DISSEMINATION OF RESULTS

6.1 Communication and Utilisation of Research Findings

There is a need to promote and increase the utilisation of your research results among all potential users, varying from community members to donor agencies. The likelihood of research findings being used will increase if the following steps are taken:

6.1.1 Key Steps

(1) Develop and use a systematic dissemination and communication strategy for reaching different audiences of potential users;

(2) Present the research results to all stakeholders including relevant ethics committees through appropriate dissemination channels such as radios, blogs, newspapers, journal article, TVs, posters and conference presentations as well as policy briefs, in order to obtain feedback on findings and recommendations.

NB: For tips on how to write journal article, refer to author guidelines for various journals and Equator network (www.equator-network.org).

(3) Develop a plan of action to promote the implementation of the recommendations that resulted from your study.

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