COURSE: NURSING RESEARCH

CHAPTER III: STEPS FOR DOING RESEARCH

Three main stages for doing research include:

a) Writing a Research Proposal
b) Collection and analysis of data
c) Writing Research Reports (i.e. communicating the results)

3.1 RESEARCH PROPOSAL

- Research proposal is a written plan or guide for doing research. The proposal is used for the following purposes:
  i. To seek approval of the research
  ii. To solicit for research funds.
  iii. To serve as a guide during the research process

- The format and content of a research proposal vary widely, but there is a standard format for Schools of nursing and midwifery as shown in the table below.

3.2 RESEARCH REPORT

- Research report is the presentation of the research results for dissemination purposes.
- Research report can be in the form of progress reports, final report, dissertations, publications (scientific papers), seminars, workshops, and conferences, discussion with policy makers, and programme managers.
- The format of reports vary in some respects, but there is a standard format for dissertation done in Schools of nursing and midwifery.

3.3 SIMILARITIES AND DIFFERENCES BETWEEN RESEARCH PROPOSAL AND WRITTEN RESEARCH REPORT

	FEATURE	RESEARCH PROPOSAL	REASEARCH REPORT (E.g. DISSERTATION)
A. (i)	**TITLE (**Short form of Research Problem)	Same	Same
(ii)	**SUMMARY** (Written *LAST*)	• Format is similar • Tenses and some sections may differ • 150-200 words	• Format is similar • Tenses and some sections may differ • 150-200 words
B.	**CHAPTER 1: INTRODUCTION**		
1.	Definitions of key terms pertinent to the study.	Same	Same
2.	Background for the study (i.e. Motivation)	Same	Same
3.	Research Problem Statement	Same	Same

4.	Objectives (Main Objective and Specific Objectives)	Same	Same
5	Research questions/Hypothesis	Same	Same
6.	Significance (i.e. Rationale) of the study	Same	Same
7.	Subdivisions of the Study	Same	Same
C.	**CHAPTER 2: LITERATURE REVIEW**	Same	Same
D.	**CHAPTER 3: METHODOLOGY**	Same, **in future** tense	Same, **in past** tense
1.	Study Area		
2.	Study Design		
3.	Study population		
4.	Study sample		
5.	Data collection		
6.	Data analysis		
7.	Problems and Limitations of the study		
8.	Ethical Considerations		
E.	**CHAPTER 4:**	**PRESENTATION OF RESULTS** **In future tense**. Dummy tables (i.e. Tables without data) are given.	**RESULTS** **In past tense.** Tables contain data.
F.	**CHAPTER 5: DISCUSSION**	Absent	Present
G.	**CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS**	Absent	Present
9.	References (In text and Reference list)	Same	Same
G	**OTHERS**		
1.	Work Plan	Present	Absent
2.	Gantt Chart	Present	Absent
3.	Budget and its justification	Present	Absent
4.	Profile of the Applicant (i.e. Curriculum Vitae) and the Institution	Present	Absent
5.	Appendices	Present	Present

- **A detailed description of formats** for the final paper Research Proposal in Schools of nursing and midwifery is given in respective **Guidelines**, which a student must read very carefully, understand and follow. Please ensure you get a copy of each.

3.4. IDENTIFICATION OF THE RESEARCH PROBLEM (i.e. Main Research Question)

3.4.1 Definition of a Research Problem (i.e. Main Research Question)

- Identification of a research problem is to find a topic to do research on. That is find a subject that has not been researched on.
- In order to see clearly what one needs to do research on, ***first write the research idea as a question.*** Once it is clear, write it as a statement, or as both statement and question separated by a colon (:). Eg. Malnutrition in underfives: What is the status in Jabana Sector, Gasabo district?

NB: *Identification of the research problem is only a research process; and* ***it is not a part of the written proposal or research report.***

3.4.2 Sources of Research Problems

- Sources of Research Problems may include the following:
  i. Problems encountered in routine activities i.e. Practical Problems
  ii. Head of academic institution/department may offer some ideas
  iii. Funding agencies e.g. UNICEF, WHO, may have a list of research priorities
  iv. Manufacturers of medical devices and drugs can offer both research problems as well as financial grants (i.e. funds).
  v. Literature review (i.e. reading critically reports, and published papers to find out if what you want to do research on has already been done or not).

3.4.3 Feasibility of a Research Problem

- The feasibility of a Research Problem is the possibility for successfully completing the research project.
- The feasibility is determined by the following factors:
  i) Time duration of the study (i.e. How long the study will take to complete compared to time available).
  ii) Its cost (How much financial, material and human resources are needed compared to those available).
  iii) Its Ethical implications (Whether it is technically and morally acceptable or not).
  iv) Availability of desired cooperation to of the end of the study (Lost cooperation of the study subjects or community can ruin the research when money and other resources have already been spent on them).
  v. Level of Expertise available (Your expertise and that of your collaborator e.g. your supervisor must be considered whether it is adequate to carry out a particular study).

3.4.4. LITERATURE REVIEW PROCESS

- Literature review is the reading of various books and journals in order to get more information on the subject you want to do research on.
- Literature review must be done **early** in the research process because it widens your knowledge of the subject you wish to do research on.

NB: *Literature review process* ***is not the same*** *as "Literature Review" in Chapter 2 of the written Proposal or Research Report. Chapter two* ***is just an organized part describing various parts of your subject of research and literature sources you read.***

Importance of literature review process.

- Literature review process is important because of the following reasons:

i) Identification of the Research Problem (after widening your knowledge of the subject of study).
ii. To get detailed information to be written in the sections on "Background to the study"(i.e. Motivation for the study), "Research problem statement", "Rationale/Justification/Significance for the Study", and "Literature Review" of the Final Report
iii) To learn more about the methodology (e.g. procedure and measurements) for the planned study.
iv) To obtain more references from the literature you read.
v) To identify problems encountered in the previous studies, in order to plan how to avoid or solve them.

Procedure for Literature Review Process (i.e. how to conduct literature review)

i. Searching (i.e. looking) for existing literature (i.e. journal articles, reports, and books)

- Concentrate your effort on books and journals relevant to your research subject. Avoid newspapers.
- In searching for literature you can use printed or electronic forms of:
  a) Library catalogues based on subject, title, and author to identify relevant books to read.
  b) Indices of Journals e.g. Humanities index (on CD-ROM, and/or Internet)
  c) Abstracts of Articles e.g. (on CD-ROM, and/or Internet)
  d) Citation indices e.g. Social Science Citation Index (on CD-ROM, and/or Internet)
  e) Electronic Databases e.g. HEALTHROM, CINAHL, MEDLINE, ERIC (on CD-ROM, and/or Internet)

ii. Classify important literature on the subject. It is useful to do this in a table form as shown below:

Author Year Article Journal/Book/ town Publisher,	**Study location and Time**	**Design of study**	**Subject**	**Controlled variables & Monitored variables**	**Results**
Curtis, C.F. *et al.* A comparison of use of pyrethroid insecticide for house spraying or bednet treatment against malaria vectors. *Tropical Medicine and International Health.* 3: pp 619-631	Tanzania, 1998	Longitudinal study	Pyrethroid insecticide spraying versus treatment of nets	Initial malaria transmission levels similar in study sites. Monitored *Anopheles* mosquito densities, and Anaemia, amount of insecticide used.	- Both methods were asociated with a reduction in anaemia and *Anopheles* mosquitoes. - Net treatment used one sixth as much insecticide as used for residual spraying.
			Same		

			Same		

iii. Critically (i.e. by asking questions) read the literature:

Ask yourself such questions as What?, Which?, Where?, Why?, How?, Who? in order to find out whether:

a) The information is confirmed,
b) There are weaknesses in the study,
c) The study can be repeated elsewhere,
d) There are areas that have not been researched on (i.e. there are gaps in knowledge).

iv. Make a theoretical framework. i.e.

Discuss widely the **various theories**, scientific views and techniques about the general subject.
E.g. In the study on "The relationship between mortality and fertility", review various theories of mortality and fertility and show their weakness.

v. Then, make a Conceptual framework.

- Choose one or two aspects from the theories already reviewed and discuss those in detail, indicating currently accepted standards of those systems to be studied. **It is like making a problem tree** whereby you show how the main problem branches into smaller and smaller problems.
- Show the different relationships of factors diagramatically.

vi. Writing up the literature reviewed.

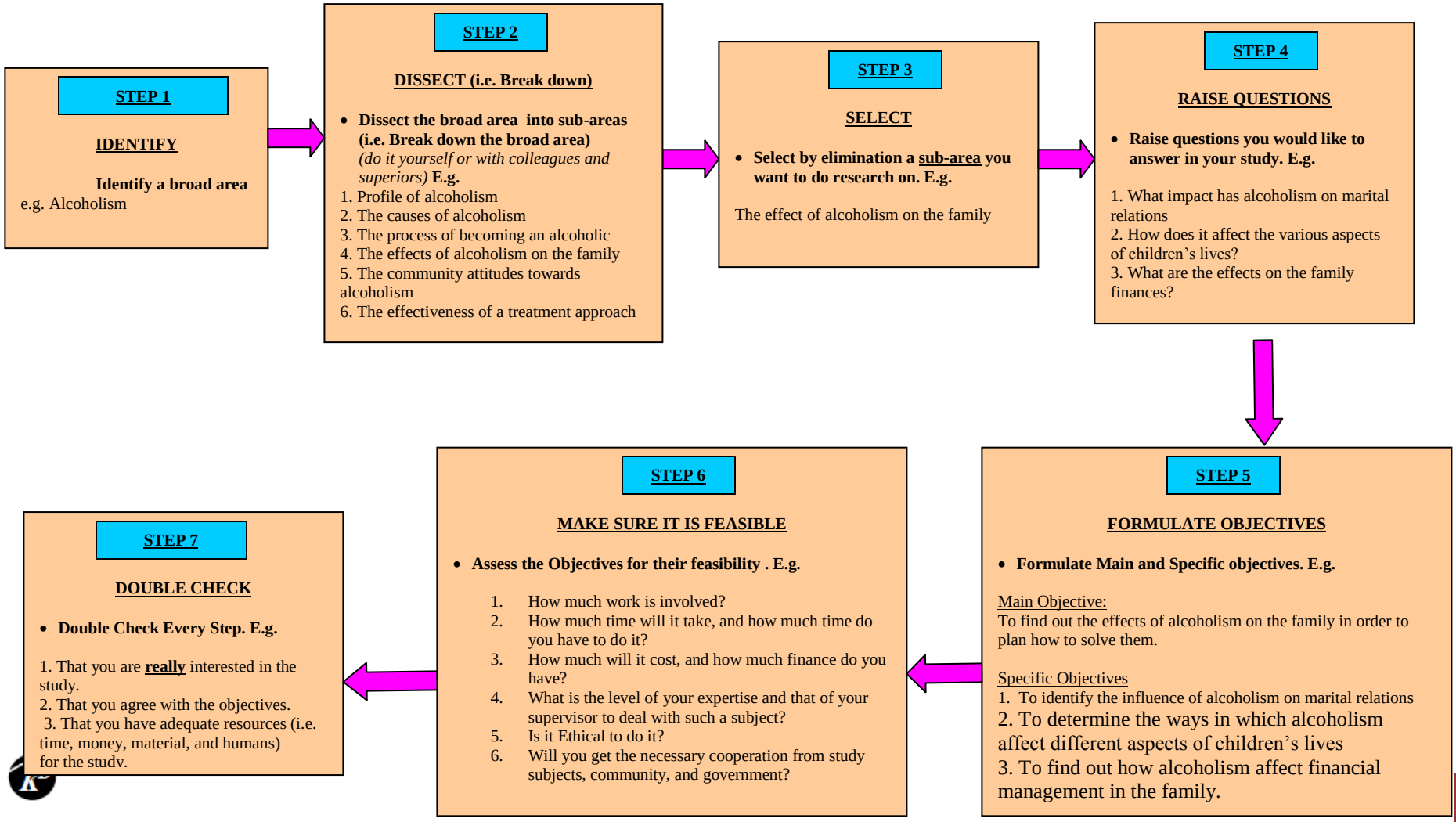
a) Write the information obtained during literature review into the following **sections** of the Proposal; or research report: Background to the study (i.e. Motivation for the study, Research Problem Statement, Significance (i.e. Rationale, Justification), and Literature Review (see below).
b) Cite the references **in the text** by using either Harvard Referencing System, Vancouver System, or Foot Note System (See guidelines on writing final year research proposal/dissertation about referencing) and
c) Write a reference list (in addition to in-text citation) to be at the end of the report/dissertation before appendix.

3.4.5 SUMMARY OF SEVEN STEPS FOR IDENTIFICATION (I.E. FORMULATION) OF THE RESEARCH PROBLEM (I.E. FINDING A RESEARCH TOPIC):

If you do not yet have a specific research topic (i.e. a research problem) then you follow these **SEVEN STEPS** to find it using a pen, rough paper, internet, colleagues, and supervisor and making simple drafts that may/or may not be very organized.

Schematic diagram to show of Research Problem Identification (or formulation)

- The **seven steps** for identification of the research problems are the following:



Once you have identified your research topic, you start your research following those different steps:

3.4.6 INTRODUCTION

Introduction forms "Chapter 1" in the proposal or research report. It consists of:

i. Definitions of key terms pertinent to the study
ii. Background to the study
iii. Problem Statement
iv. Objectives (Main Objective and Specific Objectives)
v. Research questions or Hypothesis
vi. Significance (i.e. Rationale) of the study
vii. Subdivision of the Project

Definitions of key terms pertinent to the study (i.e. proposal or research report)

- Give definitions of terminology used in the proposal or research report.
- Show references from where you obtained the definitions

3.4.7 BACKGROUND TO THE STUDY (i.e. Motivation for the Study)

Background to the study shows the following main issues:

1. The actual magnitude of the challenging situation facing the community or practitioners of some kind
   e.g. maternal mortality problem, HIV disease, etc. (Show source of that information i.e. reference). It specifies:
   i. Magnitude of the problem (show data or cite references)
   ii. Time frame of the problem (how long has it existed)
   iii. Geographical area (Where does the problem commonly occur).
   iv. Population (Does the problems affect certain groups of people only or most people? If so what are their characteristics of groups affected?)
2. What is actually done to improve the situation? (Show source of that information i.e. reference)
3. The research results available to show factors making it hard to improve the situation **even further**? (Show source of that information i.e. reference)
4. The aspects that the current researcher has identified that have not been researched on to find factors making it hard to improve situation even further? This will be the "Research Problem" i.e. "research question" also called "Research Topic". The Research problem (i.e. question)indicates that:
   - There is still lack of knowledge (i.e. information) to allow intervention to take place.

Note:

- Widely known information that has never been published in accessible reports or as papers in journals is scientifically considered to be unknown.
- Remember that what **you** personally do not know, **does not necessarily mean** that it is not yet research on and published and so it is scientifically unknown. You have to search for literature exhaustively before saying so.

- Not *all problems require that research be done <u>first</u> in order to be solved! Some problems require <u>intervention</u> if the necessary information about them is already available. What might be missing are resources (i.e. funds, expertise and time)*

Background to the study can be <u>up to two pages long.</u>

3.4.8 MAKING (i.e. FORMULATION) OF "RESEARCH PROBLEM STATEMENT"

- A Research Problem Statement is a concise (i.e. short and clear) **<u>summary</u>** of the background to the study (i.e. motivation for the study), whereby it shows:
  i. ***<u>EITHER</u>***
     a) That research has already been done and reported on the topic **<u>but some aspects</u>** (identified by the *current* researcher) have not yet been research on and shall be studied, (i.e. Show what has been found out so far ***in order to reveal what has not been research on and mention it***).

  <u>OR</u>

     b) That although a certain procedure, method, or belief is being practiced, there is no scientific research that has been done to show that it is beneficial (or works) or not. Then show what type of research should be done now.

  ii. The time period (i.e. duration) it will take to do it, which people or other study units it will involve.

- It is usually one paragraph, otherwise not more than half a page. That is, it is just a short <u>STATEMENT.</u>
- <u>Most Research Problem Statements</u> start with "Although", "While", "Whereas" "Despite" "In spite of", "Even though" or "However". <u>Otherwise these words are just implied</u>.
- <u>In articles published in journals</u>, the research problem statement is found in one or two paragraphs above the objectives or materials and methods (if objectives are not listed).

<u>Examples of research problem statement:</u>

i. *<u>Although</u>* information on communicable diseases and health conditions related to maternity and childhood exists at health facilities, supplemented by data from community-based surveys, little is known about injury in rural areas of Rwanda. Therefore, a study is going to be conducted to assess the status of injury in the rural communities in Rwanda. The study to take one month shall find out the risk factors for injury, the types of injuries sustained and preventive measures practiced by the community.

ii. Despite the fact that the washing of hands regularly, before preparing food, before eating or feeding the baby and after visiting the toilet has been shown to reduce the transmission of communicable diseases by 45% and above, it is not certain whether the majority of the rural population observe the hand washing practice. A study is therefore going to be conducted to assess the knowledge, attitude and practice concerning the washing of hands by mothers of children less than five years in three sectors of Kayonza district. The study will take about one month.

3.4.9 OBJECTIVES OF THE STUDY

i. Definition**:** An objective is a statement about what you intend to achieve by doing your study.

ii. **Characteristics of Objectives**

Specific Objectives are said to be **SMART** meaning the following characteristics

a) Specific - They are focused and definite, and not general.

b) **Measurable -** They can be implemented (i.e. put into action) by taking measurements of some kind.

c) Achievable - They can be put into action (i.e. they are practicable and not just hypothetical).

d) Realistic - They are reasonable and within the means available.

e) Time bound - Can be achieved in the available time

iii. **Types of Objectives**

There are two types of research objectives:

i. Main Objective(s)

i. Specific Objective(s)

Note: **A specific objective** in one study **can become the main objective** in another ***detailed*** study.

Main Objective

- The main objective is a statement of the **purpose** of the research project.
- It should mention the **outcome** measure of the study.
- It should generally describe the main questions to be addressed by the research without going into details.
- It must relate to the research problem.

Examples of the Main Objective

i. To measure the effect of *Plasmodium falciparum* asexual blood-stage vaccine in reducing morbidity and mortality due to malaria.

ii. To assess the status of HIV/AIDS in Karongi District and identify the efforts made by the district health management team to control the disease.

iii. To assess the prevalence of Malaria in the Eastern Province

Specific Objectives

i. A specific objective is a statement (or question) expressed in measurable terms (i.e. parameters) using action verbs about what you want to achieve.

- *Examples of measurable terms or parameters include*: quantity (e.g. number or weight of things), size (e.g. height, breadth), quality (e.g. colour, texture etc).
- *Examples of Action Verbs include:* To assess, to determine, to identify, to explore, to investigate, to find out.
- Do not use non-action verbs such as the following: to know, to recognize, to perceive, to appreciate, or to detect as it is not possible to show their actions.
- Examples of Specific Objectives:
  a) To find out the number of HIV seropositive people aged 15-49 years.

b) To determine the number of children aged 2-9 years who are infected with malaria parasites.

iii. The specific objectives can be derived from the indicators to be measured. E.g. Seropositivity, prevalence.

3.4.10 RESEARCH QUESTIONS OR HYPOTHESIS

- The use of either Research questions or Hypothesis shall depend on the type of study).
- Most surveys do not have hypothesis. They have research questions only.
- Studies comparing situations e.g. drugs, etc have hypothesis to be tested.

RESEARCH HYPOTHESIS (AND BASIS FOR HYPOTHESIS) AND RESEARCH QUESTIONS

Research Hypothesis

- A Hypothesis (or tentative guess) is a specific statement of prediction about the status of a situation or system, which usually specifies a relationship between two or more variables although its validity (i.e. truth, accuracy, or correctness) is unknown.
- The validity (i.e. accuracy) of the hypothesis is confirmed or rejected by the research results.
- *A single study may have more than one research hypothesis.*

Example of Research Hypothesis and basis for hypothesis:

Children who receive sex-education course before entering their teenage are more likely to use contraceptives at first sexual intercourse than children who do not receive such a course. This is based on the fact that:

a) Knowledge influences practice

b) Knowledge influences attitude

Characteristics of a Research Hypothesis

i. It must be simple, specific and conceptually clear (i.e. It should test one relationship at a time).
ii. It should be verifiable i.e. It must be feasible to collect data about it using available or new techniques).
iii. It must be operationalisable i.e. it can be expressed in measurable terms e.g. numbers/year, etc.
iv. It must be based on the already available knowledge (i.e. literature). **This forms the basis for a research hypothesis.**

Function of a Research Hypothesis

i. The main function of the research hypothesis is ***to focus the study*** on specific aspects (i.e. areas) only.
ii. To bring clarity to the research problem.

Types of Hypotheses

- Theoretically, there should be only one type of hypothesis, that is, **Research hypothesis**. In fact this is the hypothesis normally found written in dissertations or other reports.

- ***However***, by convention (i.e. rules) of scientific enquiry there are two main hypotheses for each study:
    i. Research Hypothesis (or Alternative hypothesis)
    ii. Null Hypothesis

Research Hypothesis:

- This is the hypothesis (i.e. prediction) that the study intends to prove as right or wrong, and therefore it is the basis for the investigation
- The Research Hypothesis is called an Alternative hypothesis and is denoted by $\mathbf{H_A}$ or (H_1)

e.g. a) Taking 300mg/day of drug A, will bring a significant change in body temperature. i.e. There will be **a significant difference** in body temperature after taking the drug.
b) Taking 500mg/day of drug D will **lower** the blood pressure.

Null Hypothesis

- This is the statement opposite (i.e. negative) to the research hypothesis expressing all possible remaining outcomes (i.e. predictions) and it is denoted by $\mathbf{H_o}$ or (H_0)

e.g. a) Taking 300mg/day of drug A, will **not** bring a significant change in body temperature. i.e. There will not be a significant difference in body temperature after taking the drug.
b) Taking 500mg/day of drug D, will **either** bring no significant change **or** will **increase** the blood pressure.

Two-tailed Hypothesis and One-tailed hypothesis

- **Two-tailed Hypothesis** does not specify the direction of the effect (e.g. change)
  e.g. Taking 300mg/day of drug A, will bring a significant change in body temperature. Note that it does not specify whether temperature will decrease or increase.
- **One-tailed hypothesis** specifies the direction of the effect (e.g. direction of change)
  e.g. Taking 500mg/day of drug D, will **either** bring no significant change **or** will **increase** the blood pressure.
- During data analysis, one-tailed or two-tailed statistical test must be used accordingly basing on the type of the hypothesis (i.e. one-tailed or two-tailed).
- After analysis of data the research hypothesis (H_A) is accepted or rejected. If it is rejected then the Null hypothesis (H_o) is accepted and conclusions made on the study.

When to use a *Research Hypothesis* or *Research questions* in research.

- ***All types*** of research work should contain a formal clear statement of either a) the research question(s) or b) hypothesis(es) to be tested
- The use of research questions or hypotheses **depends on the type of research.**
- **In Epidemiological studies**:

a) Some Descriptive or Exploratory studies **use Research Questions** instead of Hypothesis. That is, they generate hypothesis(es), but do not predict relationships between variables. E.g. Cross-sectional studies. Example of research question:
- What are the levels of maternal and infant mortality in refugee camps in province A?

b) Other analytical and Experimental studies can make predictions about relationships between variables and therefore do test hypothesis. E.g. Ecological studies, case-control studies, cohort studies and experimental studies.

ERRORS IN TESTING HYPOTHESES (i.e. Rejecting or Accepting Hypothesis wrongly).

- To conclude that the hypothesis (i.e. Research hypothesis or Null hypothesis) for the study is either **true** (and therefore accept it) or **false** (and therefore reject it) you must use the **results from the analysis of your research data.**
- However, research results are not always so perfect. Therefore, **imperfect** (i.e. deficient) results may lead you to reject a true hypothesis or accept a false hypothesis.
- **Imperfect results can be caused by any, some or all of the following factors:**
  i. Faulty study design used
  ii. Incorrect Sample size of the study units
  iii. Faulty sampling procedure applied
  iii. Inaccurate method of data collection.
  iv. Wrong analysis done.
  v. Wrong conclusions drawn

- **Conventionally** (i.e. by rule) when you say that you are accepting or rejecting a hypothesis it means that you are rejecting or accepting a **NULL HYPOTHESIS.**
- However, to be brief some people only say "According to the results we accept the Research Hypothesis". Conventionally, they indirectly mean to say "According to the results we reject the Null hypothesis and accept the Research Hypothesis".

- In accepting or rejecting the **Null Hypothesis**, one can make **two types of errors** because of deficient results. These are **Type I error (or α error) or Type II error (or β error).**

TYPE-I ERROR (i.e. α error):

This is the rejection of a **Null Hypothesis** that is actually true, but the study results indicate that it is false.

The chance (i.e. possibility or probability or likelihood) of making **Type-I error (i.e. α error)** is statistically called ***level of significance*** of the study. It is also called the alpha (**α**) level chance.

- By convention, you **reject the Null Hypothesis** (and therefore accept your Research Hypothesis) **only if** the alpha (**α**) level is less than 0.05 (i.e. <5%) as shown by a specific statistical test e.g. t-test, chi-square, Analysis of Variance (i.e. ANOVA), etc. (Computer programmes produce alpha (**α**) level with the results of statistical analysis automatically.

- If the ***level of significance*** (i.e. **α** level) of the study as shown by statistical data analysis is **more than 0.05 (i.e. > 5%)** you must **accept the Null Hypothesis** (and therefore reject the research hypothesis.

- **The Confidence level** that is (**1-α**) is the probability (i.e. chance) of accepting the Null Hypothesis when it is true.
- Confidence level is usually presented as a percentage as follows **100(1-α)%.**
  E.g. (1-0.05) x100=95% Confidence level.

TYPE-II ERROR (or β error).

- This is the acceptance of a **Null Hypothesis** that is actually false, but the study results indicate that it is true. It is also called the beta (**β**) level chance.

- **The Power of the Study** that is **(1-β)** is the probability (i.e. chance) of **correctly rejecting** a Null Hypothesis when it is **really false**. **Power** of the study is usually presented as a percentage as follows: **100(1-β)%**
- In epidemiological studies, the **power of 80%** or above is most commonly applied.
- The study with a higher **power** i.e. 100(1-β)% will detect a small effect (i.e. outcome) of the intervention better e.g. detecting a small reduction in blood pressure after trying a certain drug in a sample of people.

SUMMARY OF TYPE-I ERROR (or α error), TYPE-II ERROR (β error), CONFIDENCE LEVEL (1-α) AND POWER OF THE STUDY (1-β).

	REALITY		
Conclusion of hypothesis Testing (i.e. Significance testing)	**Null Hypothesis is TRUE**		**Null Hypothesis is FALSE**
Reject Null Hypothesis	**TYPE-I ERROR** or **(α error)** = ***Level of significance*** of the study. e.g. 100**α**% = 5%, 1%, 0.1%, 0.01% • *i.e. With rejecting of the Null Hypothesis the results and conclusions of your study can be suspected wrong by a chance of about 5% or1%, etc..*		**POWER OF THE STUDY (1-β)** e.g. 80%, 90%,95%. • *i.e. With rejecting of the Null Hypothesis the results and conclusions of your study can be assumed correct by a chance of 80%, 90%, 95%, etc.*
Accept Null Hypothesis	**CONFIDENCE LEVEL (1-α)** e.g. 100(**1-α**)% = 95%, 99%, 99.9%, 99.99% • *i.e. With accepting of the Null Hypothesis, the results and conclusions can be assumed correct by a chance of 95%, etc.*		**TYPE-II ERROR (β error)** e.g. 100**β%=** 5%, 10%, 15%, 20%. • *i.e. With accepting of the Null Hypothesis the results and conclusions can be suspected wrong by a chance of 5%, etc.*

- The values of Level of significance (i.e. α error), and Power (i.e. 1-β) are essential in the estimation of sample sizes of various study designs.

3.4.11 SIGNIFICANCE (I.E. RATIONALE) OF THE STUDY

- The Significance or Rationale of the study means the usefulness of the results to be obtained in the provision of service, in planning, in teaching, in research, etc.
- It shows clearly how the results to be obtained from research shall be used to in solving the existing problem or advancing knowledge.

  Example:
  - The knowledge of the prevalence of HIV/AIDS in different age groups and the risk factors for getting infected will be used in the planning for interventional measures for those sections of the population.

Subdivision of the Research Proposal/Research Report

Mention briefly the main parts of the research proposal. E.g.

- For proposal: The different chapters, work-plan, budget, personal and Institutional profiles
- For research report: The different chapters from introduction, literature review, results and discussion, to Recommendations.

3.4.12 LITERATURE REVIEW SECTION

- The SECTION called **Literature Review** is Chapter 2 in the Final Year Research Proposal or in the research report (See the guidelines on writing the final year Project).
- Literature Review Section contains the following information gathered during the **process** of literature review in the preparation for the study:

  i. Focused overview of the subject to be researched on.
  ii. Discussion of the known standards about the topic of your study.
  iii. Various views about what is practiced (i.e. currently done) compared to the standards.
  iv. Discussion of the problems, limitations, or superiority of techniques to be used in answering the research questions

3.4.13 METHODOLOGY

- Methodology is **Chapter 3** in the Final year Research Proposal or Research Report.
- The "Methodology" section can also be called "Materials and Methods".
- It contains a description that will normally depend on the nature of study. The following parts comprise this section.

➢ **Study Area**

Description under study area will depend on the type of the study. Generally, the following information can be given:

a) Geographical characteristics of the area e.g. map of the area, rainfall, temperature, altitude.
b) Demographic information e.g. males, females, less than 5 year olds, fertility rates, tribes (if they can influence behaviour and where applicable). Here, groups other than your study group can be mentioned.
c) Social economic indicators e.g. literacy rate, religion, income distribution, economic activities (like occupations and migrations).
d) Environmental characteristics e.g. clean, or not clean.
e) Health facilities and Health staff e.g.
   (i) Health facilities by type and ownership including pharmacies and drug outlets

(ii) Staff by type and distribution e.g. government, non-government, faith based or private.

f) Epidemiological data of various endemic and epidemic diseases in the area.

- **Study Population**

- A study population is only the group from which you select your study units (i.e. sample), or where the group is small it is entirely used in the study and not the population of the area.
- A study population can be people, villages, dispensaries, wells, households, schools, etc.
- Describe the population for your study to include:
  (i) Their demographic characteristics e.g. Age groups, Sexes, Occupation, general conditions.
  (ii) Why they were chosen (i.e. Appropriateness)
  (iii) Accessibility(If they can be reached with ease)
  (iv) Their cooperation
  (v) Their representativeness of the general population.
  (vi) Stability -If they have to be followed-up state if they are not mobile e.g. nomadic.
  (vii) Criteria for assigning to case and control groups (in the case of case-control study)
  (viii) Definition for "case" and "control", and other variables (i.e. features).

- **Study Design**

- State the type of study (e.g. Cross Sectional, Longitudinal, Case-control, Cohort, Community based intervention trial, randomised double blind placebo controlled trial, etc)
- Consider at this stage the type of data analysis you will use later.

- **Sample Size and Sampling Methods**

The Concept of Sampling

- Sampling is the process of selecting study units (e.g. people, villages, dispensaries) from a population (i.e. group) of interest, so that by studying the sample (i.e. selected units) it may possible to generalize the results for the whole population from which the sample (i.e. selected units) was taken.

- Advantages of studying a ***sample*** instead of the ***whole study populations***:
  (i) It is more economical to use a sample in terms of resources, time, labour, and money.
  (ii) It is easier to handle (i.e. manage a small sample than a large study population.
  (iii) A representative sample can yield enough information about the study population.

Terminology used in sampling

i) Study population

This is the total number of individuals from which the sample is being obtained. E.g. All children of a certain age in a district, all HIV/AIDS patients in a village, all schools in a district, etc.

ii) Sampling unit (unit)

This is the smallest part (i.e. individual) that can be selected from the study population. e.g. one child, one school, or one household, one well.

iii) A sampling frame

- This is the arrangement (i.e. organization) of the sampling units from which a sample is select using a sampling method.
- Sampling frame includes list of names, or plan of an area showing arrangement of houses or other structures.
  - Examples of sampling frame: List of named schools in a district, list of named households in a village, list of named districts in a province, list of names of children organized according to their schools, plan of a town showing numbered houses.

iv) Sampling domains or Strata

- Sampling domains (or Strata**)** are subdivisions of the study population based on certain characteristics.
- Examples of sampling domains (or strata)
  a) Different age groups of people make different strata (or domains) e.g. less than 1 year old, 1-4yrs old, 5-9yrs old, etc are different strata.
  b) Sex form different strata: Females are one stratum, and Males are another stratum and so there are two strata in sex.

➢ **Sample Size.**

- A sample size is the number of units (i.e. individuals) needed for the study to represent the study population.
- Example of sample size: 300 children of age 1-4 years chosen out 3000 children of the same age found in a study area is the sample size.
- Calculation of sample size depends on the type of the study design.
- In general, the following information is required before a specific method (i.e. formula) is used to calculate the sample size:
  a) The level of the statistical significance (α), usually 0.05 (i.e. 5%).
  b) The power of the test (β). This is defined as the probability of correctly rejecting the null hypothesis (H_o) when H_1 is true. Usually 80% power or higher is used.
  c) The amount of the disease (or condition) in the population (i.e. prevalence). The higher the prevalence of the disease or condition studied the smaller the sample size, and vice versa.
  d) Relative sizes of groups being compared (i.e. whether the treatment and comparison groups are of the same size or not.

N.B: Computer programme are now more frequently used in sample size calculations. Nevertheless, seek the advice of the statistician or epidemiologist for accurate calculation of sample size whenever possible.

FORMULAE FOR CALCULATING SAMPLE SIZE*

From: Corlien M. Varkevisser, Indra Pathmanathan, Ann Brownlee (2003)

The formulae for calculating required sample size are divided in two categories:

1. For studies trying to measure one variable with a certain precision.
2. For studies seeking to demonstrate a significant difference between two groups.

1. Measuring one variable

In the formulae below the following abbreviations are used:
n - sample size
s - standard deviation
e - required size of standard error
'margin of error = precision' means ± 2 times the size of the standard error (if a precision is based at 95% confidence limit)
r - rate
p - percentage

- **Single mean**

In a study the mean weight of newborn babies will be determined. The mean weight is expected to be 3000 grams. ***Usually***, weights are approximately normally distributed and 95% of the birth weights are probably between 2000 and 4000 grams (i.e. 3000±1000); therefore the standard deviation (**S**) would be 500 grams (i.e. 1000grams/2 **S** = 500 grams). ***The desired*** 95% confidence interval ***for the study planned*** is 2950 to 3050 grams (i.e. 3000 ± 50grams), so the standard error would be 25 grams (i.e. 50/2 **e**=25grams). The required sample size would be:

$$n = \frac{s^2}{e^2} = \frac{500^2}{25^2} = \frac{250000}{625} = 400 \text{ new born babies}$$

- **Single rate**

The maternal mortality rate in a country is expected to be 70 per 10,000 live births. A survey is planned to determine the maternal mortality rate with a 95% confidence interval of 60 to 80 per 10,000 live births. The standard error would therefore be 5/10,000. The required sample size would be:

$$n = \frac{r}{e^2} = \frac{70/10000}{(5/10000)^2} = 28.000 \text{ live births}$$

- **Single proportion**

The proportion of nurses leaving the health services within three years of graduation is estimated to be 30%. A study that aims to find causes for this, also aims to determine the percentage leaving the service with a confidence interval of 25% to 35%. The standard error would therefore be 2.5%. The required sample size would be:

$$n = \frac{p(100 - p)}{e^2} = \frac{30 \times 70}{2.5^2} = 336 \text{ nurses}$$

* Modified from Kirkwood B (1988) *Essentials of Medical Statistics*. Oxford: Blackwell Scientific Publications, 1988.

- **Sampling methods**

These are methods of selecting study units of required number (i.e. equal to sample size) into your sample.

There are two main categories of sampling methods:

1) Probability sampling.
2) Non-probability sampling.

Probability sampling methods

- Probability sampling is a sampling where the probability (i.e. chance) of a unit to be selected is known.
- Probability sampling includes the following methods.

i) Simple Random Sampling

- This is a sampling method whereby each unit in the study population is given an equal chance of being selected into the sample through random selection from a list (i.e. sampling frame).
- It requires the availability and use of a list of all the units of a study population (i.e. a sampling frame must be used).
- Simple random sampling can be done by using:
  a) A lottery method (i.e. ruffle/ tombola) by picking the names blindly with replacement.
  b) Using tables of random numbers.
     - Numbers read from the table must have equal number of digits as the study population.
     - Simply select the starting point blindly, move on noting numbers corresponding to those units in the sampling frame.
  c) Use of a computer software (i.e. computer programme e.g EPI INFO, etc.).

ii) Systematic sampling

This is the choosing of a study unit (e.g. a child) after a certain specific interval of units on the sampling frame. E.g. Choosing every fifth or 10^{th} or 20^{th} or n^{th} unit depending on the sample size.

Example:

If a sample of 50 persons is needed to be selected from a study population of 2000, then every 40^{th} person is chosen i.e. $2000/50 = 40^{th}$

Procedure for Systematic Sampling

- There should be a random selection of the number to start off with within the sampling interval by lottery method, or blindly touching any such number. e.g. In the example above randomly choose one number between 1-40.

- If the starting point is number 20, the next is 60 (i.e. 20+40), 100 (i.e. 60+40), 140, etc. until 50 persons are randomly chosen from the list.
- The sequence may sometimes be of patients coming to see a doctor, or houses in a street.

Note: Where sampling frames (i.e. lists of study units) cannot be easily obtained (e.g. of patients coming to see a doctor, or of unnumbered houses) systematic sampling can useful there.

iii) Stratified random sampling.

- This is the selection of the study units into the sample by first separating them into different sub-groups (i.e. strata) e.g. male and females, and then ***separately*** randomly choosing from each stratum the required number of units which together form the sample size.

- ***Note***: The strata (i.e. domains or subgroups) can be provinces in a country, or districts in a province, or classes in a school.

- Purpose of doing Stratified Random Sampling.
  It is used when representation within each important stratum is necessary.

- Types of Stratified random sampling.
  (a) **Proportionate Stratified random sampling** i.e. Equal Probability Selection Method (or EPSEM) selects study units by equal proportion (and not number) in each stratum. i.e. **(sample size/Study population) x Number of units in stratum**)
  Example: With a sample size of 50, study population of 1000 (containing 600 men and 400 women) the number of men and women needed are calculated as follows:
  Men: (50/1000) x 600 men = 30 men
  Women: 50/1000 x 400 women = 20 women
  Sample size = 30 men + 20 women = 50 people.

  b) **Disproportionate Stratified random sampling** may select more individuals from smaller ***but important*** groups. In the above example it may be possible to take 25 women and 25 men whereby more women have been taken when proportion is considered.

iv) Cluster sampling

- This the selection of study units based on their ***geographical groupings*** i.e. clusters (e.g. village, cell, sector, district), each of which contains individuals having a variety of characteristics.
- Then some few clusters are chosen at random, and finally ***all the individuals*** of interest in e.g. infants (i.e. < 1 year old) in each chosen cluster are included in the study i.e. there is no selection of study units from the clusters.
- Therefore sampling is done at cluster level only.

Example of cluster sampling:
If you need to study malaria in children under five years of age:
- Group children on the basis of their locality e.g. villages
- Select **randomly** a few villages.
- Study **all** under 5year olds in each selected village.

Advantages of cluster sampling

- Cluster sampling is useful when the study population is widely dispersed and large, requiring a lot of effort and travel from one place to another, and making it unsuitable to use of random sampling to choose sampling units (e.g.< 5yr old children).

- Useful when there is no full list of the study population i.e. when sampling frame is not available.

Disadvantages of cluster sampling

- The sample size tends to be much larger than the resources usually available.
- Unknown geographical variations may affect the results.
- The results cannot be generalized beyond the clusters used in the study.

NB: In order to evercome the cluster effect (i.e.)design effect) multiply the sample size by 2 or 3 to compensate for simple random not done to choose individual study units.

v) Multistage random sampling

- This is the taking of samples from samples randomly in stages from a highest level until the required number of study units is obtained.
- It is an extension of cluster sampling in that there is sampling of study units in the lowest level.

Example:

If you need 100 children aged less than 5 years from one district, in one province, you could follow the following procedure:

- First randomly select one province out of the provinces of interest (i.e. higher level)
-Secondly randomly select one district out the districts of that province.
-Thirdly randomly, select a few sectors in that district.
-Fourthly randomly, select a few cells from each of the selected sectors.
-Then finally, randomly select the children as desired (proportionately or disproportionately) from the cells for the study.

Advantages of Multistage random sampling

- It produces sampling units which are geographically not dispersed.
- It is possible to reduce the sample size to suit the resources available, which is not possible in cluster sampling.

Disadvantages of Multistage random sampling

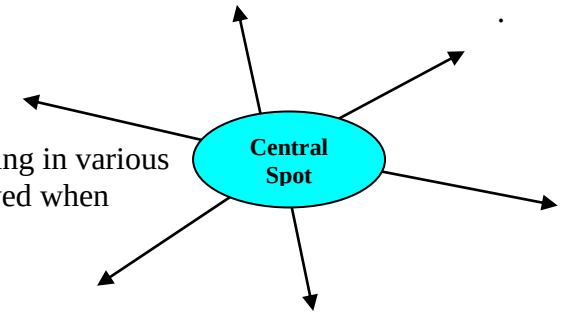
- Lists of sampling units or sampling frames (e.g. provinces, districts, villages, children) are required.
- Results can be best generalized to the study population only e.g. under five year old children (not all children); or school children (not all children)

vi) Radial sampling

This is a sampling method used in the field when there is no sampling frame (i.e. list of units of study) whereby a central spot (e.g. in a village) is chosen, and then by spinning a pen or bottle the first direction to follow is randomly identified, such that all sampling units (e.g. households) encountered on the way are chosen as a researcher moves out on a series of imaginary lines

radiating out from that central spot. The central spot could be a village office or any other land mark.

Imaginary lines radiating in various directions to be followed when sampling in a village.



vii. Combining the methods

- There is nothing wrong in combining the sampling methods. e.g. A country can be stratified by provinces and then in each province simple or multistage random sampling done to select study units.
- Sampling is ***not always necessary*** in choosing your study units. If the study population is very small, study every individual. E.g. One class of 40 students; or a few individuals with a ***rare disease*** condition in an area like children born deaf are 1 in 100,000 live births.

<u>Non-probability sampling methods.</u>

These are sampling methods whereby **the probability** (chance) of a unit to be included in the sample **is not known**. Non-probability sampling methods have the following features:

a) Used where probability sampling is not feasible e.g. where there is no sampling frame (list of study units), resources required are not available for a probability sample, which might be too large.
b) Less complicated to set up
c) Acceptable where no statistical generalizations to any population are to be made beyond the sample surveyed.
d) Used to pilot (i.e. try out) a survey before doing some probability sampling for the main survey.
e) Their accuracy relies greatly on the skill and experience of those involved.

Types of non-probability sampling methods

1. Quota sampling.
2. Dimensional sampling.
3. Convenient sampling.
4. Purposive sampling.
5. Snowball sampling.

✓ **Quota sampling**

- This is a sampling method whereby **various categories** of the study population need to be **included into the sample in relative proportions** (i.e. quota) in which they occur in the population, then the individuals from each quota are chosen by convenient sampling method. E.g. stopping and interviewing passers-by of different categories until their quotas are complete.
- Examples of categories of people in the study population: Youths, middle aged, old people, or non employed, employed, unskilled, semi-skilled, skilled, etc.

- Disadvantage of quota sampling is that there is a bias (i.e. partiality) introduced by the interviewer who might avoid certain situations like climbing hills, moving across rivers, going up stairs without lift, avoiding certain people/or favoring certain people or tarmac bias.

✓ **Dimensional sampling**

- This is an extension of quota sampling whereby various dimensions (i.e. factors) thought to be important in the survey are included and at least one representative of every possible combination of these dimensions (i.e. factors) is included. E.g. employees, their sex, and their length of stay at work. So dimensional sampling would include at least one individual in each combination of factors

  Example: 1skilled female with 2 years in the hospital.
  1semiskilled male with 1 year in the hospital, etc
- Disadvantage is as for quota sampling.

✓ **Convenient sampling.**

- This is a sampling method whereby the **nearest and most convenient persons (or other units) are chosen** to act as respondents to be interviewed (or measured) and the process continues until the sample size is reached.
- It is most frequently used in piloting (i.e. trying out) a survey before the real survey begins.
- Disadvantage of convenient sampling method
  i. It is sometimes used as a cheap and dirty way of doing a sample survey.
  ii. It does not produce representative findings.
  iii. It is probably one of the most widely used and least satisfactory methods of sampling.

✓ **Purposive sampling.**

- This is a sampling method whereby the units to be chosen (e.g. persons, households, etc) for the study sample, **depend on the interest of the researcher** or the uniqueness (i.e. importance) of the unit.
- That is, the person is chosen because of some reason e.g. because the person is a leader in the village, or is in charge of a health center in the area. A water well can be chosen because it is the most used.

✓ **Snowball sampling.**

- This is a special type of purposive sampling in which it is difficult to identify members of the group of interest in the population because of their clandestine (i.e. secretive) activities like prostitution, drug using, banditry, etc.

- Therefore, one or more individuals from the group of interest (e.g. prostitutes) is chosen, and after they have been interviewed, they are used as informants to identify and bring other members of that group to be interviewed as well.

✓ **Conclusion on sampling**

- Where possible consult a statistician or an epidemiologist for assistance with sampling.
- Before sampling, mapping of the study area and doing a study population census may need to be done to get sampling frames, but they can increase the cost of the study.

3.4. 14. DATA COLLECTION

Data collection is a systematic gathering of a particular type of information (i.e. data) by using certain procedure(s) (i.e. methods) from a study sample depending on the type of variables and objectives of the study).

o Types of variables (i.e. characteristics)

- The type of data collected depends on the nature (i.e. type) of a characteristic (i.e. feature) measured or observed. ***The characteristic that is measured in a study is called a variable.***

- There are **Quantitative** and **Qualitative** variables which are further categorized as follows:

Quantitative (or numerical variables)	**Qualitative (or categorical variables)**
• ***They are <u>numerical</u>:*** i.e. they contain measurements in numbers that can be used to find the mean (i.e. average). • **<u>Numerical variables include</u>** i. <u>Discrete variables</u> These have whole numbers (i.e. no decimals) e.g. Number of cases of malaria can be 0, 1, 20 or more, not1.1, or 5.5. (ii) <u>Continuous variables</u> These have measurements that are continuous including decimals. e.g. Age (5.5years), height (1.2 metres), weight (30.78 kg).	• ***They are <u>Non-numerical:</u>*** i.e. they contain **<u>no</u>** <u>measurements</u> in numbers that can be used to find the mean (i.e. average). • **<u>Non-numerical variables include</u>** i. <u>Nominal</u> variables e.g. names of place of birth, ethnic group, type of drug. ii. <u>Binary variables</u> e.g. Age (Old or young), height size (tall or short), weight (heavy or light), sex (male or female), patient (survives or dies). iii. <u>Ordinal variable</u> i.e. arranged in a certain order one over the other e.g. Agreement can be 1= strongly disagree 2= disagree 3= neutral 4= agree 5= strongly agree

	or 1st =Karongi 2nd = Muhanga 3rd = Rusizi

- **Types of data (**singular =datum), (plural = data, not datas).

- The data collected can be divided into two categories: Quantitative data and Qualitative data
- **<u>Quantitative data</u>** contain numbers from measurements of quantitative variables**.**
- **<u>Qualitative data</u>** contain no numbers that can be used to get the mean, and are obtained from qualitative variables.

- **Data collection procedures (methods)**

Before starting the actual collection of data make sure you are well prepared as follows:

1. Decide on the information that will be collected e.g. what variables are to be measured /observed?
2. How are the measurements going to be taken?
3. How much data is needed?
   i.e. What is the essential minimum data? Do not collect so much information unnecessarily because it consumes more resources). The actual amount of data needed will depend on the nature of study and statistical analysis to be used.
4. How are specimens going to be collected, identified, stored, and which tests are to be performed ?

5.All information about an individual(including laboratory data) must be recorded as quickly as possible on to a single form, if forms are many they must be stapled together before or soon after.

6.Make sure the data collection form or questionnaire has two sections:

(i) Identification of the individual studied/or community
   e.g. Sex, age(group), name of village (residence), level of education, level of income, number of children, etc. depending on the nature of the study.

(ii) Data section
   i.e. section onto which to record answers from the research questions

7. Data collection forms must be prepared and piloted (i.e. tried out) sometime before gathering of the data. The pilot study (i.e. pre-testing) makes it possible to correct the form accordingly. The rule is: NO PILOT STUDY, PROBLEMS AHEAD.

- **Methods of enquiring for information from people i.e. Social enquiry research methods.**

These include:

i) <u>Observation</u>

This the finding out by only watching. Observation can be divided into

- Participant observation whereby the researcher participates in the activities being studied
- Structured observation whereby the researcher does not participate in the activity being studied.

ii) Interviewing

- This can be personal face-to-face or voice- to- voice (on telephone) interaction. They use questionnaires, which are forms with preset questions to be answered by the respondent.
- Interviews can be divided into
  a) Fully structured interview
     i. Here the questions are set earlier, and the possible responses are also written earlier. The interviewer or interviewee chooses and ticks accordingly.
     ii. The order of questions must be followed.

  b) Semi structured interview
  Here the questions and answers have been determined but their order can be changed, or some questions can even be skipped (i.e. left out) during the interview.

Example of semi-structured questionnaire:

APPENDIX 1: PRIMARY **SCHOOL *QUESTIONNAIRE* FOR WATER AND SANITATION FACILITIES IN 4 PROVINCES IN RWANDA**

INTRODUCTION

The government of Rwanda wishes to have information on the status of water, sanitation and hygiene in the Primary Schools. For that purpose, Schools of nursing and midwifery in collaboration with UNICEF and the programme of HAMS (*Hygiene et Assainissement en Milieu Scolaire i.e Hygiene and Sanitation in the School Environment),* is carrying out an assessment to collect such information. Your school is one of the few that were randomly selected to represent other schools. We believe that your participation in this study will eventually help not only your school but also other schools, people in the villages and other communities.

IMPORTANT: PLEASE ASK QUESTIONS *AS THEY ARE*, to avoid confusion, and wasting of time!

SECTION A. *SOCIAL DEMOGRAPHIC INFORMATION OF THE SCHOOL/HAMS COMMITTEE*

NB:Interview Headteacher or someone representing him [BE SEATED].

Time of Starting the Interview/Observation: ……

1. ID No. of School (***to be completed later during data coding)*** **.....**
2. Name of Observer/Interviewer**.....**
3. Date of Observation/interview**.....**
4. Province ……..
5. District……..
6. Sector…….....…….
7. Name of School...…….....…….
8. Year of registration of School…….
9. Status of School……(1= State, 2=State Supported, 3=Private Religious funded, 4=Private Parents Association, 5=Private for Profit).
10. Number of Pupils in Class 1……..Boys…….Girls…….

    Class 2……..Boys…….Girls…….

    Class 3……..Boys…….Girls…….

    Class 4……..Boys…….Girls…….

    Class 5……..Boys…….Girls…….

    Class 6…….....Boys…….Girls…….

10b. Total Number of Pupils ……

11. Number of Classrooms …….

12. Number of Teachers ……., Female teachers ……., Male teachers ……

13. Most of the pupils come from how far to the school?……..km

14. What is the farthest distance traveled by a pupil from home to school?……..km.

15. HAMS* Committee Present at School ……

16. HAMS* Committee Present at level of District …….(1=Yes, 2=No, 3=Don't know)

17. HAMS* Committee Present at level of Province …….(1=Yes, 2=No, 3=Don't know)

**Hygiène et Assainissement en Milieu Scolaire (Hygiene and Sanitation in the School Environment).*

SECTION B: INFORMATION ABOUT A COURSE ON ELEMENTARY SCIENCE AND TECHNOLOGY

{[CONTINUE WITH THE HEADTEACHER/TEACHERS], BE SEATED}
NB: Ask the teacher(s)

1. Is the course of "ELEMENTARY SCIENCE AND TECHNOLOGY" taught in this school?…….*(Y/N)*
2. If "No" why not?.....
   If "Yes" go to 3.

[NB: Limit your questions to the following topics only: Environmental sanitation, Hygiene, and Water education*]*.

3. Content of course
   i) Are the following topics taught?
   - Environmental sanitation…….*(Y/N)*

   If "Yes" to which classes……
   If No",why?.....
   .....

   - Hygiene ……*(N/Y)*

   If "Yes" to which classes……..
   If "No", why?.....
   .....

   - Water education ……*(Y/N)*

   If "Yes" to which classes……
   If "No", why? .....
   .....

THANK YOU VERY MUCH FOR YOUR KIND COLLABORATION

TIME YOU FINISH THE INTERVIEW……

c) Unstructured (completely informal) interview

The interviewer has a general idea of the area (i.e. subject) of interest, but lets the conversation develop naturally around the subject.

- It uses question guide: A list of the questions that can be used to guide thediscussion.

- **How to carry out structured and semi-structured interviews**

- **Appearance**:-Dress in a way similar to those you will interview. Otherwise be neat and neutral.
- **Approach**: -Be pleasant (i.e. nice)
- **Knowledge of content of questionnaire**: know your questionnaire very well.
- **Wording**: Use exact words and questions on questionnaire and keep their sequence (as applicable).
- **Answers**: Record answers exactly as they are given.
- **Probes**: Use standard probes only. Probes are devices (i.e. ways or means) used by interviewer for the respondent to give more information. They include:
  i. A period of silence
  ii. An enquiring glance (i.e. questioning look)
  iii. Mmhhmm …
  iv. Repeating back all or part of what was said by the respondent.
- **Personal conduct / behaviour**

  - Do not ask for ***any*** *favours* e.g.drinks, food etc.

  - Do not ask questions unrelated to the work you are doing. "Remember to ask is to promise".

iii) Self administered questionnaire

- Here the respondents fill in the questionnaires by themselves.
- This method saves time, effort, and money.
- Disadvantage is that honesty; seriousness of respondents may be very little, some respondents may not be able to read and write.
- The researcher can use questionnaire to interview respondents where most cannot read or write

3.4.15 SPECIMEN COLLECTION

- Specimen should be collected, labeled, preserved accordingly, and batch analysis done.

3.4.16 ETHICAL CONSIDERATIONS

Make a statement on official permit to be given to do the study, also on informed consent of study individuals.

What are ethical issues in research?

- Ethical Issues include the principles that are considered correct both technically and morally in the process of doing research.

- Guidelines on health research ethics are contained in the Declaration of Helsinki established in 1964 by the World Medical Assembly in Helsinki Finland

- They form what is called a Code on human experimentation and contains principles that safeguard the person on whom research is done.

- The Code has been amended to incorporate research aspects conducted in developing countries.

- The new document is called "International Ethical Guidelines for Biomedical Research Involving Human Subjects. It is described by the "Council for International Organizations of Medical Sciences" (CIOMS, 2002).

    - **Research on Human Subjects includes**

i. Medical Research Combined with professional care (Clinical Research)
ii. Non-Therapeutic biomedical research involving human subjects (Non-clinical biomedical research)

Basic principles on medical/health research ethics apply to both of these types of research

Examples of Research involving human subjects

- Studies of a physiological, biochemical or pathological process, or of the response to a specific intervention – whether physical, chemical or psychological – in healthy subjects or patients;

- Controlled trials of diagnostic, preventive or therapeutic measures in larger groups of persons, designed to demonstrate a specific generalizable response to these measures against a background of individual biological variation;
- Studies designed to determine the consequences for individuals and communities of specific preventive or therapeutic measures; and

- Studies concerning human health-related behaviour in a variety of circumstances and environments.

➢ **The CIOMS *(i.e. Council for International Organizations of Medical Sciences*) Health Research**

Guidelines relate mainly to:

i. Ethical justification and scientific validity of research;
ii. Ethical review of research proposals before implementation
iii. Informed consent of the persons to be studied must be voluntary.
iv. Vulnerability - of individuals, groups, communities and populations involved in the study. Vulnerable groups includes children, the mentally infirmed, the elderly, the poor, prisoners, students, etc.
v. Women as research subjects as well as special considerations for pregnant women but not being excluded on the basis of their gender.
vi. Equity regarding burdens and benefits of research between different groups of people to be studied
vii. Choice of control in clinical trials
viii. Confidentiality of the study procedures and persons involved as subjects;
ix. Compensation for injury of persons being studied
x. Strengthening of national or local capacity for ethical review;
xi. And obligations of sponsors to provide health-care services to the communities being involved in the study.

For more details see the following reference: CIOMS (2002)

Example of Informed Consent form:

Informed Consent form

Title of Research:
You are invited to participate in a study of
……..
We hope to learn ***(State what the study is designed to discover or establish).*** You were selected as a possible participant in this study because ***(State why and how the subject was selected.)***

Before agreeing to participate in this research study, it is important that you read the following explanation of this study. This statement describes the purpose, procedures, benefits, risks, discomforts, and precautions of the program. Also described are the alternative procedures available to you, as well as your right to withdraw from the study at any time. No guarantees or assurances can be made as to the results of the study.

Explanation of Procedures
This research study is designed to examine ……
Participation in the study involves completion of a short demographic data collection sheet and an interview, which will last for approximately one hour. The interview will be conducted at a setting that is mutually agreeable to the participant and the researcher.

Risks and Discomforts
There are no risks or discomforts that are anticipated from your participation in the study. Potential risks or discomforts include possible emotional feelings of sadness when asked questions during the interview.

Benefits
The anticipated benefit of participation is the opportunity to discuss feelings, perceptions, and concerns related to the experience of parenting a hospitalized preterm infant.

Alternative Treatments
Because this study does not involve specific treatments or procedures, there are no known alternative treatments to participating in this study.

Confidentiality
The information gathered during this study will remain confidential in a locked draw during this project. Only the researcher will have access to the study data and information. The participant's names will not be available to any-one else. The results of the research will be published in the form of a paper and may be published in a professional journal or presented at professional meetings. The information will us to better understand how to provide quality services.

Withdrawal without Prejudice
Participation in this study is voluntary; refusal to participate will involve no penalty. Each participant is free to withdraw consent and discontinue participation in this project at any time without prejudice.

Full name of Participant

Signature of Participant Date

Full name, address, and phone number of Researcher

Signature of Researcher Date

3.4.17 STUDY PROBLEMS AND LIMITATIONS.

Mention important challenges met. These include Problems and limitations that can adversely affect your research and the conclusions and recommendations you make. This would pre-empt (i.e. avert) questions and doubts when the work is done and the results are given.

i. Problems:

These are logistical constraints you might encounter. E.g.

a) Securing permission to do the study,
b) Availability of data,
c) Transport problem,
d) Consent to participate in the study,

e) High number of people dropping out of the study,
f) Unwillingness to give some samples
g) Difficulty in obtaining information on sensitive and/or private matters
h) Shortage of funds

ii. Limitations

These are technical aspects that are not expected, or are not considered to be the best under normal conditions with that type of study but have to be used for some stated reasons. E.g.

a. Smaller sample size
b. Different sampling method
c. Different study design e.g. data collection without first doing a baseline survey

3.4.18 DATA ANALYSIS.

Decide on who will assist you in quantitative and qualitative data analysis and involve them during the design of the study and not after data collection.

Proposal section on Data Analysis

In a proposal, just mention how you will analyse the data, which variables are you going to compare, and the computer software you will use. That is all.

Research Report Data Analysis

Research report writing will involve actual data analysis.

A. Analysis of quantitative data

1. Create a computer database. E.g. using EPI-INFO software or Excel, SPSS, STAT etc.
2. Enter data into the computer.
3. Clean and validate of data. Simple analysis of data to show frequency of each variable may show errors done during data collection or data entry into the computer.
4. Always have a list of specific type of analyses to be done based on each of your objectives
5. Do analysis to show summary statistics. E.g. mean, median, mode, range, interquartile range, variance, standard deviation, and standard error.
6. Graphical presentation of the results may be done by using:
    a. Standard deviation error bars
    b. Univariate scatter diagrams.
    c. Box and whiskers plots.
    d. Histograms, etc
7. Do further data analysis to show associations or correlations between variables.
8. Record your interpretation of the results. Write on a separate sheet the following questions.
    i. What do the results mean?
    ii. Are they a new finding? If not new do they agree with previous findings or not?
9. What are the implications of these results?

On answering these questions you will be writing a discussion of your results and making recommendations.

B) Analyze qualitative data manually or using soft wares of computer e.g. by content analysis, TEXT BASE ALPHA, TAP (Text Analysis Package), Ethnograph, etc.

3.4.18 "PRESENTATION OF RESULTS" OR "RESULTS AND DISCUSSION"

- This is ***Chapter Four*** in the Research Proposal or Research Report, but the *naming is different*.
- In Research Proposal it is called **"Presentation of Results"**
- In Research Report it is called **"Results and Discussion"**

Research Proposal and Chapter 4: "Presentation of Results":

In a proposal, indicate how data will be presented by including dummy tables. Dummy tables are tables without data but with titles.

E.g. Table 1: Marital status of the respondents

MARITAL STATUS	NO.OF RESPONDENTS	PERCENT
Married		
Single		
Divorced		
Widow		
Widower		
Separated		
TOTAL		

Research Report and Chapter 4: "Results and Discussion"

- Present your results as tables or figures. Avoid presenting a certain aspect of your results as a table as well as figure.
- Always introduce your results with a statement.
- Point out important finding (i.e. result)
- Also do interpret your data. (i.e. Answer questions you find raised by the result). What you think might be the reasons of discrepancy from standards.
- Relate your results, which other peoples work, or your previous work, and established standards

Example 1on results and discussion:

TABLE 3.1.7: LEVEL OF EDUCATION OF THE RESPONDENTS

LEVEL OF EDUCATION	*NO. OF RESPONDENTS*	*PERCENT*
Primary School	*770*	*58.3%*
Secondary School	*101*	*7.6%*
University/college	*7*	*0.5%*
No formal school	*443*	*33.5%*
Total	***1321***	***100.0%***

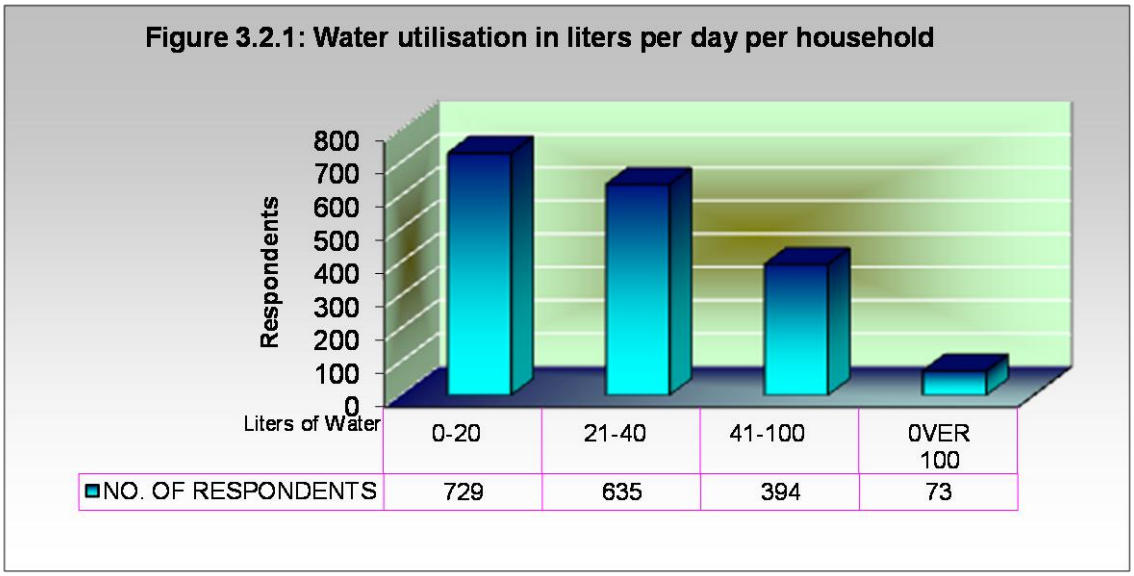
Table 3.1.7 presents the levels of education of the respondents. About 58.3% had primary education while 33.5% of the respondents had no formal education. This high level of lack of formal education may suggest that practicing hygiene and sanitation could be fairly negatively affected, but it remains to be seen from the results.

Example 2 on Results and Discussion

3.2: Availability of Portable Water in Households

About 39.8% (729/1831) of the households used 20 litres or less of water per day which is considered not adequate (Figure 3.2.1). Twenty litres is the minimum quantity of water recommended for one person per day (WHO/SDE/OEH/99.10, 1999).

Figure 3.2.1: Water utilisation in liters per day per household



3.4.19 CONCLUSION AND RECOMMENDATIONS

- **Research Report**

In a Research Report there is Conclusions and Recommendations.

- Accept or reject your hypothesis (if it was there).
- Conclusion on the basis of your interpretation of the data results.
- Try to confine conclusions to your study population.
- Make recommendation on the basis of your results, not just on what you feel is useful.
- Suggest areas for future research

Example of Conclusion and Recommendations:

- *There is a need to make available potable water to the communities studied.*
- *Sensitization is required for all the people to use latrines*
- *Good VIP latrines need to be promoted in the households, Public places and in schools*

3.4.20 REFERENCES; BIBLIOGRAPHY

List them accordingly. (i.e. Alphabetically or numerically)

1. **Referencing** is a standard way of acknowledging the sources of information (e.g. books, publications from journals, etc.) that you have used in preparing your document. Referencing serves two main purposes:
   i) To avoid plagiarism and
   ii) To enable the readers to access the referred sources for more detailed information.

2. **Two basic components of a referencing system**

Although there are many ways of making references, they all have two basic components. These are:

i) **In-text citations**: These are the sources of information mentioned in the text of your document e.g. (Mpagazekubwayezu, 2004), or [1], or (1).
ii) **List of references**: A list of all the sources of information mentioned in the text that is given towards the end of your proposal after the section on "Presentation of Results".

3. **Three common referencing systems**

There are three commonly used referencing systems. These can be used *only one at a time and not mixed in the same Research Project* (i.e. in the same document). They include:

1. **Harvard Referencing System**
2. **Vancouver Referencing System**
3. **Footnote Referencing System**

The three systems are allowed for proposal writing. However, they do differ in the ease with which they can be applied as described in the Table below. ***A more detailed treatment of the three systems can be found in the Schools of nursing and midwifery Referencing Manual or from the Internet after typing and searching for the name of either of the referencing systems.*** Please pay much more attention to the format for **electronic references** as well as to the information obtained from the World Wide Web.

Table to show the main features of three Referencing Systems

REFERENCING SYSTEM	ALSO CALLED	FEATURES OF THE SYSTEM
1. Harvard System *(Much Easier to use and most recommended)*	Author-Date System	a) Cites references by the **Authors names** and **Year** in the text. b) It follows the **alphabetical** order of authors' names without numbering them in the **reference list**. c) **Full citation of a book in the reference list:** Authors, Year of publication. *Title of book,* Place of publication, Publisher,. Page numbers.

		d) **Full citation of a Journal Article in the reference list:** Authors, Year, Name of article, *Name of Journal*, Volume No., Page numbers.
2. Vancouver Style *(A little <u>harder to use</u> since numbers have to be changed if and when a reference is added to or removed from the middle of the text).*	Citation Order System	a) Cites references **by number** in the order in which they appear in the text, e.g. as superscript [1], or in brackets (1). b) The **first reference** to be cited becomes number (1) in the **text** and in the **reference** list. c) **Does not** follow the alphabetical order of authors' names in the reference list. d) **Full citation of a <u>book</u> in the reference list:** Authors, Year of publication, *Title of book*, Place of publication, Publisher. Page numbers. e) **Full citation of a Journal Article in the reference list:** Authors, (Year), Name of article, *Name of Journal*, Volume No. Page numbers f) **Numbers have to be changed accordingly** whenever a reference is removed from or added in the middle of text.
3. Footnote Style *(Much <u>harder and more tedious to use</u> since numbers have to be changed if and when a reference is removed or added), and it is double work to write the footnote <u>and then the reference list</u>)*	Oxford System	It is as in **Vancouver** style, but: **a)** The references are **first** written as **footnotes** (i.e. at the bottom of the page on which they appear). **b)** In the footnote Authors' starts with an Initial and not the Surname e.g [7]A. Kanyana. 2000. The Importance of ICT. *ICT Review*, Vol. 5, pp 4-5 **c) In the Reference list** references are listed **<u>alphabetically</u>** without numbering them starting with the Surname and not the Initial, e.g. Kanyana A. 2000. The Importance of ICT. *ICT Review*, Vol. 5, pp 4-5 **d) Numbers have to be changed accordingly** whenever a reference is removed from or added in the middle of text. **e) Can use Latin abbreviations to shorten second or subsequent refereces.E.g.** i. *ibid (ibidem) i.e.*Found in the same work (e.g. book, paper) as just cited above • Use "ibid"when two ***successive*** citations come from the same source e.g. same paper or same book. ii. *loc. cit* (*loco citato) i.e.*Found in the same place (page) as just cited above (in preceeding reference) iii. *op. cit (opere citato)* i.e. The citation is from the work already cited but which is not just

		preceeding (i.e. not immediately above) it. Provide some details e.g Authors name, to help identify the document referred to. e.g. [5] John, *op. cit.* p. 12. **Examples of use of *ibid, loc cit.* and *op. cit.*** [3] A. Kanyana. 2000. The Importance of ICT. *ICT Review,* Vol. 5, p. 4. [4] *ibid*., p. 5. (Note that *ibid* indicates that this citation is from the same reference as 3 above but from page 5 and not page 4). [5]*loc. cit.* (Note that *loc. cit.* indicates that we are still referring to A. Kanyana page 5 in reference 4 above). [6]R. Ross. 1910. *The prevention of malaria*, London, John Murray. p. 15 [7] A. Kanyana *op. cit.* p. 3. (This *op. cit.* refers to the same article by A. Kanyana as number 3 above but to page 3 and not page 4).

3.4.21. APPENDICES (I.E. ANNEXES): *FOR THE RESEARCH REPORT*

- **For the Research Report** annexes follow immediately the reference list and ***mark the end of the research report.***
- An annex is an attachment of some document with important information. These annexes may include:
  - Questionnaires used (a blank ones)
  - Some maps, if any.
  - Permit to do the research.
  - Informed consent, etc.

WORK PLAN OF THE PROPOSAL

A proposal must have a work plan. ***It follows the reference list in the written proposal.***

A work plan is a time frame with specified dates in which the research process is expected to begin and end. It lists i) all the **main** activities, ii) dates they shall be done, iii) responsible persons, and iv) person-days. The person-days are eventually used in the calculations for the budget.

Example of a Work Plan

TASKS TO BE PERFORMED	DATES TO BE COMPLETED	PERSONNEL ASSIGNED TO TASK	PERSON DAYS REQUIRED.
Research Proposal preparation and submission.	Week 1-8 1 Jan-25 February	**Names** of (e.g. 2) person(s) to be involved	2 persons x 24 days =48
2. Ethical clearance and permission to do the work	Week 9-10 1-14 March	**Name** of (e.g. 1) person to be involved	1 person x 14 days =14
3. Community contact to orient members on project.	Week 11-14 15-31 March	Etc.	Etc.
4. Pre-testing and finalising research instruments e.g. questionnaires.	Week 11-14 15-31 March		
5. Data Collection (Fieldwork)	Week 15-24 1 April-31 May		
6. Data coding, and entry into computer	Week 25-28 1-30 June		
7. Data analysis	Week 29-30 1-14 July		
8. Report Writing (First Draft)	Week 31-34 15 July-14 Aug		
9. Report Presentation (Workshop)	Week 35 15 Aug		
10. Report Writing (Final draft)	Week 36 16-31 Aug		
11. Submission of Final Report	Week 37 1-7 Sept		
12. Feedback to the Community	Week 38 8-14 Sep		

GANTT CHART

This is a chart that lists the main activities shown in the Work Plan and displays **diagrammatically** the period during which each task begins and ends. It does not show number of persons, or person-days involved.

Example of the Gantt Chart

TASK TO BE PERFORMED	Year 1								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1.1 Finalise Project 1.2 Project for submission.	xxxx	xxxx							
2. Ethical clearance and permission to do the work			xx						
3. Community contact to orient members on project.			xx						
4. Pre-testing and finalising research instruments e.g. questionnaires.			xx						
5. Data Collection (Fieldwork)				xxxx	xxxx				
6. Data coding, and entry into computer						xxxx			
7. Data analysis							xx		
8. Report Writing (first draft)							xx	xx	
9. Report Presentation Workshop								x	
10. Report Writing (Final draft)								xx	
11. Submission of Final Report									x
12. Feedback to the community									x

BUDGET

A detailed budget for running the project to the end must be shown. A budget is the systematic enumeration (listing in detail) of the anticipated costs of the planned inputs and activities of the project. Make sure each request is directly related to the **Work Plan** already described.

Example of a Budget

I. Preparation for the study

Nº	Item	No. of Persons	No. of Days	No. Person-days	Cost/Unit (RWF)	Total RWF
1						
2						
	Sub-total 1					

II . The survey

Nº	Item	Persons/ Materials	No. of days	Person-Days	Unit Cost (RWF)	Total (RWF)
	Sub-total 2					

III. Study supplies

Nº	Item	Quantity	Unit Price RWF	Total RWF
1	Note Books A4			
2	Identification Cards			
3	Clipboards			
4	Pencil			
5	Bic			
6	Rubber eraser			
	Etc			
	Sub – total 3			

IV. Production of the report

Nº	Item	Quantity	No. of days	Pers.-days	Unit Price RWF	Total RWF
1	Crosscheck & Verification of					

	data					
2	Entering Data					
3	Analysis of Data					
4	Report (Draft 1-3)					
	Sub – total 4					

V. Workshop for report validation

Nº	**Item**	**Quantity**	**NO./Days**	**Pers-days**	**Unit Price RWF**	**Total RWF**
1						
2						
	Etc.					
	Sub–total 5					

VI. BUDGET SUMMARY

Nº	**DESCRIPTION**	**TOTAL**
1	Preparation for the Study	
2.	The survey	
3	Study supplies	
4.	Production of the Report	
5	Workshop for report validation	
	TOTAL BUDGET	

VII. BUGET JUSTIFICATION

It involves describing explicitly each and every budget line to show the way it is related to the study activities.

Example:

I expect to go to the study village five times to complete data collection. Each round trip costs RWF 2000 by hired motorcycle. This will need a total of RWF 10,000.

PROFILE OF THE APPLICANT AND THE INSTITUTION

a. A curriculum vitae (CV) of the applicant

Make sure you attach your Curriculum Vitae on the Research Proposal. A curriculum vitae is a profile of the Principal Investigator and other key investigators, highlighting his/her achievements in the proposed or similar projects (i.e. ones track record). One page CV is adequate. Example of a format for CV is shown in the Table below.

Example of a short curriculum vitae

CURRICULUM VITAE of APPLICANT, PARTNER(S) and COLLABORATORS *(1 page <u>each</u>)*	
1.Surname:	Date of birth:
First name(s):	Nationality:
2. Academic Profile*: Qualification, School or University, Year*	
3. Posts held: *Work experience*	
4. List full bibliographic references of the five most important publications over the last five years.	

b. <u>Institutional Profile</u>

<u>Introduce</u> the investigator's <u>institution</u> by for example citing or attaching: the institution's enabling act (law), a suitable annual report, a brochure on the institution or similar documentation. Alternatively, you may attach a paper describing the nature of the institution, its legal mandate, number of staff and proportion of professional staff, the budget and its sources, the institutional vision and goals, the key areas of operation and the recent achievements.

3.3.22. <u>ANNEXES (or APPENDICES): *FOR THE PROPOSAL*</u>

- **<u>For the Proposal</u>** annexes follow immediately the ***Institutional Profile*** and ***<u>mark the end of the Proposal</u>***

- Attach all the instruments (i.e. forms for data collection, e.g. questionnaire) that will be used, Authority to do research, Informed consent forms and other relevant documents.

<u>PREPARING A SUMMARY</u>

- It is written ***<u>LAST</u>*** and ***placed <u>just before Table of Contents</u>*** according to SCHOOLS OF NURSING AND MIDWIFERY guidelines
- It must contain 150-200 words**.**
- It must be concise (i.e. short and clear) but comprehensive covering all major aspects of the research including the Background to the study, Problem Statement, Objectives, Research question or Hypothesis, Significance (Rationale), Methodology, Presentation of Results or

Results and discussions, Conclusions and Recommendations depending on whether it is a Proposal or Research Report . Give sub-headings in bold for the different sections.

3.4.23. GENERAL PROCEDURES FOR PRESENTING RESEARCH WORK

PRESENTING THE PROPOSAL OR RESEARCH RESULTS

- **Research work** (i.e. Research Proposal or Research Results) can be presented somewhere to make it **known** to others.
- A **Proposal** can be presented somewhere for the following reasons:
    i. To seek for funding
    ii. So that others may not spend time and other resources on the same work
    iii. To get ideas from other researchers
    iv. For getting marks when it is part of a qualification requirement

- A **Research Report** can be presented somewhere for the following reasons:
    i. To report to agency that provided the funding
    ii. To inform others the results and challenges so that they can do more research
    iii. To inform the practitioners providing services about the findings so that they can consider improvement in the methods they use, or plan using the new results presented.
- **Presentation of Research Work (Proposal or Research results) can be done in two ways:**
    (i) As written documents
    (ii) Orally (This **can** apply to both Research Reports and Proposals but not always). **In Schools of Nursing and Midwifery, *Proposals are not presented orally.***

WRITTEN DOCUMENTS

All written documents follow the format that suits the audience (e.g. people) to where it is sent.
Written documents include:

i. Research Report (Bachelors degree), Dissertation (Master's), Thesis (PhD)
ii. Proposal for Advanced Diploma
iii. Papers for publication in journals
iv. Technical reports to funding agencies e.g. UNICEF, WHO, etc, or policy makers.

Research Report and Proposal

The structure of a Final Year Research Report depends on the guidelines laid down by the concerned authority like a training institution. These guidelines must be strictly followed.

Papers for a Scientific Journal

- A paper for a scientific journal must follow the style and meet the requirements of the *journal concerned. E.g. African journal of Nursing and Midwifery*
- Different journals can have different styles e.g. of references etc.
- However most parts of the paper are almost similar to those of the research report. But a paper is usually shorter comprising of only a few pages e.g. 10.
- Always first check on the "Instructions to authors" of the journal to which you want to submit (i.e. send) your paper for publication.

Technical reports to funding agencies e**.g. UNICEF, WHO, etc, or policy makers**.

- The format of writing the technical reports depends on the agency to which it is to be submitted.
- Most agencies have their own formats. E.g. UNFPA format may differ from that of UNICEF, etc. Ask for the format before you write the report.

3.4. 24. ORAL PRESENTING OF A RESEARCH WORK

This is the physical oral presentation of your findings to an audience (i.e. public)

- Make sure you attend other oral presentations before hand (i.e. early) to learn the tricks and traps.
- Prepare your presentation on power point or slides or transparences.
- Time your presentation (by doing some practice through mock presentation with your colleagues) to make sure it does not exceed the time allowed.
- Learn before hand how to use LCD projector, overhead projector, or slide projector and the specific computer you would use. Computers differ in the location of settings.
- Make sure the quality and size of letters (e.g. font, and letter size) can be easily read by those attending.
- N.B. Font size 24 is normal. Making your figures colorful interests people.
- Avoid mannerisms, which can be distracting (i.e. diverting people's attention) from what you are saying. i.e. Avoid scratching, biting your mouth, facing one side only, touching you nose or eyes,etc,
- Dress smartly and try to be confident.
- In responding to questions make sure you have heard or written the questions down.
- Thank the person who has asked the question before you answer.
- Answer your questions in a relaxed manner to (i.e. calmly) without considering how the question was asked.
- Confine your answers to the study you have done. Avoid undue (unnecessary) generalizations.
- Make sure you write down the important comments you get from the audience. You may appoint someone beforehand to write them down for you. Incorporate the good comments in your report.

The End.