**KMTC**

**DIPLOMA IN KENYA REGISTERED COMMUNITY HEALTH NURSING**

 **RESEARCH METHODOLOGY**

**LECTURE NOTES**

**WELDON KIPROP (BSCN UON)**

**INTRODUCTION TO REASERCH**

**DEFINITION OF RESEASCH**

* Process of arriving at dependable solutions through planned systematic collection analysis and interpretation of data
* A systematic process of collecting examining and interpreting data

**NURSING RESEARCH**

A study into those aspects of professional activity which are predominantly and appropriately the responsibility of nurses

**COMPONENTS OF RESEARCH**

* Systematic-solves problems in a systematic way
* Objective- it attempts to find an unbiased solution to a problem.
* Based on observable experience or empirical evidence
* Employs carefully designed procedures or rigorous analysis.

**TYPES OF RESEARCH**

1. **BASED ON AIMS OF RESEARCH**
2. **BASIC RESEARCH**

This is a type of research that aims at building knowledge but not of immediate application by practitioners

It doesn’t produce results of immediate and practical use but it provides empirical knowledge which constitutes foundations for fundamental knowledge

1. **ACTION/APPLIED RESEARCH**

This is a type of research that focuses on activities in order to obtain information to solve operational problems.

It solves immediate and practical problems requiring scientific and immediate solutions on top of adding to scientific knowledge.

It provides information for planning and implementation of projects and Programmes.

It is conducted before a project is implemented (feasibility/baseline study) or to evaluate a programme (formative and summative evaluation)

Action research has **5 steps**

1. **Problem identification**

Problem identification is done through various ways such as: Observation, Discussion with other people, Experience etc.

1. **Consideration of action alternatives**

The researcher develops a number of alternative solutions to the problem and then considers the strengths and weaknesses of each of the solution. In evaluating the various action alternatives the research would consider such factors as AFASS (affordability, feasibility, acceptability, sustainability, safety)

1. **Action taking**

This involves implementation of action that is considered the most desirable. It will include such activities as developing an action plan, mobilizing resources etc

1. **Evaluation of consequences of actions**

The research after implementing the action will the review the outcomes, this will include assessment of the success of the action in addressing the problem and any challenges encountered in the implementation stage.

1. **Extractions of lessons learnt**

The researcher then identifies what worked well and what didn’t work well the reasons why. This is the step that contributes to new knowledge in action research

1. **BASED ON TYPE OF DATA COLLECTED**
2. **QUANTITATIVE RESEARCH**

This is a type of research that deals with quantitative data. It relies on the principle of verifiability or proof.

Knowledge is derived from what can be proven by direct observation and focuses on measurements.

**Characteristics**

* Concise and narrow
* Collects information under conditions of control
* Uses structured procedures and formal instruments to collect information such as questionnaires, interviews.
* Analysis is done through statistical procedures
* Investigator does not participate in the events under investigation
* Begins with preconceived ideas about how concepts are interrelated
* Emphasis objectivity in the collection and analysis of data.

Quantitative research is further divided into non experimental and experimental research

1. **EXPERIMENTAL RESEARCH**

This is a study concerned with cause- effect relationships. It involves manipulation or control of independent variable (cause) and measurement of dependent variable (effect). In experimental research, the researcher is interested in controlling the extraneous variables that may influence the results.

Experimental research is further classified into:

1. **True Experiments**

 True experiments are characterized by

* **Manipulation** of the experimental variable(s)
* **Control** by introduction of one or more controls over the experimental situation including the introduction of a control or comparison group. This ensures that the dependent variable is as a result of independent variable and not other variables. A control group is the group that does not receive the experimental treatment.
* **Randomization**- subjects are randomly assigned to either the experimental or the comparison group. Each individual has an equal chance of being placed into any of the groups in an experimental study
1. **Quasi-Experiment**

This is an experimental research in which there is no control group or the subjects are not randomly assigned to groups.

It involves mostly implementing a specific treatment and later examining the effects of treatment using selected methods of measurements.

Example: randomized clinical trials.

1. **NON EXPERIMENTAL RESEARCH (DESCRIPTIVE)**

This is a study that explores a phenomenon in real life situations. The purpose is to observe, describe and explore aspects of a situation as it is without manipulation. It does not try to explain or understand t he underlying causes of variable of interest.

Non experimental research is further divided into

1. **Survey**

This is a type of descriptive research that focuses on obtaining information regarding prevalence, distribution and interrelationships of variables within a population

It obtains information from a sample of people by means of self report i.e. people in the sample respond to a series of questions posed by the investigator.

Surveys ask subjects to report their attitudes, opinions, perceptions or behaviors.

Advantage of Survey include: ability to provide accurate information on populations using relatively small samples and also ability to obtain large amount of data rather quickly and with minimal cost.

The disadvantage of survey is that data may be unreliable because in self report, people tend to provide socially acceptable responses.

1. **Correlational studies**

This is a type of research where the investigator examines the strength of relationships between variables by determining how changes in one variable are associated with changes in another variable i.e. how variable X is related to variable Y.

This relationship can be positive or negative. The magnitude and direction of the relationship is indicated by the correlation coefficient.

In correlational studies, one group of subjects is measured on two variables.

1. **Comparative studies**

This is a study that examines the differences between two intact groups on some independent variables of interest.

Unlike in experimental design the researcher is not able to manipulate the independent variable.

Comparative studies are classified as:

1. **Retrospective**

Dependent variable (effect) is identified in the present (a disease condition) attempt is made to determine the independent variable (cause) that occurred in the past.

Example: case control studies.

1. **Prospective**

Independent variable (presumed cause is identified at the present time and then subjects are followed in future to observe the dependent variable.

Example: cohort studies.

**Differences between experimental and Descriptive Research**

* Descriptive research merely describes something whereas experimental research tests a hypothesis
* Researchers can control variables in experimental research but cannot in descriptive research
* Descriptive research is subjective but experimental research is objective
* Experimental research can lead to predictions but descriptive research cannot.
1. **QUALITATIVE RESEARCH**

This is a type of research in which a systematic, subjective approach is used to describe life experiences and give them meaning. Data collected is in the form of words rather than numbers and data is then grouped into categories, themes and patterns.

 **Characteristics**

* Collects information without formal structured instruments such as KII, FGD etc.
* It involves sustained interaction with the people being studied.
* It does not attempt to control the context of the research but rather attempts to capture the context in its entirety.
* It attempts to understand the phenomenon in its entirety.
* It has few preconceived ideas and stresses the importance of people’s interpretation of events and circumstances rather than the researchers interpretation
* Analyses narrative information in an organized but intuitive fashion.
* Does not aim to generalize the findings.

**Advantages**

* Permits research to go beyond the statistical results usually reported in quantitative research
* Enables study of attitudes and other emotional behavior

 Qualitative research includes:

1. **Phenomenological studies**

These are studies that examine human experiences through the descriptions that are provided by people involved. These experiences are called “lived experiences

The goal is to describe the meaning that experiences hold for each subject.

In these studies subjects are asked to describe their experiences as they perceive them.

1. **Ethnographic studies**.

This involves the collection and analysis of data about cultural groups.

Systematic process of observing, detailing, describing, documenting and analyzing the lifeways or particular patterns of a culture in order to grasp the lifeways/patterns of the people in their familiar environment.

The researcher lives with the people and becomes part of their culture or interviews people who are considered knowledgeable about the culture.

1. **Grounded theory**

This is a study in which data are collected and analyzed and then a theory is developed that is based (grounded) on the data. It uses purposive sampling.

1. **Historical studies**

Concerned with the identification, location, evaluation and synthesis of data from the past. It seeks to discover the events of the past and to relate those events to the present and future.

1. **Case studies**.

This is an in depth examination of people or groups of people, institution etc. case studies may be considered qualitative or quantitative depending on the purpose of the study and the design chosen by the research.

In qualitative case studies, the researcher must be interested in the meaning of experiences to the subjects themselves rather than generalizing the results to other groups of people.

Case studies can be used to generate hypothesis but not to test hypothesis. They are also time consuming and costly.

1. **BASED ON TIMEFRAME FOR STUDY**
2. **LONGITUDINAL**

This is a study which follows subjects over a period of time in the future. In study that follows the subjects for six or more months is considered longitudinal

1. **CROSS SECTIONAL**

This is a study which examines the subjects at one point in time.

**THE RESEARCH PROCESS**

**PHASES**

The research process can generally be divided into **4 phases**:

1. Conceptual/ thinking/planning phase
* This involves formulation and delimitation of the problem, formulation of objectives, hypothesis and research questions
* Literature review
* Development of theoretical /conceptual framework
* Determining materials and methods.

The end product of this phase is a research proposal.

1. **Empirical/doing phase**

This includes data collection and preparation for analysis. In this phase the research proposal is implemented.

1. **Interpretive /analytic phase**

This is the phase of data analysis and interpretation.

1. **Communication/dissemination phase**

This is the phase of writing the report and communicating the findings.

**STEPS**

The research process can also be divided into 10 key steps:

1. Identification of the research topic- This includes background information and problem statement.
2. Formulation of research objectives, hypothesis and research questions.
3. Explaining the rationale/justification of the research problems.
4. Review of literature.
5. Highlighting the materials and methods.
6. Determining the methods of measurements.
7. Conducting a pretest/pilot study
8. Data collection and presentation
9. Data analysis and interpretation
10. Communication of the research findings.

**STUDY VARIABLES**

**Definition**

* Variables are attributes, properties and/or characteristics of individuals, events or objects that are examined in a study or
* Any measured characteristics on which individual observations are made or
* Any factor, characteristic, quality or attribute of cases that is measured or recorded in a study

**Types**

1. **Predictor/explanatory/independent**
* Factors that the researcher thinks explain variations in dependent variable
* It is the variable manipulated by the researcher to ascertain its effect if any on dependent variable
* Not dependent on any other
* Usually comes first.
1. **Dependent// criterion**
* A measured variable which is dependent upon the independent variable
* Variation on the dependent variable is what research tries to explain (effect)
* It is the outcome variable that the researcher wants to explain
* Usually there is one dependent variable.
* Usually comes later or last.
1. **Discrete/categorical variable**

These are variables that take only a few values e.g. gender, marital status

1. **Extraneous intervening variable**

These are variables that are not of direct interest to the researcher but that could affect the variables being measured. e. g. age, level of nutrition

They are thought to affect the relationship between the dependent and independent variable

**IDENTIFICATION OF RESEARCH TOPIC**

**Research Topic/ problem**

* A broad issue/ area that is important to health/human service profession
* An issue/area under investigation or
* Issue or concern that puzzles the researcher due to its effects or consistence despite measures taken e. g neonatal deaths, maternal mortality, students performance e. t. c

**Steps in topic selection**

1. Identify what interests or puzzles one in an area e.g. neonatal mortality
2. Identify key words for the topic i.e. zero down to the real aspect that is puzzling e. g increase in neonatal mortality, uptake o0fv contraceptives
3. Define the topic i. e analyze key words keenly by determining what to concentrate on e. g neonatal death- early or late, malnutrition-causes or effects
4. Formulate the topic.

**Characteristics of a good research topic**

* Researchable / feasible
* Addresses current concerns or priority areas in nursing
* Captivates the interests of the researcher
* Pay more attention to ethical issues.
* Enhance existing knowledge by filling in the gaps that exist
* Improves nursing services by contributing to more knowledge and better skills.

**Sources of research problems**

* Experience – the nurse’s everyday experience provides a rich supply of problems for investigation
* Nursing literature- ideas for research projects often come from reading the nursing literature (published research reports) and textbooks/articles
* Existing Theories – this includes theoretical schemes and conceptual frameworks that have been developed in nursing and other related disciplines.
* Ideas from external sources- a research topic can be given to students as a direct suggestion. In other cases ideas for studies may emerge as a result of brainstorming session or from discussions with other nurses, researchers e. t. c
* Societal trends –social concerns reflected in the policies, legislation and funding priorities of the Government.
* The media – issues which are frequently reported in the media can also form the basis of a research problem.

**Conditions / components for the existence of a research problem**

1. There must be an individual or group which has some difficulty or problem
2. There must be some objectives to be attained.
3. There must be alternative means (or courses of action) for obtaining the objective(s) one wishes to attain
4. There must be some environment(s) to which the difficulty pertains.

**Writing down the research problem**

A good statement

* Clearly and unambiguously identifies the variable(s) under consideration
* Clearly expresses the variables relationship to each other
* Specifies nature of the population(s) being studied.
* Specifies the environment(s) where the study will be undertaken.

**FORMULATION OF RESEARCH OBJECTIVES, QUESTIONS AND HYPOTHESIS**

**RESEARCH OBJECTIVES**

**Definition**

* Aspects of the phenomenon understudy that the researcher desires to bring out at the end of the research period or
* Clear, concise , declarative statement expressed to direct a big study
* Objectives are usually derived from the stated problem of the study.

It focuses on identification and description of variables and /or determination of the relationships among variables.

The objectives suggest the manner in which the researcher seeks to study the question and the level of evidence to be obtained through the study findings

Verbs like discover, explore or describe suggest an investigation of an infrequently researched topic. Verbs like test or compare suggest a study with better established knowledge base.

**Importance**

1. Bridge the gap between the research and its purposes and the study design and plan for data collection and analysis
2. Summarize what is to be achieved by the study
3. Guide in formulation of testable hypothesis
4. Build a close link with the statement of the problem
5. Help the researcher to keep within the scope of study by defining the area of focus

**Types**

1. Broad
2. specific

**Characteristics of a good research objective**

* Specific-addressing one outcome or issue
* Measurable-use action verb e.g. determine, compare, investigate, explore, find out, examine, inquire, establish e.t.c.
* Achievable – in terms of time, resources
* Realistic
* Time bound/timely

**RESEARCH QUESTIONS**

**Definition**

A Statement that identifies the key study variables, their possible interrelationships and the nature of the population of interest stated as a question.

**Characteristics of a good research question**

* It has the key variables of the study
* It states the possible interrelationship of study variables
* It identifies the population of study.

**Components/parts**

* Stem – what, who, why, how
* Topic

**Levels of Questions**

This depends on amount of knowledge available, number of variable and availability of a theory about the topic.

1. **Level 1 Questions**
* Has a stem and the topic
* The stem is always “what is” or “what are” and the topic is a single entity or concept
* They lead to exploration and result in complete description of the topic.
* Has only one variable and one population
* There is little or no prior knowledge of the topic.
1. **Level 2 Questions**
* Build on the results of studies at the first level.
* Has atleast two variables
* Looks at the relationship between variables- the stem question asks “what is the relationship?”
* Literature is available from previous studies
1. **Level 3 Questions**
* Builds on the results of previous research.
* These are “why” questions-ask why the relationship exists
* All level 3 questions lead to experimental designs.
* Each has two variables
* Each question specify that one variable causes or influences the action of the other variable
* Researcher answers the initial why question before proposing the relationship between variables

**HYPOTHESIS**

**Definition**

* Statement of predicted relationship between variables under study or
* Tentative proposition formulated for empirical testing or
* Tentative explanation for certain behavior patterns, phenomena or events that have occurred.

**Sources of hypothesis**

* Chance
* Critical analysis of the problem and discussion with other experienced nurses or colleagues
* Theories- theory provides direction by stating what is known.
* Observation
* Experience
* Findings from other studies

**Characteristics of a workable hypothesis**

1. Testable – possible to measure by either qualitative or quantitative methods.
2. Logical, factual/theory based- a sound hypothesis is consistent with existing body of theory and research findings. It should be based on a sound rationale.
3. Directly related to the research problem-hypothesis should contain essentially the same material as the problem statement or purpose statement.
4. States a relationship between independent and dependent variables
5. Represents a single unit/ subset of the problem

**Wording the hypothesis**

A well stated hypothesis should communicate

* The variables of the hypothesis
* The population being studied
* The predicted outcome of the hypothesis.

**Purpose of hypothesis**

1. Provides direction- bridges the gap between the problem and evidence needed for its solution
2. Identify the anticipated direction of the relationship
3. Form the basis for the ultimate conclusions of solutions- conclusions are made on the basis of the results of the tests of hypothesis
4. Guide collection of data.
5. Permits the research to understand the problem with greater clarity.

**Types of hypothesis**

**Research vs null**

1. **Research /scientific/workable/alternative**

It consists of a statement about expected relationship between variables.

It can be:

1. **Directional**

This is a Hypothesis that specifies the expected direction of relationship between the independent and dependent variables. Existence of the relationship is proposed and the nature of the direction of this relationship.

It uses terms such as positive, negative, less than e. g there is a negative correlation between increase in age and performance; more girls than boys are likely to have a friend of the opposite gender before form one.

1. **Non directional**

Indicate the existence of a relationship between variables but the anticipated direction of the relationship is not stated. It is formulated because:

* The relationship has never been studied previously or
* There has been conflicting explored findings in previous studies
1. **Null/statistical**

Null hypothesis states that no difference exists between groups or that there is no correlation between variables.

If in data analysis a statistically significant relationship emerges between the variables at a specified level of significance, the null hypothesis is rejected.

Rejection of the null hypothesis is the acceptance of alternative hypothesis.

**Simple vs complex**

1. **Simple / bivariate hypothesis**

This contains only one independent and one dependent variable

1. **Complex / multivariate**

Complex variables contain two or more independent variables, two or more dependent variables or both.

Unless the study is examining the relationship between variables, hypotheses are not required. Qualitative research as well as single variable descriptive and methodological studies do not test hypotheses

When hypotheses cannot be tested in the research, research questions are posed.

**LITERATURE REVIEW**

This is a process of critically reviewing and documenting relevant published and unpublished research work done thus far in the area under investigation.

It entails the systematic identification, location and analysis of documents containing information related to the research problem being investigated.

**Purpose of literature review**

1. Prevent duplication of work that has already been done
2. To refine the problem statement by establishing what others have learnt and reported
3. Helps the researcher to familiarize with the research methodology- by identifying the strategies procedures and measuring instruments that have been found useful in the investigation of the research problem
4. Helps the researcher to justify why the research is needed.
5. To ensure that no important variable that has been found in the past to repeatedly have an impact on the problem is ignored.
6. Help make the researcher familiar with previous studies and thus facilitate interpretation of the results.

**Scope of literatures review**

Literature review focus on areas related to the topic understudy starting with the recent publications or articles (5-10 years)

A minimum of 10 and maximum of 20 publications suffice for the research at this level.

When reviewing any literature the research needs to:

* Assess the strengths and weaknesses of past work on the subject
* Report any inconsistent findings
* Identify gaps in knowledge
* Determine the contribution of proposed study
* Consider the possibility of unintentional duplication

**Sources of literature**

1. Primary

This is a direct description of any occurrence by an individual who actually observed or witnessed the occurrence. It is the work written by the person who is actually involved in or is responsible for generating the idea published. This is the person who conducts empirical research and publishes it

e.g. Theses and Dissertations

ii) Secondary sources

These include any publication written by an author who was not a direct observer or participant in the events described. e.g. books, Govt documents, Journals, reports, Newspapers, Magazines.

**Steps**

1. Identify the various published and unpublished materials available on the topic of interest and gain access to these
2. Gather the relevant information by either going through the necessary materials in a library or getting access to online sources

 Prepare an index card or computer entry for each article read to help organize the information.

**Content of an index card**

* Quotation or citation
* Key word
* A summary of content of book or article concentrating on information relevant to the study.
* Brief analysis of the content with comments such as :
	+ Problem that was researched
	+ Appropriateness of the methodology
	+ Important findings of the study
1. Write up the literature review

Analyze, organize and report all relevant information in an orderly way.

Use the objectives to organize your write up and use your own words using relevant references.

**THEORETICAL/ CONCEPTUAL FRAMEWORK**

**Framework**

This is an explanation based on the literature you have read on how variables in the study are expected to relate to each other

**Conceptual framework**

Explanation based on literature and research about variables but the literature doesn’t contain any particular theory that explains the relationship among variables

**Theoretical framework**

Variables have been studied before and have been found to be related to one another and there is an existing theory that explains the relationship or one proposed by the author

Literature should be added to explain the theory being used.

 From theoretical framework:

* Testable hypothesis can be developed to examine whether the theory formulated is varied or not
* If testable hypotheses are not developed developing a good theoretical framework is central to understanding the problem under investigation.
* Identify the network of relationships among variables considered important for the study
* Identify the problems first and then the problems that contribute to it.

**Features of theoretical framework**

* Contains Variables considered relevant to the study
* It shows the relationship between two or more variables and how they are related to each other
* Shows the nature and direction of the relationship as established from previous studies
* A clear explanation of why we expect the relationship to exist
* A schematic diagram of the theoretical framework so readers can see and clearly comprehend the theorized relationship.

**CITATION AND REFERENCING**

This is the process of identifying the sources of direct quotations and of any facts or opinions used by the researcher.

**Reasons**

1. To show anyone that you understand the topic and can demonstrate your own thoughts on it.
2. To demonstrate that you have read widely and deeply i. e show the depth and scope of your research.
3. To enable the readers to locate where you obtained each quote or idea
4. By providing the original source you are acknowledging that you have read the work and recognize the original author.

**Citation styles**

Citation within your text link specific passages to the sources you consulted or quoted. This can be done through intext parenthetic notes, footnotes or endnotes.

In addition, a list of works cited is placed at the end of the paper.

There are many different citation styles. These include:

1. **Harvard University (author-date) style**

This is widely accepted in academic publications. When you refer to ideas or information you have collected during your research you include the author and date of the publication referred to or cited.

1. **APA style (American Psychological Association)**

This is commonly used in social sciences. When using APA author date method is used in the intext citation.

1. **MLA (modern Language Association of America)**

This is commonly used in literature.

1. **Chicago University style**

**Harvard University style**

In intext citation more emphasis may be placed on:

* The writer hence you start with the writer followed by the parenthesis

 Kimani (2004) found out that there is a high drop out among mothers enrolled in the ANC clinic

* The idea in which case you start with the parenthesis (indirect)

 There is a high drop out among mothers enrolled in the ANC clinic (Kimani, 2004)

**Intext citation**

1. **Author’s name mentioned in the text**

When making reference to an author’s work in your text their name is followed by year of publication

E.g. Kimani (2004) found out that there is a high drop out among mothers enrolled in the ANC clinic

**2) Author’s name not mentioned in the text**

The author and the year of publication should be place at the relevant point in the sentence or at the end of the sentence in brackets e.g.

 There is a high drop out among mothers enrolled in the ANC clinic (Kimani, 2004)

1. **More than one author’s work cited**

Where reference is made to more than one author in a sentence and they are referred to directly, they are both cited.

E.g. Kimani (2004) and Kwamboka (2006) have both found out that there is a high drop out among mothers enrolled in the ANC clinic or

There is a high drop out among mothers enrolled in the ANC clinic (Kimani, 2004; Kwamboka, 2006)

1. **2, 3 or 4 authors cited**

The authors are cited with the last two joined by “and”

E. g. Maina and Maranga(2004) reported that the uptake of Long term contraceptive methods is low. Or

The uptake of Long term contraceptive methods is low (Maina and Maranga, 2004)

Maina, Makeni and Maranga (2004) reported that the uptake of Long term contraceptive methods is low. Or

 The uptake of Long term contraceptive methods is low (Maina, Makeni, Lijoodi and Maranga, 2004)

1. **More than 4 authors cited**

Only the first author should be used followed by “et al”

Maina et al (2004) reported that the uptake of Long term contraceptive methods is low. Or

The uptake of Long term contraceptive methods is low (Maina et al, 2004)

1. **Several works by the same author in different years**

If the works illustrates the same point and published in different years then the reference should be cited in chronological order i.e. earliest first with years separated by semicolons

E.g. Maina (2004; 2011) reported that the uptake of Long term contraceptive methods is low

**7) Several works by one author in the same year**

If several works published in the same year are referred to on a single occasion, these should be differentiated by adding a lower case letter directly with no space after the year

E.g. there is need to add life to years added to live of the elderly (Moraa, 2011a; b)

**8) Corporate authors**

If the work is by a recognized organization and has no personal author then it is usually cited under the body that commissioned the work. This applies to publications by Associations, Companies and Govt Departments. It is Acceptable to use standard abbreviations or acronyms for these bodies provided that full name is given the first time with the abbreviation in brackets.

E.g. according to WHO (2006)……

**9) If no author or date is given**

If the author cannot be identified use anonymous (Anon) and the title of the work and date of publication. Title should be in italics

E.g. *Child Mortality in Kenya* (Anon), 2001………..

When date is note given use no date (n.d)

E.g. according to Muchai (n.d)…………..

**10) Secondary sources**

You may come across a summary of another author’s work in the source you are reading which you would like to make reference to in your work.

This is cited:

Brown (1994) cited in Moraa (2006)…………….

**11) Quoting portions of published text**

If you want to include text from published work you must include quotation marks and may be introduced by such phrases as the author states that…

E.g. the author states that

 “There is need to add life to years added to live of the elderly” (Moraa, 2011 p. 20)

Start the quotation on a separate line indented 1/2” from the left margin.

**12) Page numbers**

Including page numbers in the reference will help the readers trace your source especially when using quotes and for paraphrasing specific paragraphs in the text

p. for single page (p.12)

pp. for multiple pages (pp. 12, 40-42)

**Referencing**

**Basic rules**

* All lines after the first line of each entry in your reference list should be indented one half inch from the left margin (hanging indentation)
* Authors name are inverted (last name first). Give the last name and initials for all authors of a particular work up to the 4th author. If more than 4 authors, write the first author and the initials followed by et al.
* Reference list should be alphabetized by the last name of the first author of each work
* If you have more than one article by the same author, single author references or multiple author references with the same exact authors in exact the same order, list by the year of publication starting with the earliest.

**Referencing Different sources:**

1. Books

**Author, initials, year. Title of the book: subtitle, Edition. Place of publication (town/city): Publisher**

E.g. Calfee, R.C (1991) APA guide to citation: a practical Guide, 2nd Edition. Washington D.C: American Psychological Association

1. Articles in Journals or periodicals

**Author, initials, year. Title of the article, full title of the journal, volume number (issue number/part number) page numbers.**

E.g. Imhoff, J.A (2010) Use of non financial incentives in motivating health workers. *Journal of Human resource Management*, 66(3), 1200-1223

Title of the journal should be in italics.

1. Electronic journal sources
2. Journals available from Databases

**Author, initials. Year. Title of the article. Full title of the journal [type of medium] volume number (issue/part number) page number. Available through: Name of Database [data accessed]**

Imhoff, J.A (2010) Use of non financial incentives in motivating health workers. *Journal of Human resource Management* [e-journal] 66(3), 1200-1223available through: BMC database [May 2nd, 2012]

1. From internet

**Author, initials. Year. Title of the article. Full title of the journal [online] volume number (issue/part number) page number. Available at: full web address [data accessed]**

E.g. Imhoff, J.A (2010) Use of non financial incentives in motivating health workers. *Journal of Human resource Management* [online] 66(3), 1200-1223available at: http:/www.someadress.com/full/url [May 2nd, 2012]

Instead of using URL you can use digital object identifier (DOI) when is available

1. Articles in Magazines

**Author, initials. Year. Title of the article. Full title of Magazine, Day, month, page number and column number.**

Schultz, S. (2005) cervical Cancer. The Parents, 3rd Sept. pp1A, 2A

1. Article in the Newspaper

**Author, initials. Year. Title of the article. Full title of Newspaper, Day, month, page number and column number.**

E.g. Baraza, S (2012) cervical Cancer. The East African Standard, 6th May, p1A

For letters to the editor, you add [letter to the editor] after the title before the title of the Newspaper.

E.g. Baraza, S (2012) NHIF: A Cash cow [letter to the editor] The East African Standard, 6th May, p1A

f) Interviews, email and other personal communications

No personal communication is included in your reference list. Instead, parenthetically cite in the main text only:

**(Communicator’s name, date of communication)**

E.g. E. Robbins, Personal Communication, January 4th, 2012)

g) Conference reports.

**Author/authorship, editor /organization, year. Full title of conference report, location, date , place of publication: publisher**

e.g. Makali J.W, WHA,2006. 6th Global forum on Health, Nairobi, 23rd-27th June, Geneva, WHO

h) Conference papers

**Author, initials, year. Full title of conference paper in: followed by editor or name of the organization, full title of the conference, location , date , place of publication: publisher**

e.g. Makali J.W,2006. Prevalence of cervical cancer among WRA in Zambia in: WHA, 6th Global forum on Health, Nairobi, 23rd-27th June, Geneva, WHO

i) DVD, video or Film

**Full title of DVD or video*.* Year of release. [type of medium] Director. (if relevant) Country of origin: Film studio or maker. (Other relevant details).**

*e.g Great films from the 80s: a selection of clips from Warner Brothers top films from the 1980s.* 2005 [DVD] New York: Warner Brothers.

For a film the suggested elements should include:

***Title*. Year of release. [Medium] Director. Country of origin: Film studio.**

 *e.g. Macbeth*, 1948. [Film] Directed by Orson Wells. USA: Republic Pictures

j) Broadcast

For a broadcast the suggested elements should include:

***Series title and episode name and number if relevant*, Year of broadcast. [type of medium] Broadcasting organisation and Channel, date and time of transmission.**

*e.g. Agenda-Kenya*, 2010. [TV programme] KBC, KBC1, 30 January 2010, 9.00.

For a broadcast obtained through BoB (Box of Broadcasts)

*Little Britain*, 2006. [TV programme recording] BBC, BBC2, 30 January 2006 20.00. Available through: Box of Broadcasts database [Accessed 12 August 2011]

**HIGHLIGHTING RESEARCH METHODOLOGY**

 **(MATERIALS AND METHODS)**

**RESEARCH DESIGN**

Research Design can be defined as:

* The scheme, outline or plan that is used to generate answers to research problems or
* A blueprint or guide to the researcher activities or
* An arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance with the research purpose or
* The overall plan for obtaining answers to the research questions and for testing the research hypothesis

A research design spells out the strategies that the researcher adopts to develop information that is accurate, objective and interpretable.

Every researcher has to identify an appropriate research design that he/she will use for the study.

**Factors to consider when selecting a design**

* Available information (state of knowledge) about the problem
* The nature of the problem and its environment (setting)
* Availability of resources for the study
* The skills and creativity of the researcher
* The type of comparisons that will be made.
* The procedures that will be used to control extraneous variables
* When and how many times data will be collected from the research subjects
* Whether an intervention will be required at the end of the study.

**Type of designs**

1. **Quantitative designs**
2. Experimental design
* **True**-determined by manipulation , randomization and control
* **Quasi**-those in which either no comparison group or random assignment of subjects.
1. Non experimental design
* **Survey**-obtain data on certain variables to determine the characteristics of populations on those same variables. It collects data through self report.
* **Correlational studies**-examine the strength of relationships between variables.
* **Comparative studies**-examine the difference between intact groups on some dependent variable of interest.
* **Methodological studies**-concerned with the development, testing and evaluation of research instruments and methods
1. Qualitative designs
* **Case studies**-in depth examination of people or groups of people.

It may be qualitative or quantitative depending on the purpose and design chosen by the researcher.

* **Phenomenological studies**-examine human experiences through descriptions provided by people involved (lived experiences)
* **Ethnographical studies**- collect data from groups such as cultural groups.
* **Grounded theory**-stud that develops a theory based on the data collected.
* **Historical studies**-concerned with collection and analysis of data from the past.

**Qualities of an effective Research design**

* Systematic and logical-effectively address the questions raised in the study
* Contribute to accurate and fair interpretation of results
* Clarify to the researcher the respondents and the means by which the study will be conducted
* Contribute to deeper insights and better understanding of the research topic

**RESEARCH SITE**

This refers to the location of the study

The selection of a research site is essential. This is because it influences the usefulness of the information produced.

In selecting a research site:

* Identify the largest areas which are relevant to your research questions and objectives
* Consider the heterogeneity of the potential study population and choose areas or communities which represent the range of variations on the most important characteristics
* Identify and select actual communities which fulfill these criteria by making site visits, discussing with community leaders
* Issues of accessibility should also be considered.

It is important to discuss how the research site was selected and the reasons why.

e.g. the study was carried out in Mathare Slums. Purposive sampling was used to select Mathare Slums because it has……………..

In selecting the study site it is important to consider the following factors

* study design
* size of the study population-availability of the adequate subjects
* available resources
* available time
* purpose of the study

**STUDY POPULATION**

Population refers to:

* entire set of elements that meet specified criteria or
* A complete set of persons or objects that possess some characteristics that is of interest to the researcher or
* Entire aggregate of elements or cases that meet a designated set criteria or
* A complete group/set of individuals, elements or both which have a set of common observable characteristics predefined by the investigator.

It is important for the researcher to find out as much as possible about the study population including demographics.

**Types of population**

1. **Target population**

This consists of every element in the world that meets the sampling criteria. It is the entire group of people or objects to which the researcher wishes to generalize the findings of the study.

1. **Accessible population**

This refers to that portion of the target population that the investigator can reasonably reach.

This is referred to as the study population and it is the population from which samples are drawn because the likelihood of getting a list of target population is low.

It is important to describe your target population in great detail discussing:

* Who they are
* Where they are located
* When they can be found
* Whether or not there is a listing of your population and whether this listing is available to you.

 In describing the study population it is important to highlight the inclusion and exclusion criteria

1. **Inclusion criteria**

Sometimes called eligibility criteria, inclusion criteria refers to those characteristics that must be met in order to be considered for participation in the study.

The investigator specifies what the sample will look like and what characteristics all study participants will have in common.

 For example: in a study of efficacy of a drug in treatment of DM, the participants must have a diagnosis of DM.

1. **Exclusion criteria**

This refers to those characteristics that if present, would make persons ineligible to be in the sample even though they meet all the inclusion criteria. These exclusions limit the representativeness of the sample and therefore the generalizability of the findings.

These should represent only those conditions or characteristics that might potentially make a difference in the outcome. e.g. in the above study, expectant mothers might be excluded.

 **SAMPLING**

**Terminologies used in sampling.**

**Sample**

* A chosen research group within a population or
* A subset of cases or subjects that are taken to represent the population

**Elements of the sample**

This refers to basic units about which information is collected. These are the entities that make up the samples and populations.

**Sampling frame**

 This is a comprehensive list of all sampling elements in the target population e.g national census register, list of all nurses

 **Sampling bias**

Systematic overrepresentation of some segments of the population in terms of the characteristics relevant to the research question

**Sampling error**

This is the difference between population parameters and sample statistics. E. g average age.

**SAMPLING METHODS**

Sampling refers to the process of selecting a number of individuals for a study in such a way that the selected individuals represent the large group (entire population) from which they are selected

Researchers use samples instead of populations because of efficiency and cost effectiveness as it is practically impossible to study the entire population

In quantitative research the major concern in sampling is how well the sample represents the target population. Therefore the resulting sample should look like the target population on important characteristics.

In qualitative studies the concern is how well the sample represents the phenomena of interest. Therefore in this case, the sample must be appropriate to provide both sufficient and relevant information on the research problem.

Sampling strategies can be classified into probability or non probability depending on the possibility of selection of each element.

1. **Probability sampling methods**

This refers to random sampling strategy that gives each element in the population an equal independent chance of being selected. This is the most respected and preferred approach. It can be used to provide information about groups that are too large to study in their entity. It also provides an efficient system of capturing in a small group the variations or heterogeneity that exists in the target population.

Probability sampling techniques include:

1. **Simple random sampling**

This refers to a process in which the researcher defines the population, lists and consecutively numbers all elements of the population and then randomly selects a sample from the list by:

* Putting all the numbers in a container and drawing out the desired number of elements.
* Using a table of random numbers. In this case, the researcher begins at any point on the list of numbers and reads consecutive numbers in any direction choosing those numbers that corresponds to the numbered elements in the population. This is done until the desired sample size is achieved. The starting point is selected by closing the eyes and pointing at the data in the table.

This method is cumbersome and not the most statistically efficient method

1. **Systematic sampling**

Sampling technique where elements are selected from the population at predetermined fixed intervals i.e each subject is selected at the nth number of the sampling frame. The interval is determined by dividing the total population by the desired sample size.

1. **Stratified sampling**

This is used when the composition of the population in respect to some study characteristics important to the study is known. The population is first divided into two or more subgroups/strata by that characteristic so that each element belongs to one and only stratum. This is followed by simple random selection of elements for each group. If desired the researcher may use proportionate sampling to ensure that the sample accurately reflects the composition of the population on the characteristics by which the population is stratified.

This method is appropriate when the researcher is interested in issues related to gender, race or age disparities in the population. The goal of this technique is to achieve desired representation from various groups.

However, bias can occur in some groups being overrepresented.

1. **Cluster/multistage sampling**

This strategy involves the selection of study units (cluster) instead of the study units individually. The strategy employs random selection of first larger then subsequent smaller sampling units/clusters. This method is used when:

* It is most possible to get the total list of the target population
* When the population is large and widespread.

**Advantages of probability sampling methods**

* Results can be generalized
* Allows use of inferential statistics
* Sampling bias is minimized as every member has an equal chance of being selected
* Large populations can be analyzed

**Disadvantages of probability sampling methods**

* Non responsive rate may be high as the respondents are unpredictable
* Selection of the first sample member or preparation of the random table may result in a bias in the entire sample
* Requires expertise
1. **Non probability**

In this method, the sample elements are chosen from the population by non random methods. These strategies are less likely to produce sample that are representative of the population. They are used when the researcher is not interested in selecting a representative sample of the population. Mostly used in qualitative studies because the focus is on in depth information and not generalizations or making inferences. They are widely used because of convenience and the desire to use available subjects.

They include

1. **Convenience /accidental sampling**

This is the process of selecting elements to be in the sample simply because they are readily available.

This is the simplest with potentially the least representativeness of all the sampling strategies. It is currently the most frequently used sampling strategy in nursing studies.

1. **Purposive / judgmental**

Participants are handpicked by the researcher either because they are typical of the phenomenon of interest or because they are knowledgeable about the issues under investigations. Often used when the researcher desires a sample of experts.

1. **Snowball/networking**

Participants already in the study are asked to provide referrals to potential study subjects. Initial study subjects are selected using purposive sampling method. Few identified then name others who have the required characteristics.

1. **Quota sampling**

This is similar to stratified random sampling. The researcher identifies the strata of the population and then identifies the number of elements in each stratum to proportionately represent the population. Actual selection of the subjects is then done through convenience, purposive or snowballing.

Useful when the population that possess the characteristics understudy is not well known and there is need to find subjects.

**Advantages of non probability sampling**

* Useful when sampling frame/parameters of the population is not known
* Doesn’t require any expertise
* Useful when in-depth information is required
* Response rate is high
* Saves time and costs

**Disadvantages of non probability sampling**

* The findings cannot be generalized
* Data obtained cannot be used to test hypothesis
* High sampling bias and sampling error.

**SAMPLE SIZE DETERMINATION**

Once the researcher has decided on who to sample and how to sample, then a decision is made on the sample size. Sample size refers to the number of subjects in a sample. Question of sample size is crucial when the objective is the ability to generalize findings to the population.

 The larger the sample the smaller is the sampling error.

**Factors to consider in determining the sample size**

In quantitative studies, the factors that should be considered include:

1. Population factors
* Homogeneity of the population
* Expected rate of the phenomenon, event or outcome being measured. If the phenomenon occurs frequently, a smaller sample size is needed and vice versa
* Expected attrition rate. In longitudinal studies attrition rates are expected to be high hence the need for a larger sample.
1. Design factors
* Type of study
* Number of variables. As variables increase the sample size also increases
* Sampling strategy. Stratified and quota sampling requires smaller samples than simple or convenience because some of the representativeness is already built into the stratification process
1. Measurement factors
* Sensitivity of the research instrument and the effect the process has on the outcome the greater the precision of the instrument, the smaller the sample since measurement error is low.
1. Practical factors
* Cost
* Convenience

**Methods for determining sample size**

1. **Rule of 30**

According to this rule there should be 30 subjects for each group or 30 subjects for each variable. This is based on the central limit theorem which states that in randomly generated samples of 30 or more subjects, the mean characteristic will approximate the population mean

1. **Power analysis**

This is a statistical calculation of the number of subjects needed in order to accurately reject the null hypothesis.

Sample size can be calculated using the following **Cochran’s formula**

**no =Z 2 p q**

 **e2**

Where:

**no** is the desired sample size (for target population greater than 10,000)

**z** is the standard normal Deviate at the required confidence interval set at 95 %( 1.96)

**p** is the estimated proportion of the target population that has the characteristics being measured

**q** is the proportion of the target population estimated not to have the characteristic being measured (q= 1-p)

**e** is the level of precision set at 5% (0.05)

When there is no estimate available of the proportion of the target population who has the characteristics understudy, 50% will is used as **p.**

When the study population is less than10, 000 sample size is adjusted using the formula:

**n =nO/1+ {(n0-1)/N}**

Where:

 **n** is the desired sample size when population is < 10,000

**no** is the desired sample size when the population is >10,000

**N** is the estimate of the population size

**In qualitative studies**,

Relatively small non random samples are employed because the aim of qualitative studies is to describe and analyze the meaning and experiences of particular individuals or groups.

Sample size should be determined according to the need for sufficient information to answer the research question based on the principles of data saturation and redundancy.

Participants continue to be enrolled until no new information is being uncovered (saturation). In this case redundancy occurs in all subsequent data collection encounters. This may be achieved with limited number of participants if the sample is homogenous

**DATA COLLECTION METHODS AND TOOLS**

Data collection needs to be objective and systematic to ensure generalizability of the resulting outcomes to the broader population.

It is important to specify:

* **What data will be collected**- the type of data to be collected will also govern the other considerations. The type of data needed to answer the research questions or to test the research hypothesis should be the main consideration in data collection.
* **How will data be collected**-some type of research instrument is needed to gather data.
* **Who will collect the data**-the researcher may want to use other people outside the research team. Some time these people are paid for their services. Training is needed to ensure data uniformity and checks made to ensure reliability of the collected data.
* **Where data will be collected**-optimum conditions for data collection must be sought. This includes the conditions in which the questionnaires will be filled or interviews conducted.
* **When will data be collected**-the determination will need to be made of the month, day, and sometimes even the hour for data collection. Also how long data collection session will take need to be determined.

**Sources of data**

1. **Entire population**

This is where the subjects earmarked for study are interviewed directly. Data from this population is referred to as primary/new/ novel data. It is more accurate and reliable.

2) **Existing records**

This includes office records such as health institutions medical records, registers of births and deaths, CBS, government and non government registers etc. Data from this source is referred to as secondary/existing/accessible data. The reliability of secondary data depends entirely on the original person who collected it.

**Data collection methods**

This refers to the mechanism for measuring the variable(s) of interest.

Data collection method selected depends on:

* The research questions or hypothesis
* Design of the study
* Attributes of the subjects
* Amount of knowledge available about the variable of interest
* Expected results and outcomes

**Characteristics of data collection methods**

1. Structure-research data are usually collected in a highly structured manner i.e. exactly the same information is collected from all the subjects in comparable pre-specified way
2. Quantifiability- data that will be subjected to statistical analysis must be gathered in such a way that they can be quantified. Both quantitative and qualitative data structured and unstructured can be quantified
3. Obtrusiveness- data collection methods differ in terms of the degree to which subjects are aware of their subject status.
4. Objectivity –data collection methods strive for objectivity rather than subjectivity

**Data collection tools/instruments**

This refers to the devices that are used to collect information about the variable(s) under investigation. It facilitates the observation and measurement of variables of interest and depends on the data collection method(s) selected. If physiological data are sought some type of physiological instrument is needed. If observational data is sought an observational schedule or checklist is used.

**Criteria for selecting a data collection instrument**

1. **Practicability**

This concerns its cost and appropriateness for the study population in terms of the length of time required to administer the tool, physical/mental stamina required to complete the tool, special motor/physical skills required of the subjects, special training required to administer or score the instrument etc.

1. **Reliability**

This refers to the consistency, stability and repeatability of a data collection instrument. A reliable instrument does not respond to chance factors or environmental conditions; it will have consistent results if repeated over time on the same person or if used by two different investigators on the same subject.

In general, the more items the instrument has the greater is the reliability.

**Types of reliability**

1. Stability reliability

This refers to consistency of an instrument over time

1. Equivalence reliability

Concerns the degree to which two different forms of an instrument obtain the same results or two or more observers using a single instrument obtain the same results

1. Internal consistency reliability/scale homogeneity

Extent to which all items on an instrument measure the same variable

1. Validity

This refers to the ability of the tool to gather data that it is intended to gather. The content of the tool is of prime importance in validity testing. The greater the validity of an instrument, the more confidence you can have that the tool will obtain data that will answer the research questions or test the research hypotheses.

**Methods of establishing validity**:

1. Content validity

This is concerned with the range or scope of items used to measure the variable. i.e. are the number and type of items adequate to measure the concept or construct of interest.

1. Criterion validity

This assesses the ability of an instrument to determine subjects’ responses at the present time or predict subjects’ responses in the future e.g is a suicidal potential assessment tool useful in predicting actual suicidal behavior in the future?

1. Construct validity

This refers to the degree to which an instrument measures the construct that it is supposed to measure. Construct validity is concerned with measurement of a variable that is not directly observable but rather is a construct or abstraction derived from behavior e.g assertiveness, anxiety

As researcher can decide to use an existing instrument or develop his own.

Data collection methods include

1. **Use of questionnaires**

A questionnaire is a paper-and- pencil self report instrument containing questions that respondents are asked to answer in writing

Questionnaires can be used to measure knowledge levels, opinions, attitudes, beliefs, ideas, feelings and perceptions as well as to gather factual information about respondents.

A questionnaire can be administered

* in person
* By mail
* Internet.

**Principles in development of a questionnaire**

1. Ensure that tool addresses the research purposes, objectives, goals and/or questions
2. Consider the target population to use the questionnaire so that administration is easy
3. Use simple familiar language without jargon and with correct grammar
4. Consider sequencing of questions from impersonal to personal. less sensitive to more sensitive , broad to specific
5. Each statement should be short and specific and addressing a single topic only
6. Use neutral words to avoid leading or embarrassing the participants
7. Group the questions by topic and begin with questions that stimulate interest.
8. In wording of the questions
* State questions in the affirmative rather than a negative manner
* Avoid ambiguous questions- these contain words with more than one meaning or can be interpreted differently by various people
* Avoid double negative questions- don’t you disagree
* Avoid double barreled questions- ask two questions in one

**Types of questions**

* Demographic questions gather data on characteristics of the subject-demographic variable/attributes
* Unstructured/ Open ended questions- questions that require the respondents to complete questions in their own words
* Structured/ Closed ended questions-most structured type of questions. Respondents are asked to choose from given alternatives.

The response categories must be exhaustive (all possible answers are given) and mutually exclusive (no overlapping).

* Contingency questions- items that are relevant for some respondents and not others

The determination of whether respondents should answer certain questions is dependent on their answers to other questions.

* Matrix questions- questions that share the same set of response categories. They are common whenever scales are used.
* Filler questions- questions that the researcher has no interest but are included in the questionnaire to reduce emphasis on specific purpose of other questions.

A cover letter should accompany a questionnaire.

Information on how to complete the questionnaire should be provided and should be clear and concise. If all questions are answered using the same format, instructions are provided at the top of the questionnaire otherwise instructions will need to precede each type of question.

**Qualities of an effective questionnaire**

* It is simple to understand
* Instructions are clearly given
* Questions are focused and limited to a single idea
* Each item included has a specific response and contributes to the study
* There are no leading, ambiguous or embarrassing questions
* There is a balance of questions per topic

**Advantages**

* Quick and generally inexpensive means of obtaining data
* One of the Easiest to test for reliability and validity
* Administration is less time consuming than interviews or observational methods
* Data can be obtained from respondents from widespread geographical areas
* Respondents can remain anonymous
* If anonymity is assured respondents are likely to give more honest answers

**Disadvantages**

* Mailing may be costly
* Response rate may be low
* Respondents may provide socially acceptable answers
* Respondents may fail to answer some of the items
* There is no opportunity to clarify items that may be misunderstood by respondents
* Respondents must be literate
* Respondents may not be representative of the population
1. **Interviews**

This is a data collection method that involves oral questioning of respondents either individually or as a group. The interviewer obtains responses from a subject in a face-to –face encounter or through a telephone call.

An interview schedule is a form with predesigned questions to be asked by the interviewer and as he gets answers, he fills them in or completes. The source of the information is referred to as the interviewee and the data collector is an interviewer. The foremost variation with the questionnaire method is the presence of the interviewer.

Questions in the interview schedule are generally open ended and responses are documented in thorough and detailed notes or transcription

**Types of interview**

1. **Unstructured**

The interviewer is given a great deal of freedom to direct the course of the interview. They are conducted like a normal conversation and topics are pursued at the discretion of the interviewer.

These are appropriate for exploratory or qualitative research studies where the researcher doesn’t have enough knowledge about the topic to structure questions before data collection.

Unstructured interviews produce more in-depth information on subjects’ beliefs and attitudes than any other data gathering method.

1. **Structured**

This involves asking a set of questions in the same order and in the same manner to all the respondents in a study

The main purpose of this method is to produce data that can be compared across respondents

1. **Semi structured**

An interviewer is required to ask a certain number of specific questions, but additional probes are allowed or even encouraged. Open and closed ended questions are included in a semi structured interview. In this interview data collected can be compared across all respondents. Additionally individualized data may be gathered that will provide depth and richness.

**Probes** are additional prompting questions that encourage the respondent to elaborate on the topic being discussed.

Respondents’ answers may be entered directly on the interview schedule or recorded on audiotapes or videotapes.

Tape recording is advantageous because:

* Eye contact can be established between the interviewer and interviewee
* Total process can be captured

Disadvantages of tape recordings include

* The entire tape has to be played and transcribed during data analysis
* Respondents may be reluctant to give permission to be taped
* Written permission will be required and permission form should indicate how the information will be used and how confidentiality will be maintained.

Interviews include:

1. **Key informant interview**

This involves an interview between the interviewer and a person who is considered more knowledgeable in an area of study. Therefore, it relies on opinions of an individual subject or respondent.

Key informants should be interviewed individually and not as a group.

Information collected from key informants is used to validate data that has been gathered using other methods such as focused group discussions.

1. **Focused group discussion**

This represents coordination of an interview with 6-12 homogenous individuals who are led in the discussion of a selected topic

Each session tends to last 1-3 hours. To facilitate collection of data, each session is videotaped or audio taped for analysis at a later time. The researcher acts as a moderator. The role of the moderator includes:

* Encouraging all participants to participate in the discussion
* Stimulate discussion between participants
* Guide the group from one discussion topic to another
* Remain neutral and refrain from expressing personal opinion on a subject
* Retain control over the discussion.

The investigator of a study has the responsibility of training all the interviewers who will conduct the interviews to reduce measure variability. Training, practice and Rehearsals need to be done and the performance critiqued. The process of recording information must be explicitly communicated. Special attention should be given to the use of probes. Training should be carried out in groups so that all interviewers receive the same instructions

Role playing the interview helps the interviewer to gain some appreciation of what the actual interviews will look like. Each interviewer should play the interviewer and the respondents’ part.

During interviews the researcher should seek as much privacy as possible for the interview. The interviewer and the respondents should be alone, interruptions should be avoided and television and radio should be turned off.

**Interview guidelines**

Before the interview

* The interviewer should do self introduction, explain the purpose of the study
* Potential subjects should be told why they were chosen and how the information will be used
* The person should be told of how long the interview will take

During the interview

* Ensure a comfortable interview atmosphere
* Subjects should be seated in a comfortable position or lying down
* Control unnecessary noise as much as possible
* Use language easily understood by the respondents and talk in a conversation tone.
* Inform respondents that there is no right or wrong answers and no pressure should be applied to answer.
* Sensitive questions should be asked at the end of the interview-rapport is fully established

After the interview

* Ask if the respondents have any questions
* Further explanations of the study may be done
* Thank the respondents
* Indicate how the respondents may obtain results of the study.

**Advantages**

* Responses can be obtained from a wide range of subjects
* Response rate is high
* Most of the data obtained is usable
* In-depth responses can be obtained
* Non verbal behavior and verbal mannerisms can be observed
* Data collected is quantifiable
* Allows collection of data without the requirement that the respondent can read and write

**Disadvantages**

* Interviews are time consuming and expensive
* Subjects may provide socially acceptable answers
* Subjects may be influenced by interviewer’s characteristics
* Interviewers may misinterpret non verbal behavior
* Researcher may miss out on some important points that are not included in the questions formulated
* Analysis of data collected is time consuming
* Subjects may be anxious because answers are being recorded.
1. **Observation method**

This is a method of collecting descriptive, behavioral data. It is concerned with collection of data through visual observation.

The research question or hypothesis should determine the behavior to be observed

It is important to have more than one observer to increase reliability. The training of the observers is probably the most crucial phase of the observation research to increase interrater reliability- the degree to which two or more observers assign the same score/rating to an observation

**Types of observation**

1. **Structured**

A predetermined observation checklist/guide is prepared and the observer observes and records only those behaviors. This is used when the researcher has prior knowledge of the phenomenon of interest.

1. **Unstructured**

The observer attempts to describe the behaviors as they occur with no preconceived ideas of what will be seen. The observer observes everything and anything

Frequently, a combination of structured and unstructured observations is used.

**Levels of observation**

1. **Complete participant**

The observer takes the role of member within the sample. The data is collected via covert/hidden/undercover process. Members of the group are not informed about the data collection process

1. **Participant-as-observer**

Observer continues to work from within the group but does collect the data through an overt/informed process; the members of the group are aware that the observer is taking on the dual roles of member of the group and spectator

1. **Observer –as-participant**

The observer does work from within the group but spends more time in the role of spectator instead of member of the group. Data is obtained through overt manner.

1. **Complete observer**

The observer is totally in the role of complete spectator. Covert observations are used to collect the data.

If covert method of data collection is to be used the researcher has to justify why because of ethical issues. On the other hand when participants know that they are being watched, the researcher has to make sure that the behavior are not modified due to this knowledge.

**Advantages**

* Provides highly detailed information from an external perspective of what usually occurs
* Can be used by any individual regardless of educational preparation
* Relatively cheap
* Important technique for human behavior.
* Subjects are usually available
* Is most open to using recording devices such as video
* Observation can begin and stop at any time
* Instrument is quite simple to develop compared with the questionnaire

**Disadvantages**

* Time consuming
* Labor intensive
* Expensive
* Bias may compromise the integrity of the study
* Presence of an observer creates an artificial situation
* Extensive training is necessary if more than one observer is used to collect data.
* Events that occur rapidly or suddenly may be missed.
1. **Bio-physiological methods**

This involves the collection of physical data from the subjects. These types of data are generally more objective and accurate than many of the other data collection methods. This method necessitates the use of specialized equipments to establish the physical and/ or biological condition of the subjects

**Types of physiological measures**

1. **In vivo**

This requires the use of some apparatus to evaluate one or more elements of a participant

E.g. Height, weight BP

2**) In vitro**

This requires the extraction of physiological materials from the participants frequently via laboratory analysis.

This type of data collection process is frequently used with experimental and quasi experimental designs.

**Advantages**

* Very objective
* Precise and accurate

**Disadvantages**

* May be expensive
* Time consuming
* Lack of willingness of the accessible population to participate in the study
* Special expertise may be necessary to use some of the devices
* Presence of certain data collection instruments may adversely influence the subjects
1. **Attitude scales**

These are self report data collection instruments that ask the respondents to report their attitudes or feelings on a continuum. They are composed of a number of related items and respondents are given a score after the item responses are totaled.

Commonly used rating scales are:

1. **Likert scale (summated rating scale)**

A type of composite measure of attributes that involves summation of scores on a set of items (statements) to which respondents are asked to indicate their degree of agreement or disagreement.

The scale consists of several declarative statements that express a viewpoint on a topic. The person’s attitude is generally rated on a 5 point scale where:

1-strongly disagree 2- Disagree 3-undecided 4-agree 5-strongly agree

High scores indicate a favorable attitude

1. **Semantic differential**

This consists of a particular object, situation or event which people then rate on a series of bipolar adjectives such as good-bad, fast-slow, weak-strong.

The adjectives used are those that reflect:

* Evaluation –good-bad, helpful-unhelpful, flexible-inflexible.
* Perceived strength or potency-strong weak
* Activity-fast –slow
1. **Preexisting data/records**

This involves the use of information that has not been collected for research purposes. This may involve use of patient charts, records from agencies such as hospitals, letters, diaries, Family pictures etc.

The researcher has to explain what pieces of the primary data will be used in the reassessment of the information

**Advantages**

* Records are readily available hence data can be collected without any intrusion into peoples’ lives
* Saves time
* Allows for reevaluation of alternative conclusions
* Researcher can identify trends because the entirety of the incident can be manipulated
* Less expensive

**Disadvantages**

* Data source is restricted since only the data that was initially amassed can be used
* Potential for data to be outdated
* Restriction on accessing certain documents such as those controlled to protect individual privacy
* Original sampling, inclusion and exclusion criteria could negatively affect secondary assessment of archived data
* Lack of open ended or qualitative data related to the question.

**CONDUCTING A PRETEST/PILOT STUDY**

**Pilot study**- a small version of a proposed study conducted to refine the methodology. It involves going through the entire research procedure with a small sample. It uses the same respondents and setting as the main study.

**Purpose**

1. To determine whether the proposed study is feasible
2. Identify any problems with the research design
3. To ensure that items in the data collection instrument are stated clearly and have the same meaning to all research respondents.
4. To assess the time taken to administer the research instrument
5. To determine whether the sample is a representative of the population
6. To determine the effectiveness of the sampling technique used
7. To give researcher the real experience in the field
8. To determine the human and financial resources required for the study.
9. To determine the effectiveness of the training to research assistants where necessary
10. To evaluate the procedure for data processing and analysis.

Ideally a pretest should be done before the full scale study is done i.e. before finalizing the proposal.

**Procedure for conducting a pretest**:

1. Ask colleagues to review the questions critically- to identify if the questions are clear and whether they meet study objectives.
2. Pretest the questionnaire on people who are very similar to your target group
3. Simulate the actual data collection procedure. If you will use assistants, they should also be involved in pretesting
4. Obtain feedback about the form and content of the questionnaire
5. Check if questions produce the information needed.
6. Try out tabulations and analysis procedure to determine if the questionnaire yields data that can be analyzed
7. Revise the tools.

**DATA COLLECTION PROCESS**

Data collection refers to the process of gathering information to serve or prove some facts. This will determine the findings of the entire research study.

**Purpose of data collection**

* To stimulate new ideas because data collection helps in identifying areas related to the research topic that need improvement or further evaluation
* To highlight a situation and there create awareness and improvement
* To influence legislative policies or regulations
* To provide justification for an existing programme or need for a new programme
* It is the only reliable way to evaluate the responsiveness and effectiveness of the study

It promotes decision making and resource allocation that are based on solid evidence

**Data collection plan**

Before beginning data collection process, a plan should be drawn up. This will ensure that:

* One has a clear overview of what tasks have to be carried out, who should perform them and the duration of the tasks
* Human and material resources for data collection can be organized in the most efficient way
* Problems that will require modifications to the proposal are identified.

 **Steps in developing a plan**:

1. List the tasks that have to be carried out and who will be involved
2. Make a rough estimate of the time needed for different parts of the study.
3. Identify the most appropriate period in which to carry out the research
4. Schedule the different activities that have to be carried out each week in a plan.

In developing a plan the **following factors should be considered**:

* Type of data to be collected and demands of the project
* Availability of research team members and research assistants
* Appropriate season(s) to conduct the field work
* Accessibility and availability of the sample population
* Public holidays and vacation periods.

**Stages of data collection**

1. **Permission to proceed**

Consent must be gotten from relevant authorities, individuals and the community in which the study is to be carried out. This may involve organizing meetings at national/Provincial/District and at the village level.

1. **Data collection**

When collecting data it is important to consider the logistics. Identify who will collect what, when and with what resources.

When allocating tasks for data collection, it is important that tasks should be listed, then identify who can best implement each task.

**Use of research assistants**:

Where research assistants have to be used:

* They should be from the same educational level
* They should be knowledgeable concerning the topic and local conditions but not object of the study themselves
* They should be adequately trained
* Ongoing supervision should be arranged especially if the area to be covered is large.

It is important to devise methods to ensure **data quality** by:

* Requiring interviewers to check whether the questionnaire is filled before finishing each interview.
* Asking supervisors to check at the end of each day whether the questionnaires are filled completely and whether recorded information makes sense
* Having the researchers review the data during the data analysis stage to check whether data are complete and consistent.
1. **Data handling**

Once data has been collected, a clear procedure should be developed for handling and storing them. During this stage:

1. Check that all the data are uniform, complete and accurate
2. At some stage number the questionnaires either at the time of data collection or when questionnaires are stored
3. Identify the person responsible for storing data and the place where it will be stored
4. Decide how data should be stored either:
* Paper storage-where coded data is written on paper before analysis
* Electronic storage-using a computer.

**Sources of error in Data Collection**

1. Instrument inadequacies. This is concerned with the items used to collect data and the instructions to the subjects that are contained in the instrument.
2. Instrument administration biases. This may occur if the instrument is not administered in the same fashion to all subjects.
3. Environmental variations during data collection
4. Temporary characteristics of the subjects during data collection such as levels of anxiety, tiredness, influencing responses etc.

**ETHICAL PRINCIPLES IN DATA COLLECTION**

There are three principles that guide researchers each with rights that need to be observed

1. **Principle of beneficence**

This is a fundamental principle that seeks to protect subjects from harm, exploitation and maximize benefits. This principle includes:

1. **Freedom from harm**-exposing subjects to experiences that result in serious or permanent harm is unacceptable.
* Only scientifically qualified persons should conduct research especially if potentially dangerous equipment or specialized procedure are used.
* Avoid inflicting psychological harm by phrasing questions carefully, debriefing and providing the researcher’s contact.
1. **Freedom from exploitation**- Subjects should not be placed at disadvantages or exposed to situations for which they have not been explicitly prepared.
* Therefore, subjects should be explained that their participation or information they might provide would not be used against them in any way
* The subjects enter into a special relationship with the researcher. This relationship should not be overtly or maliciously exploited.
1. **Risk/benefit ratio-** Researchers are expected to carefully assess the risks and benefits that would be incurred in conduct of a study before its inception both to the researcher and the subjects.

Research should not be undertaken when perceived risks outweighs the anticipated benefits of the research.

1. **Principle of respect for human dignity**
2. **Right to self determination**
* Prospective subjects have the right to decide voluntarily whether or not to participate in a study without the risk of incurring any penalties or prejudiced treatment.
* Subjects have the right to decide at any point to terminate their participation , to refuse to give information or to ask for clarifications or specific questions
* Humans should be treated as autonomous agents capable of controlling their own activities and destinies
* Freedom from coercion of any type.
1. **Right to full disclosure-** The researcher should fully describe the nature of the study, the subject’s right to refuse participation, the researcher’s responsibility and likely risks and benefits so that the subjects can make informed voluntary decision about their participation in a study.
2. **Informed consent**

**Elements of informed consent**:

* The subjects have to be adequately informed regarding the research i.e. the type of information to be obtained from them
* Degree of understanding of the subjects to be capable of comprehending the information
* The fact that the subject have the power of free choice enabling them to consent voluntarily to participate in the research or not.

**Preconditions for informed consent**:

* Competence to understand and decide
* Voluntary willingness in deciding without coercion.

Informed consent is based on the right to full disclosure and right to self determination.

Consent form documents the consent process

**Vulnerable subjects**

These are special subjects who need additional procedures since they cannot give fully informed consent or may be at a higher risk of unintended side effects due to their circumstances. These include:

* Mentally or emotionally disabled people
* Physically disabled people
* Children
* Pregnant women
1. **Principle of justice**
2. **Right to fair treatment-** Subjects have the right to fair and equitable treatment before, during and after their participation in the study.
3. **Right to privacy-** Subjects’ privacy should be maintained throughout the study. To ensure this:
* Strict confidentiality of all data collected should be ensured
* Anonymity should also be maintained
* A promise of confidentiality is guaranteed to subjects that information will not be made public or accessible to parties other than those involved in the study.

**Importance of ethics in research**:

* To ensure that human subjects are not harmed
* To ensure that human subjects are not wronged by being treated as mere means or objects
* Access to research may provide benefits to participants that are otherwise unavailable
* Health benefits to society results from research.

**DATA ANALYSIS AND PRESENTATION**

**Data analysis**

This is the process of examining what has been collected in a survey or experiment and making deductions and inferences.

**Data processing**

This refers to the transfer of quantified data on computer storage to facilitate electronic computation of data.

Once data has been entered, the choice of statistical procedure will depend on:

* Proposed hypothesis and objectives- for exploratory study, descriptive analysis is adequate. If hypothesis will be tested, inferential statistics will be used.
* Research design- experimental design which comprises of various groups calls for analysis of variance
* Type of measurement scale used

We should think about data analysis upfront rather than waiting until all the data has been collected. This will enable us collect the right data for analysis.

**Types of analysis**

1. **Quantitative analysis**

**Steps**

1. **Data organization**

This is done immediately the tools have been received from the field.

All the tools are checked for accuracy, completeness and uniformity. Those that are incomplete or do not make sense are left out. A record of the decision should be kept.

A unique identifier such as a serial number is assigned to the remaining questionnaires.

The data is then entered manually or by computer.

1. **Coding**

This is the process of assigning numerals or other symbols to answers so that responses can be put into a limited number of categories or classes. The classes should be appropriate to the research problem under consideration. The coding process starts with the preparation of a code book.

1. **Classification/categorization**

This is grouping of related facts into classes according to some predetermined characteristics.

Data classification is important because:

* It facilitates comparison
* It gives prominence top the important information gathered while dropping out unnecessary elements
* It enables statistical treatment of materials collected
* It pinpoints the most significant features of data at a glance
1. **Tabulation**

This is the process of summarizing raw data and displaying the same in compact form

Tabulation is essential because:

* It conserves space and reduces explanatory and descriptive statements to minimum
* It facilitates process of comparison
* It facilitates the summation of items and the detection of errors and omissions
* It provides a basis for various statistical comparisons.

It involves calculation of mean, median mode etc

The type of calculations to use depends upon what you want to know.

|  |  |
| --- | --- |
| **Do you want to know how many individuals checked each answer?**  | **Frequency**  |
| Do you want the proportion of people who answered in a certain way?  | Percentage  |
| Do you want the average number or average score?  | Mean  |
| Do you want the middle value in a range of values or scores?  | Median  |
| Do you want to show the range in answers or scores?  | Range  |
| Do you want to compare one group to another?  | Cross tab  |
| Do you want to report changes from pre to post?  | Change score |
| Do you want to show the degree to which a response varies from the mean?  | Standard deviation |

1. **Interpretation**

This is the process of attaching meaning to data. It is here that inferential deductions are made from the data from which it would help in testing the hypothesis and thus solving the research problem

It is done within the frame of reference of the research problem and hypothesis.

Interpretation requires careful judgments because often the same data can be interpreted in different ways.

Some of the techniques for interpreting data include:

* Extending the analysis by raising questions
* Connect findings to personal experiences
* Seek the advice of critical friends, colleagues
* Contextualize findings in the research
* Turn to theory

Common errors in quantitative analysis

* Use of incorrect denominator when calculating the percentages
* Averaging percentages
* using a single average that distorts misrepresents the range of information

**b) Qualitative analysis**

Qualitative data consists of words and observations rather than numbers.

Analysis and interpretation of narrative data is often referred to as content analysis.

**Sources of narrative data for analysis**:

* Open ended questions and written comments on questionnaires
* Testimonials may give reactions to a program in a few words or lengthy comments either in person or in written correspondence.
* Individual interviews can produce data in the form of notes, summary of the individual’s interview or word-0for-word transcripts
* Discussion groups or focus group interviews often involve full transcripts and notes from a moderator or observer.
* Logs , journals and diaries might provide structured entries or free flowing text that you or others produce
* Observations might be recorded in your filled notes or descriptive accounts as a result of watching and listening
* Documents , reports and news articles or any published written material may serve as evaluation data
* Stories may provide data from personal accounts of experiences and results of programs in people’s own words
* Case studies typically include several of the above.

**Steps**

1. **Get to know your data**

This means you read and re-read the text. If you have tape records, you listen to them several times and transcribe data. Write down any impressions you have as you go through the data.

Check the quality of the data. Is it complete and understandable? Is it likely to add meaning and value? Was it collected in an unbiased way?

1. **Focus the analysis**

Review the purpose of the evaluation and what you wanted to find out.

Based on your ‘getting to know your data, think about a few questions that you want your analysis to answer and write them down.

You might focus your analysis by:

1. Question, topic, time, period or event.

In this approach you look at how all individuals or groups responded to each question or topic or for a given period or event. You organize data by question to look across all respondents and their answers in order to identify consistencies and differences

1. Case individual or group

You may want an overall picture of:

* One case such as one family, or one agency
* One individual such as a teen participant in the program
* One group such as all teens 13-19 yrs.

Rather than grouping these respondents’ answers by question or topic, you organize data from or about the case, individual or group and analyze it as whole.

You may want to combine the two approaches and analyze the data by both question and by case, individual or group.

1. **Categorize information**

This is sometimes referred to coding or indexing the data.

However, categorizing doesn’t involve assigning numerical codes as you do in quantitative analysis.

To bring meaning to the words:

1. Identify themes or patterns- ideas concepts, behaviors, interactions phrases used etc
2. Organize them into coherent categories that summarize and bring meaning to the text. This involves reading and re-reading the text and identifying coherent categories.

You may want to assign abbreviated codes of a few letters, words or symbols and place them next to the themes and ideas you find

Example:



 Provide a descriptive label (name) for each category you create and be clear on what you include in the category and what to exclude.

As you categorize data you might identify other themes that serve as sub categories. Continue to categorize until you have identified and labeled all relevant themes.

**Ways of categorizing narrative data:**

1. **Using preset categories**

You start with a list of themes or categories in advance and then search the data for these topics

These themes provide direction for what you look for in the data.

You identify the themes before you categorize the data and search for data for text that matches the themes.

1. **Emergent categories**

You read through the text and find the themes or issues that recur in the data. These become your categories. They may be ideas or concepts you had not thought about.

Sometimes you may combine these two approaches by starting with some preset categories and adding others as they become apparent.

Your initial list of categories May change as you work with the data.

Sometimes some sections of data fit into two categories. Therefore you need to create a way to cross index.

1. **Identify patterns**

Once you have identified the categories, you might:

* Sort and assemble all data by theme. It is important to capture the similarities and differences in peoples’ responses within a category. It is helpful to write a summary for each category that describes these points.
* Sort and assemble data into larger categories- you may want to create larger super categories that combine several categories. You can work from more specific categories to larger ideas and concepts then see how the parts relate to the whole
* Count the number of times certain themes arise to show relative importance (not suitable for statistical analysis)
* Show relationships among categories. You may also discover that two or more themes occur together consistently in the data. Whenever you find one, you find the other. You may decide that some of these connections suggest a cause and effect relationship or create a sequence through time
1. **Interpretation**

Use your themes and connections to explain your findings-attaching meaning and significance to the analysis.

Start by developing a list of key point or important findings you discovered as a result of categorizing and sorting your data.

**Typical errors in qualitative data analysis**

* Listing all narrative comments without doing any analysis
* Including information that makes it possible to identify the respondents
* Generalizing from comments to the whole group. Qualitative information seeks to provide unique insights understanding and explanation not genaralizations.
* Using quotes to provide positive spin. Consider your purpose of including the quotes. If you use quotes:
* Specify why you chose the selected quotes
* Include enough of the text to allow the reader to decide what the respondent is trying to convey
* Confidentiality and anonymity should be ensured
* Get peoples permission to use their words
* Check with others about the value and usefulness of the quotes you select to include.

**Statistics used in data Analysis**

Statistics are used by the researcher to:

* Summarize and organize data
* Evaluate and interpret data
* Communicate numerical information

Statistics used include:

1. **Descriptive**

These are statistics that organize and summarize numerical data gathered from samples.

They also help the researcher to examine the characteristics, behaviors and experiences of study participants.

These are categorized into:

1. **Measures to condense data**

These are statistics that are used to summarize and condense data.

1. **Measures of central tendency**

These are statistics that describe the average, typical or most common value for a group of data.

Central-middle or average value

Tendency- this is the general trend of the numbers to cluster in a certain way.

Measures of central tendency include:

1. **Mean**

This refers to average sum of a set of values. It is appropriate for interval and ratio data. It is considered the most stable measure of central tendency if the distribution id normal. However it is influenced by extreme values.

1. **Mode**

This refers to the category or value that occurs most often in a set of data under consideration. That is the most representative category or value in the group.

It is the only measure of central tendency appropriate for nominal data.

Category with the greatest frequency is called the modal class.

It is possible to have no mode.

Data can also have one or more modes.

* **Unimodal**- a set of data with one value most frequent.
* **Bimodal**- a set of data with two values/categories with the same high frequency
* **Multimodal**- a set of data with more than two values/categories with same high frequency.
1. **Median**

This refers to the middle score or value (50th percentile) in a group of data when data is arranged in ascending order. With interval or ratio data, median divides the frequency distribution of data in half.

It is appropriate for ordinal, ratio, as well as interval data.

Median is not influenced by extreme variables.

1. **Measures of variability**

These describe how values differ among themselves in a distribution of values i.e. the distribution of scores around a particular central value or score and in this case the mean.

They include:

1. **Range**

This is the difference between the highest and the lowest value in a group of values or scores

It is a measure that can be used to gain a quick picture of the dispersion of the data.

It is influenced by extreme values.

To correct this influence, inter-quartile range may be reported.

1. **Percentile**

This is a datum point below which lie the values in a frequency distribution. E.g. 80th percentile of a score means 80% of the subjects received lower score or 20% of the subjects higher score.

1. **Standard deviation**

This describes how the values range from the mean of the distribution. It involves subtracting the mean from each score to obtain the deviation. It is most commonly used when interval or ratio data is obtained.

1. **Variance**

This Standard deviation squared.

1. **Measures of relationship**

These are concerned with the correlations between variables i.e. how values of one variable are related to the values of another variable.

Relationship is examined through:

1. **Correlational coefficients**

This determines the magnitude and direction of the relationship between two variables. Generally, correlational coefficients are calculated on measurements obtained from each subject on two variables

1. **Scatter plots/scatter diagrams/scatter gram**

This is a Graphic representation of the relationship between two variables. The X variable is plotted on the X-axis and the Y variable on the Y-axis. Dots are used to indicate where X and Y intersect. The concentration of the dots in the graph indicates positive/negative correlation.

1. **Contingency tables**

If data are nominal or categorical, relationship cannot be depicted on a scatter plot since no actual results are available. It is only the frequencies of occurrence of the values are presented. Contingency table/cross tabulation table is a means of displaying the relationships between sets of nominal data. E.g. relationship between gender and level of motivation

1. **Inferential statistics**

These are statistics that are used to make decisions or inferences a population. They are used to:

1. Estimate the population parameters from the sample statistics. This involves determining the confidence intervals.
2. To test hypotheses

All inferential statistical tests are based on the assumption that chance is only explanation for the relationships that are found in research studies. A researcher wants to demonstrate that chance is not the reason for the relationships found in research.

**Choosing a statistical test**

There are two types of inferential tests

* Those that search for differences in sets of data. These are used when you want to determine if there is a significant difference between groups
* Those that search for correlations between sets of data. These are used when you want to determine if there is a significant correlation between variables within one group.

Choice of the statistical test is based on:

* The hypotheses for the study or the research questions.
* Sample size
* Number of groups or sets of scores to be compared
* Whether the scores / observations are dependent or independent
* Whether you are comparing groups or sets of scores or correlating variables
* The number of observations available for each group.

Inferential statistics can be classified as

1. **Parametric**

These are concerned with population parameters and thus make assumptions about the population from which a sample was drawn.

For a parametric test to be used it is assumed that:

* The level of measurement of data is interval or ratio
* Data is taken from population that are normally distributed
* Data are taken from population that has equal variances on the variable being measured

Examples: t-test

1. **Non parametric**

These do not make assumptions about the population from which a sample was selected.

These are used

* With nominal or ordinal data.
* When sample sizes are small

Examples: wilcoxons

**DATA PRESENTATION**

1. **Narrative presentation of findings**

The findings of a study should be clearly and concisely presented in the text

Certain information should always be included in the text when discussing the study hypothesis:

* Statistical test that was used
* Test results
* Degrees of freedom (df)
* Probability value (p-value)

In qualitative research studies, hypotheses are rarely tested. Therefore inferential statistics are not included in these reports. Narrative presentation frequently contains a lot of direct quotes made by the subjects. Then the researcher may present a summary of the findings by discussing patterns and themes found in the data.

1. **Tables**

These are means of organizing data so they may be more easily understood and interpreted.

**Guidelines concerning tables**

* Tables should appear as soon as soon as possible in the report after they have been referred in the text
* Information presented in tables should also be discussed in the narrative of the report
* Titles should be clear, concise and contain the variables that are presented in the data. The name of the statistical test should not be used
* All data entries should be rounded to the same number of decimal places (1-2 commonly used)
* Decimal points if present should be lined under each other in the data columns
* If data are not available for a section of the table, a dash (-) should be entered rather than leaving a blank space , to make it clear that no data have accidentally been left off the table

Examples of tables

1. **Frequency distribution tables**

Frequency distribution is appropriate for reporting all levels of data. All values or scores are listed and the number of times each one appears is recorded. Values may be listed from the highest to the lowest.

This is depicted using a frequency distribution table.

Frequency distribution table can be:

1. **Simple table**

A single line of characters explain in a single column of information. It shows the distribution of scores in a sample for a specified variable. Size of the frequencies should always be equal to the sample size “n”

1. **Compound table**

A single line of characters has been described by two or more compounds of information

 **Grouped frequencies**

When the range of scores is large, it may be helpful to group the scores into smaller before counting the frequencies. Other instances when data is grouped include when:

* The scores are distributed in such a way that certain scores are not obtained by any subject
* The sample is very big since the frequency would be too long
* Information sought is sensitive such as annual income, age and the response categories in the questionnaire are given in intervals

Class intervals normally start with the lowest score as a multiple of the interval width.

Interval width refers to the size of the class interval. Class interval depends on the sample size and range of scores but should be between10-15 in number.

**Principles governing conversion of raw scores into group score**:

* All intervals should be the same width
* Intervals should be continuous throughout out the distribution i.e. even if there are no scores in a particular class interval, the class interval must be retained and a frequency of zero indicated against it.
* Too few intervals lead to loss of accuracy and too many class intervals result in inconveniences and range between10-15
* Intervals must be exhaustive and mutually exclusive.
1. **Figures**

Term used to indicate any type of visual presentation other than a table.

Figures may help enliven a narrative presentation since they have a visual appeal and should be considered as a valuable means of displaying research results

Figures include:

1. **Graphs**

Graphical representation of a frequency distribution is a valuable supplement to statistical analysis. The graph enables the reader to see the trend of distribution more easily than is possible by looking at numbers in a frequency distribution.

Types of graphs commonly used to present data include:

1. **Bar graph**

Figure used to represent frequency distribution of nominal data and some type of ordinal data

It is especially useful when the categories of variables are qualitative rather than numerical. The length of the bar represents frequency of occurrence of the category. To show that data being presented are separate categories, the bars do not touch each other. Data are presented on only one variable in a bar graph

1. **Histogram**

Graph that use bars to represent frequency distribution of a variable measured at the ordinal, interval and ratio.

Data are presented on one variable in a histogram

Bars are of equal width and touch each other to indicate that data are being presented in a continuum

Width of the bar represents the size of the class interval

The height of the bar represents the frequency of occurrence of each class interval

1. **Line drawings**
2. **Frequency polygon**

This is a graph that is obtained by joining the midpoints of class interval. The midpoint is established by summing up the lower and upper class limits of each class interval and dividing by 2. A dot is placed above the midpoint of each class interval. These dots are connected.

 It is used for grouped data. It represents the frequency distribution of ordinal, interval or ratio data.

1. **Charts**

Figure used to present data but data has to be converted. The mostly commonly used is the pie-chart.

1. **Photographs**
2. **Percentages**

This is a statistic that represents the proportion of a subgroup to a total group expressed as a percentage ranging from 0-100

Minimum number for computation should be at least 20

**ASSUMPTIONS AND LIMITATIONS**

**ASSUMPTION**

This refers to any fact that a researcher takes to be true without actually verifying it.

Example:

* The study assumes that the information that will be provided by the respondents will be accurate and reliable
* The health service providers have kept proper records that will provide the information required in this study.

Assumptions provide the reader with vital information which influences the way the results of the study are interpreted.

**LIMITATIONS**

This refers to any aspect of the study that may influence the results of the study negatively but over which the researcher has no control over.

Common limitations include:

* Scope of the study which may not allow generalizations
* Sample size
* Respondents withholding some information especially with sensitive issues.

The researcher should not include factors that can be controlled unless a good rationale is provided.

**DISCUSSION OF FINDINGS, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS**

**DISCUSSION OF FINDINGS**

This is the more subjective section of the research report.

It allows the researcher to make interpretations of findings. Findings are interpreted in the light of the theoretical framework and literature review.

In discussing the findings, the researcher discusses the aspects of the results that are in agreement and that are not in agreement with previous research and theoretical explanation. However no new literature should be introduced that is not already cited.

The inferential statistics used to test hypotheses should also be presented. Whether the null hypotheses is rejected, rejected and research hypothesis supported or rejected and the results are in the opposite direction from the prediction of research hypotheses should also be discussed.

**CONCLUSION**

The study conclusions are the researcher’s attempts to show what knowledge has been gained by the study and also an attempt to generalize the findings.

Conclusion is written in view of the study problem, purpose, hypotheses and theoretical framework.

In drawing conclusions the researcher should take into consideration

* The sample size,
* Population from which the sample was drawn
* The study design.

Conclusions are more abstract and use general terms as opposed to findings of the study that are concrete and tied to specific data. Conclusions go beyond the findings

Conclusions are also tentative hence the use of the word “appears” since we cannot prove.

**IMPLICATIONS**

Implication section deals with what changes are suggested based on the conclusions.

The implications should contain the “should” that result from the study.

A study implication might be

* No change is needed
* More research is called for to further verify the study results
* That changes need to be made based on study conclusions

Implications may be addressed to the clinicians, educators, researchers, administrators, theorists.

**RECOMMENDATIONS**

This is the last section of the research report. This section should contain recommendations for further research. This section should propose:

Replication of the research study

1. This involves carrying out a study similar to one that has previously been done. Only minor changes are made from the previous study such as using a different type of sample or setting.

Partial replication is more common where an instrument is changed or anew tool is added.

1. A new study in which the present study limitations are considered. This may involve:
* Alteration in the sample e.g. different age group or educational level
* Alteration in the instrument e.g. change an existing tool or use another instrument)
* Control of variables e.g. taking only a certain age group in the sample or selecting a random sample instead of using a convenience sample)
1. Change in methodology (using structured observation instead of self-report methods)

Extension of the research study

**WRITING A RESEARCH REPORT**

A research report is a question answering or problem solving document. A research report informs the reader of the problem the researcher initially set out to investigate, the method of investigation used and the researcher’s findings.

The report should present data fully and adequately and it should include accurate interpretations of the analyses of such data and should relate findings back to the objectives, hypotheses or research questions. It should therefore be formal, precise and economical, consistent. Orderly etc

A well written report comprises:

1. **Title**

A title should be simple yet informative.

Functions of title

* It gives the reader some initial information about the area of research report has covered and therefore a pointer to the content of the report.
* It is used for indexing once the document becomes official. People interested in the document may use the title to search for the report in a library or document centre.

A title page should have:

* Title of the project
* Investigators/financiers/supervisors
* Addresses.
1. **Dedication**

Some authors of research reports dedicate their work to a person or persons whom they deem special in their lives.

1. **Abstract**

This is a research report that is placed before the full report and briefly summarizes or highlights the major points. It contains the meat of the research report. It is a reflection of the salient findings of the research study. It should be placed infront of the report preferably after the dedication but on a separate page.

A good abstract should present the reader with:

* Introduction of the topic
* Purpose/ rationale of the study
* Study objectives
* Study methodology
* Major results and conclusions of the study.

An abstract may or may not be structured. It is usually written at the end and should be approximately 300 words

1. **Table of contents**

This is like a map that guides the readers in locating various sections of the research report.

It contains the chapter headings, main headings, subheadings and corresponding page number of each in the body of the document.

It helps the reader to locate the desired sections quickly and easily.

1. **List of tables**

A researcher uses tables to summarize information in a logical format or sequence. The number and title of each table appearing in the body of the report is listed together with the corresponding page number

1. **List of figures**

A figure is any pictorial representation used to clarify specific points in a discussion. They include graphs, charts, diagrams and photographs.

Give the number and title of the figure and the page number.

1. **List of abbreviations and acronyms**

Abbreviation is a short form of word e.g. Dr. Prof.

Acronym is a contraction formed by taking the first letter of several words e.g. WHO, MOH

When using acronyms and abbreviations:

* Write in full the first time that the acronym is used.
* Do not abbreviate military, religious or political titles.
* Abbreviate units of measurements only when they are used often in a report.
* Use only abbreviations that your audience will understand
* Do not abbreviate days of the week or months
* Abbreviate time designations only when they are used with actual time e.g.4.30 p.m.
1. **Operational definitions.**

This refers to definitions /meanings of words that are used in the study.

Use WHO definitions

1. **Introduction**

This has several components

* Background of the study
* The problem statement
* Study objectives
* Hypotheses and /or research questions
* Assumptions of the study
* Limitations of the study

The major role of the introduction section is to outline the gap or gaps that exist in the area of study and present the rationale of the study.

This leads to the statement of the problem. The researcher should quote existing studies and theories to support the problem statement. Literature cited in this part of the document should be limited to the most relevant and current.

1. **Literature review**

This is a researcher’s critique of findings from other studies done in a related area.

The critique should include an assessment of methodologies used in these studies, theoretical or conceptual frameworks and the relationships or differences between the researcher’s study and the studies reviewed.

1. **Methodology**

This gives details regarding the procedures in conducting the study:

It includes

* Research design
* Research site
* Study population including inclusion and exclusion criteria
* Sample size determination
* Sampling techniques
* A description of methods and instruments/tools used to collect data. Pretesting of the tool should also be discussed.
* Data collection process including training of Assistants.
* Quality assurance procedures-calibration, timing etc.
* The measurements of variables and techniques to be used in data analysis including statistical procedures that will be used.
* Limitations and assumptions
* Ethical considerations,
1. **Results and discussions**

The purpose of this part is to present the results of the data in a systematic way. If the study is empirical in nature, the researcher uses statistics to summarize the results and make generalizations on the population

Basic principle in presenting results is to give all the evidence relevant to the research objectives and questions if any.

When writing the results and discussions, it is advisable to start with a short introduction that describes the general procedures followed in analyzing the data

Pointers in writing this section include:

* Present the descriptive results of your analysis first. Descriptive statistics include: frequencies, percentages, means, modes, correlations. These statistics should be presented in tables to make the document user friendly.
* It may not be possible to report every result of analysis. The researcher therefore selects the most important findings for reporting. This should be guided by the study’s objectives or hypotheses as stated in introduction part
* Not every result or table generated in the course of the analysis or table generated in the course of analysis is presented in the report. Objectives and hypothesis should guide the researcher.
* All tables used should be numbered systematically and given appropriate titles
* Discussion based on the information contained in a table should be placed either immediately before or after the table
* Graphs, charts and other visual presentations should be included in the results and discussion section if they add value to the content. Sometimes tables and other graphic representation of the data are placed in the appendices
1. **Summary, conclusions and recommendations**

Summarize the study undertaken, conclude and make recommendations

1. **References**

Use the Harvard referencing system. The reference may be done numerically or alphabetically.

1. **Acknowledgement**

It is a matter of courtesy for the researcher to acknowledge all the individuals, institution and /or organizations that helped in the course of research. Help may include: time, resources, information. Mention only a few individuals by name to keep the acknowledgement section as short as possible

1. **Appendices**

This contains information that the researcher doesn’t deem necessary to include in the body of the report. This includes:

* Instruments used in the study
* Consent forms
* Correspondences related to the study such as letters of approval to conduct the research
* Copy of the research permit and terms of reference if any
* Statistical tables used for data analysis.

**DISSEMINATION OF STUDY FINDINGS**

Once the research has been conducted, the findings should be disseminated as widely as possible.

**Ways of dissemination**

1. Presentation of findings to professionals

This involves paper presentations in seminars, conferences, discussion forums, workshops and meetings.

1. Presentation to the world community through:
* Media
* Workshops
* Community discussions
1. Presentation to specific stakeholders like Government departments, NGOs and Research community

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 **THE END**