UNIT ONE: INTRODUCTION TO RESEARCH

1.1 Definition of Research

The word research consists of two syllables, re and search. 'Re' means again and 'search' means to examine closely and carefully. Research can hence be defined as a systematic investigation to generate new knowledge or solve a problem. By systematic investigation, it implies that research follows a structured inquiry that utilizes acceptable scientific methodologies to establish facts. The new knowledge generated through research may help in describing, predicting, understanding and explaining social and natural phenomena.

Grinnel (1995) defines research as a structured inquiry that utilizes acceptable scientific methodologies to solve problems and create new knowledge that is generally acceptable. Burn (1994) states that, research is a systematic investigation to find an answer to a problem. On the basis of these definitions, we can conclude that research is an organized inquiry designed and carried out to provide information. Through research, we are able to discover new information to expand on existing knowledge. Sometimes we may think we already know the answer to our question or may think the answer is obvious. But until we have subjected our problem to rigorous scientific scrutiny our knowledge remains little more than guess work or at least intuition.

1.2 Characteristics of Research

From the definition, it is clear that research is a process of collecting, analyzing and interpreting information to answer questions. However, to qualify as research, the process must have certain characteristics: it must as far as possible, be controlled, rigorous, systematic, valid and verifiable, empirical and critical.

1. ***Controlled***. In real life there are many factors that affect an outcome. A particular event is seldom the consequence of a one to one relationship; most outcomes are caused by a multiplicity of relationships and interacting factors. In the study of cause and effect, it is important to be able to link the effect (s) with the cause (s) and vice versa. In the study of causation, the establishment of this link is essential; however, in

practice, particularly in social sciences, it is often difficult to make this link. The concept of control implies that in explaining causality in relation to two variables, you should set up your study in a way that minimizes the effects of other factors affecting the relationship. This can be achieved to a large extent in the physical sciences as most of the research is done in the laboratory. However, in social sciences like Public Administration and Political Science, it is extremely difficult as research is carried out on issues relating to human beings living in society where such controls are impossible. Therefore, in social sciences, as you cannot control external factors, you attempt to quantify their impact.

2. ***Rigorous***. Research requires strictness in ensuring that the procedures followed to find answers to questions are relevant, appropriate and justified. Again the degree of rigor varies markedly between physical and social sciences and within the social sciences.
3. ***Systematic***. This implies that the procedures adopted to undertake an investigation follow a logical sequence. The different steps cannot be taken in a haphazard way, some procedures must follow others.
4. ***Valid and Verifiable***. This implies that whatever you conclude on the basis of your research findings is correct and can be verified by you and other.
5. ***Empirical***. This means that any conclusions drawn are based upon hard evidence gathered from information collected from real life experiences or observations.
6. ***Critical***. Critical scrutiny of procedure used and methods employed is crucial to a research inquiry. The process of investigation must be clear and free from any drawbacks. The process adopted and the procedures used must be able to stand critical scrutiny.

1.3 Types of Research

Research can be classified from three perspectives namely: application of the research study; objectives of the research; and inquiry mode employed.

1. ***Application***. When you examine a research endeavour from the perspective of its application, there are two broad categories: pure research and applied research

a. Pure Research. Pure research is concerned with the production of new knowledge and not the application of its outcomes. It is intended to acquire knowledge for its own sake. An example of this could be dissertations and theses which students submit as partial fulfillment of their study program. Other examples of pure research include developing a sampling technique that can be applied to a particular situation, developing a methodology to assess the validity of a procedure, developing a theory or framework that can be used in research, developing an instrument to measure stress levels in people and finding the best way to measure people's attitude. Pure research fulfills the academic objective of research, which relates to the generation of new knowledge.

b. Applied Research. This is the kind of research that places emphasis on application of knowledge acquired and problem solving. Most of the researches in social and physical sciences are applied; they are aimed at finding solutions to problems. Applied research fulfils the utility objective of research which relates to problem solving or policy formulation.

2. ***Objectives***. When you examine a research from the perspective of its objectives, a research endeavour can be broadly classified as descriptive, correlational, explanatory and exploratory.

a. Descriptive Research. A descriptive research attempts to describe systematically a situation, problem, phenomenon, service or program or provide information about, say, the living condition of a community, or describe attitudes towards an issue. For example, it may try to describe the type of services provided by an organization, the administrative structure of an organization, the attitudes of workers towards management, strategies put in place by an organization to improve productivity and citizens' perceptions towards politics. The main purpose of such studies is to describe what is prevalent with respect to the issue or problem under consideration.

b. Correlational Research. The main emphasis of this type of research is to establish or explore the existence of a relationship, interdependence or association between two or more aspects of a situation. What is the impact of advertising on the sale of a product? What is the relationship between technology and unemployment? What is the relationship between education and voting in an election? What is the relationship between income and job satisfaction? What is the impact of incentives on productivity of

workers? These studies examine whether there is a relationship between two or more aspects of a situation or phenomenon and are therefore called correlational studies.

c. Explanatory Research. This type of research attempts to explain why and how there is a relationship between two aspects of a situation or phenomenon. This type of research attempts to explain, for example, how does the home environment effects children's level of academic performance? Why does political violence lead to lack of interest in politics? Why do some people have a positive attitude towards an issue while others do not

d. Exploratory Research. This is when a study is undertake with the objective of either to explore an area where little is known or to investigate the opportunity of undertaking a particular research study. When a study is carried out to determine its feasibility, it is called a feasibility study or a pilot study. It is usually carried out when a researcher wants to explore areas about which he/she has little or no knowledge. A small scale study is undertaken to determine if it is worth carrying out a detailed investigation.

Although, theoretically, a research study can be classified in one of the above perspectives, in practice, most of the studies are a combination of the first three.

3. ***Inquiry Mode***. When you examine a research from the inquiry mode perspective, you look at the process adopted to find answers to research questions. Broadly, there are two approached to the inquiry mode; the structured approach (quantitative research) and the unstructured approach (qualitative research)

a. The structured Approach / Quantitative Research. The structured approach to inquiry is usually classified as quantitative research. In the structured approach everything that forms the research process – objectives, design, sample and questions that you plan to ask are pre-determined. The structured approach is more appropriate to determine the extent of a problem, issue or phenomenon. A study classified as quantitative is primarily concerned with the quantification of a problem, situation or phenomenon. Examples of quantitative research are census, labour force surveys, health surveys, election opinion polls. Quantitative research tries to answer questions like how many, how often and how much.

b. The Unstructured Approach / Qualitative Research. The unstructured approach to inquiry is usually classified as qualitative research. This approach allows for flexibility in the

research process such as the research design, sample size and the questions that you formulate to ask your respondents. The unstructured inquiry is more appropriate in exploring the nature of a problem, issue or phenomenon. A study is classified as qualitative if its purpose is to describe a situation, phenomenon, problem or event. The description of an observed situation, the historical enumeration of events, an account of different opinions people have about an issue and a description of living conditions of people are examples of qualitative research. Qualitative research tries to answer questions like who, why, where, when and how.

Some fields of study predominantly lend themselves to either quantitative or qualitative research. For example, disciplines such as Demography, Epidemiology and Psychology use more of quantitative research while History, Philosophy and Law employ more of qualitative research. However, research studies in Public Administration and Political Science can be quantitative, qualitative or both depending on the nature of the research.

1.4 Applications of Research

The following are some of the applications of research.

1. Research is key to knowledge generation. All fields of study use research in order to discover new facts which contribute to the body of existing knowledge.
2. Research aids in finding solutions to problems. It provides a base for government to formulate policies.
3. Research is useful in evaluation of policies and programmes.
4. Research is used to generate information about the nature, extent and scope of a problem, situation or phenomenon.
5. Research is main source of decision making in businesses by providing information through market research and operational research.

UNIT TWO: SCIENTIFIC CONTEXT OF SURVEY RESEARCH

2.1 The Logic of Science

In our daily lives we know things in different ways. We know that water boils at 100 degrees Celsius, that the HIV virus causes AIDS, that Democracy is better than Dictatorship, that lack of motivation affects workers productivity. In some cases we know something because we believe what we read in the media or hear on the radio. In some cases, we know something through personal experience or because it is consistent with common sense or what someone we view as reliable has told us. Besides what has been mentioned, there are various ways of knowing things such as through:

1. ***Intuition*** – this is a way of knowing things through gut feelings. It is subjective and based on personal feelings rather than on fact or proof.
2. ***Habit*** – this involves believing what we do because it is a tradition to do so. Traditions include opinions, beliefs, practices and customs which are passed on from generation to generation.
3. ***Mystical*** – this where knowledge is assumed to be solicited from divine and supernatural powers. It is acquired from the divine and other spiritually endowed individual such as prophets or witch finders.
4. ***Authoritarian*** – this where it is assumed that knowledge is derived from individuals who are politically and socially producers of knowledge.
5. ***Rationalistic Mode*** - this is where knowledge is acquired through judgment based on careful thought or reasoning.

However, the above sources of knowledge have weaknesses which science is able to address.

6. ***Science.*** Science is a way of generating knowledge which is obtained through the use of scientific process. This way of knowing differs from information derived from myth, intuition, beliefs, casual observation and common sense. It has certain characteristics that these other types of knowledge do not have. Scientists believe that their findings are based on systematic observations and that that their claims can and

must in principal be verified or falsified by a shared set of standards and procedures. For knowledge (information) to be considered scientific, it must exhibit several characteristics:

a. Empirical – this means knowledge must be based on hard evidence from real life experiences. It must be proven to be true by means of objective observation. Empirical means relying or based on observation or experience. In science, what is factual information or knowledge is what you are able to prove.

b. Verifiable – this means that whatever you conclude on the basis of your findings must be proved by others. Acceptance or rejection of a statement regarding something known must be influenced by observations.

c. Systematic – Knowledge must be generated by following an acceptable logical sequence. The different steps cannot be undertaken in a haphazard manner.

d. Logical – knowledge must be logical insofar as it is derived from deductive and inductive reasoning. Deductive reasoning is reasoning from the general to the specific, such as using theory to explain a specific event. Inductive reasoning is reasoning from the specific to the general such as making a generalization based on one's observation.

e. Replicable – if someone uses science to generate knowledge, another person who uses the same methods in similar circumstances should come up with the same results.

2.2 Social Sciences versus Natural Sciences

Since science is a way of knowing things which is based on systematic methods, objectivity and empiricism, sciences are not unified by their subject matter but rather by their methodology. A scientific methodology is a system of explicit rules and procedures. It provides the foundations for conducting research and evaluating claims of knowledge. Because of the differences in the subject matter on which scientific knowledge is generated, we have two distinct branches of science namely; social sciences and natural sciences.

The similarities between these two sciences are that they both use scientific methods to generate knowledge such as through research and observations. Both sciences aim at describing, predicting, explaining and understanding certain phenomenon. Both sciences have similar

characteristics. For example, physics has universal law like the law of gravity, when you throw an object up anywhere on earth, it will come down. In Public Administration, there are also principals which apply universally like the hierarch of authority. Similarly, we are able to predict the out an event in chemistry such as combing two atoms of hydrogen and one atom oxygen which give us water. In political science we are able to predict what happens when a government losses legitimacy. Both sciences use research studies in order to generate knowledge.

However, the differences between social and natural sciences are that social sciences like public administration and political science are concerned with the study of society. Political scientists use scientific methods to generate knowledge about power relations in society. On the other hand, natural sciences study natural phenomenon in the physical environment such as Geography, Physics, Chemistry and Biology. Social sciences deal with human beings; this means that there is a presence of normative values. Normative values are feeling, beliefs and customs which compromise objectivity when conducting research in society. On the contrary, natural sciences are not affected by normative values.

2.3 Survey Research as a Method of Social Science

In social sciences like Public Administration and Political Science, survey research is used as way of generating scientific information. A survey research involves a systematic collection of data from a sample of individuals, thereafter; the information is analyzed and interpreted in order to arrive at a conclusion. Through the use of survey research, social scientists are able to generate information which satisfies the requirements of science by;

1. Conducting research based on systematic rules and procedures, whereby researchers follow a prescribed roadmap in the way they make observations and conclusions.
2. Generating knowledge derived from reality that is from observations, perceptions or experiences of what actually exists.
3. Generating information which can be reproduced by other researchers conducting the same research in similar situations.
4. Generating information which can be transmitted to other contexts.

2.4 Goals and aims of Public Administration and Political Science as Social Sciences

The aim and goals of Public Administration and Political Science as social sciences are;

i. Understanding. Public Administration and Political Science aim at comprehending administrative and political phenomenon which pertains to their respective domains.
ii. Description. Public Administration and Political Science attempt to systematically describe situations, problems or phenomena in their respective domains.
iii. Prediction. Public Administration and Political Science forecast or project the occurrence of events by applying established theories to reality
iv. Explanation. Public Administration and Political Science aim at explaining the causes underlying certain situations or phenomenon within their fields of study.

2.5 The Research Process

The research process is an outline of steps which one has to undertake when conducting research. It is synonymous with research methodology. The research process aim to familiarize us with the steps and procedures involved at each step when conducting research. Suppose you want to go for a drive, you must first decide where you want to go and which route to take. If you know the route, you do not need to consult, but if you do not, you need to consult someone. As with your drive, there are two important decisions to make with your research journey. The first is to decide what you want to find out about, or what research question (s) you want to find out about (the research problem you want to answer). Having decided upon your research questions or problems, you then need to think of how to go about finding their answers. The path to finding answers to your research questions constitutes research methodology. At each operational step in the research process, you are required to choose from a number of methods, procedures and models of research methodology which will help you best achieve your objectives. The steps presented herein are not absolute as there are a number of variations which could be made.

2.6 Steps in a Research Study

1. Step I: Formulating a research problem. This is the first and most important step in the research process. A research problem identifies your destination, it tells others

what you intend to research. The more specific you are the better as everything which follows is influenced by the way you formulate your research problem.

2. Step II: Conceptualizing a research design. An extremely important feature of research is the use of appropriate methods. The main function of research design is to explain how you will find answers to your research questions. The research design sets out the logic of your inquiry. A faulty research design results in misleading findings. Therefore, research design is crucial to arriving at valid conclusions.
3. Step III: Constructing instruments for data collection. Anything that becomes a tool for collecting information for your study is called a research tool or a research instrument. For example, questionnaires, interview guides and observation forms are all classified as research tools.
4. Step IV: Selecting a sample. The accuracy of your findings largely depends on how you select your sample. The basic objective of any sampling design is to minimize the gap between the value of a sample and those of the population. There are different sampling strategies which are used in research. You need to be acquainted with sampling designs to select the one most appropriate for your study.
5. Step V: Writing a research proposal. A research proposal is an overall plan which tells a reader about one's research problem and how one intends to investigate it. A research proposal must tell a reader about what you are proposing to do, how you plan to do it and why you selected a proposed strategy. The format for a research proposal differs from one discipline to another, it is vital that as you develop your proposals in PAS 2014 you follow the format which has been outlined in this batch.
6. Step VI: Data collection: Having formulated a research problem, developed a study design, constructed research instruments and selected a sample, you then collect data from which you will draw conclusions and inferences for your study. Depending on the plan for data collection you have indicated in your research design, you may commence interviews, making observations, administering questionnaires and others.
7. Step VII: Data analysis / processing: Data analysis entails turning raw data you have collected at the preceding stage in to meaningful information. You have to consider whether data will be analyzed manually or using a computer and whether the data you are dealing with is qualitative or quantitative. If your study is purely qualitative, you

can write your report based on your field notes from interviews, observations or reviewing of documents by manually analyzing the contents of your notes (contents analysis) or by using computer software NVIVO or Ethnograph. If you are using quantitative data analysis, it is necessary to decide upon the type of analysis required such as frequency distributions, cross tabulation and other statistical analysis.

8. Step VIII: Writing a research report: This is the last step in the research process. The report informs your readers what you have done, what you have discovered and what conclusions you have drawn from your findings. Just as in the case of the format for a research proposal, there are numerous ways in which you can write a research report. It is therefore imperative that when you will be writing your research report for PAS 2014, you strictly adhere to the format which will be given in the second batch.

The eight steps presented above cover the total spectrum of a research endeavor, starting from problem formulation to writing a research report. Subsequent sections will focus on discussing these steps in detail as well as discussing the concepts which will arise at each stage.

UNIT THREE: FORMULATING A RESEARCH PROBLEM

3.1 Definition of research problem

A research problem is any an idea or issue which becomes the basis of your inquiry, investigation or research. However, you should make sure that your idea or issue is researchable as not all problems lend themselves to research methodology. Broadly speaking, any question that you want answered or any situation or phenomenon that you want to investigate can become a research problem or topic for your study.

3.2 Importance of a research problem

The formulation of a research problem is the first and most important step of the research process. It is like identifying your destination before undertaking a journey. The research problem is like the foundation of a building, the type and design of the building depends upon its foundation. If the foundation is well designed and strong you expect the building to be also. The research problem serves as the foundation of a research study. If it is well formulated, you can expect a good study to follow. The way you formulate a research problem determines almost every step that follows: the type of study design that can be used; the type of sampling strategy that can be employed; the research instruments that can be used or developed; and the type of analysis that can be undertaken.

3.3 Sources of research problems

Most research problems in Public Administration and Political Science revolve around four *P*s:

- ✓ People;
- ✓ Problems;
- ✓ Programs
- ✓ Phenomena

The emphasis on a particular *P* may vary from study to study but generally most studies are based upon at least a combination of two *P*s. You may select a group of individuals (a group or community as such – *people*), either to establish the existence of certain issues or problems relating to their lives, to ascertain their knowledge, attitudes or perceptions towards an issue

(problem), to establish the existence of a phenomenon or to establish the effectiveness of an intervention (program). Your focus may be upon the study of an issue, an association or phenomenon. Similarly, you can study different aspects of a program: its effectiveness; its relevance; its impact; and so on. In order to ascertain these, you collect information from people. The *people* provide you with the *study population*, where as the three *P*s furnish the subject area. Your study population - individuals, groups and communities - are the people from whom information is collected. Your study area is a *problem*, *program* or *phenomen*on about which the information is collected. Every research has two aspects, the study population and the subject area.

3.4 Consideration in selecting a research problem

When selecting a research problem or topic, there are a number of considerations to keep in mind. These help to ensure that your study will be manageable and you remain motivated. These considerations are; interest, magnitude, measurement of concepts, level of expertise, relevance, availability of data and ethical issues.

1. **Interest** – interest should be the most important consideration in selecting a research problem. A research endeavor is usually time consuming and involves hard work. If you select a topic which does not greatly interest you, it becomes difficult to sustain the required motivation, hence its completion and the amount of time taken could be affected.
2. **Relevance** – select a topic that is relevant to you as a student of Public Administration or Political Science. Ensure that your study adds to the existing knowledge, bridges current gaps in knowledge or is useful to policy formulation. The bottom line here is that your research problem or topic should be anchored on situations, problems or phenomena which are relevant to your field.
3. **Magnitude** – the research problem or topic should be narrowed down to something manageable, specific and clear. It is extremely important to select a topic that you can manage within the given time and resources. Even if you are undertaking a descriptive study, you need to carefully consider its magnitude.
4. **Measurement of concepts** – if you are using a concept in your study, make sure you are clear about its indicators and their measurement. For example, if you want to measure the

effectiveness of the Free Basic Education Policy in Gwembe, you must be clear as to what determines effectiveness and how it will be measured. As you develop your research, you should be cognizant of the fact that you need to come up with a measurement of your concept.

5. **Level of expertise** – make sure you have some elementary knowledge about the task you are proposing. Although you are learning research and can receive help from other, remember you need to do most of the work yourself. It is therefore imperative that you read sufficiently so that you do not experience major challenges.
6. **Availability of data** – If your topic entails collecting data from secondary sources (office records, national documents, progress reports, census data and other publications), before finalizing the proposal, make sure these data are available and in the format you want them.
7. **Ethical issues** – another consideration in the formation of a research problem are the ethics involved. In the course of conducting a research study, the study population may be adversely affected by some of the questions (directly or indirectly); expected to share sensitive or private information or expected to be used experimental objects. How ethical issues can affect a research problem and how they can be overcome should be thoroughly examined at the problem formulation stage.

3.5 Steps in the formulation of a research problem

If you do not know what specific research topic, issue or idea you want to research, you can go through the following:

Step 1. Identify a broad field or subject areas that interest you. What problem, situation or phenomenon in Public Administration or Political Science is of interest to your. Asking such a question may help you find an interesting topic. For example, if you are a public administration student, you might be interest in the issue of corruption in government institutions or if you are a political science student, you might be interested in issues of electoral violence. The principal here is that you must identify a problem or situation you are interested in, for example domestic violence, alcohol abuse among UNZA students and many others.

Step 2. Dissect the broad areas in to subareas. From the onset, you will realize that all the areas of interest mentioned under step 1, corruption in government institutions, electoral violence and domestic violence have many aspects. Take domestic violence, there are many aspects and issues in the area of domestic violence.

Broad area	Subareas
Domestic Violence	Causes of domestic violence
	Extent and types of domestic violence
	Profile of perpetrators of domestic violence
	Impact of domestic violence on the family
	Services available to victims of domestic violence
	Effectiveness of services provided to victims of domestic violence
	Profile of victims of domestic violence

Once you have developed an exhaustive list of successful subareas, you proceed to the next stage where you select what will become the basis of your inquiry.

Step 3. Select what is most of interest to you. It is neither advisable nor feasible to study all the subareas. Out of the list, select a subarea which you are passionate about.

Step 4. Raise research questions. At this step, you ask yourself, what is it that you to find out about the subarea you have selected. Within your chosen subarea, list what questions you want to find answers to. If you find yourself in a situation where you have too many questions, go through the process of elimination as you did in step 3.

Step 5. Formulate your objectives. Formulate your overall objective and specific objective (the next section will focus on objectives). Your objectives grow from the research questions. The main difference between objectives and research questions is the way they are written. Research questions are questions which the researcher wants to find answers to. Objectives transform these questions into behavioral aims by using words such as, to determine, to assess, to establish, to ascertain, to find out and to examine. Note that some researchers prefer the reverse process, that is, they start from objectives and formulate research questions from them.

Step 6. Now examine your objectives to ascertain the feasibility of achieving them through your research endeavor. Consider them in light of available time, expertise and resources.

Step7. Double - check. Go back and give final consideration whether you are sufficiently interested in your studies.

So far we have focused on the basis of your study, the research problem. But every research has a second element, the respondents from whom the required information to find answer to your research questions is obtained. As you narrow the research problem, you need to decide very specifically who constitute your study population in order to select the appropriate respondents.

3.6 Formulation of Objectives

Objectives are the goals you set to attain the aim of your study. The objectives should be listed under two headings, the overall objective and the specific objectives. The overall objective is the main statement of the thrust of your study. It is the statement which states what the purpose of your study is. Specific objectives are subdivisions of the overall objective; they are specific issues you want to investigate within the framework of your study. Specific objectives should be numerically listed and worded clearly and unambiguously. Action oriented words should be used when writing objectives. Each specific objective should contain only one aspect of your study. The way the overall and specific objectives are worded determines how your research is classified, such as descriptive, explanatory or correlational. In other words, the wording of your objectives determines the type of research design you need to adopt to achieve them. Irrespective of the type of research, the objectives should be clear, complete and specific. Besides the stated characteristics, in correlational studies, objectives should identify the main variables to be correlated.

3.7 Establishing operational definitions

As mentioned earlier, in every study there are two components; the subject area and the population. The main aim of formulating the research problem is to clearly and precisely define the research problem. In coming up with the research problem, you may use certain words that may be difficult or whose understanding may vary from respondent to respondent. On the other hand, it is also important to define clearly the study population from whom you intend to obtain

the required information. For example, the overall objective of a study may be; to investigate the ***effectiveness*** of a training program designed to help ***young people***. Although this objective clearly states the main thrust of the study, it is not specific in terms of the main variables to be studied and the study population. You cannot investigate effectives unless you first determine what constitutes effectiveness. On the other hand, it is equally important to determine what you mean by young people, up to what age would you consider someone to be young? In many cases, you need to develop operational definitions for the variables you are studying and for the concepts and the population which becomes a source of information for your study. In research you need to define these clearly in order to avoid ambiguity and confusion. This is achieved through the process of developing operational / conceptual definitions. You need to develop operational definitions for the major concepts you are using and a framework for the study population to enable you select appropriate respondents. Operational definitions may differ from the dictionary definition as well as the day to day meanings.

3.8 Identifying variables

In the construction of a research problem there are two important considerations: the use of concepts and the construction of hypotheses. Concepts are highly subjective as their understanding varies from person to person and therefore may not be measurable. In a research it is important that the concepts used should be operationalised in measurable terms so that the extent of variation in respondents' understanding is reduced. Techniques about how to operationalise concepts and knowledge about variables play an important role in reducing this variability.

1. Definition of a variable

We all make value judgements in our everyday daily lives: 'the food is excellent'; 'I do not like this'; and 'I think this is wonderful'. These are all judgements based upon our own preferences; the basis on which they are made may vary from person to person. There is no uniform standard on which to measure them. A particular food may be judged as 'excellent' by one person and 'awful' by another and something else could be wonderful to one person and ugly to another. When people express these feelings, they do so on the basis of certain criteria in their minds. If

you take time to question them you will discover that their judgement is based upon indicators that lead them to conclude and express that opinion.

We may also consider the following statements:

- ✓ This program is effective
- ✓ This program is not effective
- ✓ We are providing quality service to the public
- ✓ There is no accountability in this institution

These are judgements that require a sound basis on which to proclaim. For example, if you want to find out if a program is effective or if a service is of quality, you need to be careful that such judgements have a rational and sound basis. This requires the use of a measuring mechanism and it is in the process of measurement that knowledge about variables play an important role.

A variable is a property which takes on different values. Kerlinger (1986) defines a variable as, ***an image, perception or concept that is capable of taking different values***. In other words, a concept that can be measured is called a variable. A variable can also be defined as a concept that can be measured on any of the four types of measurement scale, which have varying degree of precision in measurement.

2. The different between a concept and a variable

Concepts are mental images or perceptions and therefore, there meanings vary from individual to individual, whereas variables are measurable, albeit with varying degrees of accuracy. Measurability is the main difference between a concept and a variable. A concept cannot be measure whereas a variable can be subjected to measurement by objective units of measurement. Concepts are subjective impressions; their understanding may differ from person to person. It is therefore important that concepts are subjected to measurement even though the degree of precision on which they can be measured varies from scale to scale.

Examples of concepts and variables	
Concept	Variable
Effectiveness	Gender (Male/Female)
Satisfaction	Age (- year, -months)
Impact	Income (- ZMK, US$)
Excellent	Weight (- kg)
Rich	Height (- cm)
Domestic violence	Religion (Catholic, Protestant, Jew, Muslim)

3. Concepts, indicators and Variables

If you are using a concept in your study, you need to consider its operationalisation or how it will be measured. In most cases, to operationalise a concept you have to go through a process of identifying indicators. The choice of indicators for a concept might vary with the researcher but those selected must have a logical link with the concept. Some concepts such as 'rich' can easily be converted into indicators and then variables. For example, to decide objectively if a person is 'rich', one needs to decide upon the indicators of richness. Assume we decide upon income and assets as the indicator. Income is also a variable since it can be measured in numerous currencies; therefore, you do not need to convert this into a variable. Although the assets owned by an individual are an indicator of his or her wealth, the still belong to the category of concepts. You need to look further at indicators of assets. For example, houses, cars and investments are indicators of assets. Converting these assets into cash value will give a total value of the assets owned by an individual. Thereafter, you can add the total income and value of assets to make a decision whether one would be classified as rich.

4. Types of Variables

A variable can be classified in a number of ways; these classifications can be on the basis of: casual relationship; design of the study and; unit of measurement.

a. Classification on the basis of causation – in studies that attempt to investigate the causal relationship or association, four sets of variables may operate:

i. Change variables or independent variables, these are variables which are responsible for bringing about change in a phenomenon.
ii. Outcome variables or dependent variables, these are variables which are the effect of the change variable;
iii. Unmeasured Variables, these are variables which affect the link between the cause and effect variables;
iv. Connecting or linking variables, these are variables which in a certain situation are necessary to complete the relationship between cause and effect variables.

In research terminology, change variables are called independent variables, outcome/effect variables are called dependent variables, the unmeasured variables affecting the cause and effect are called extraneous variables and the variables that link the cause and effect relationship are called intervening variables. Therefore:

- ✓ *An independent variable is the cause responsible for bringing about change (s) in a phenomenon or situation.*
- ✓ *A dependent variable is the outcome of the changes brought about by introduction of an independent variable.*
- ✓ *Extraneous variable are several factors operating in real life situation which may affect changes in the dependent variable. These factor not measured in the study may increase or decrease the magnitude or strength of the relationship between independent or dependent variables*.
- ✓ *Intervening variable, sometimes called confounding variables, links the independent and dependent variables. In certain situations, the relationship between an independent and a dependent variable cannot be established without the intervention of another variable. The cause variable will have an assumed effect only in the presence of an intervening variable.*

To explain these variables let us consider some examples. Suppose you want to study the relationship between smoking and lung cancer. You assume that smoking is a cause of cancer. Studies have shown that there are many factors affecting this relationship, such as the number of cigarettes or the amount of tobacco smoked everyday; the duration of smoking; the age of the smoker; dietary habits; and the amount of exercise undertaken by the individual. All these

variables may affect the extent to which smoking may cause lung cancer. These variables may either increase or decrease the magnitude of the relationship. In this example, smoking is the independent variable, cancer is the dependent variable and all the variables that might affect the relationship either positively or negatively, are extraneous variables.

b. Classification on the basis of study design – a study that examines association or causation may be a controlled/contrived experiment, a quasi experiment or a non experimental study. In a controlled experiment, the independent variable (cause) may be introduced or manipulated by the researcher or by someone else who is providing the service. In these situations, there are two sets of variables.

i. Active variables – these are variables that can be manipulated, changed or controlled.

ii. Attribute variables – these are variables that cannot be manipulated, changes or controlled, and they reflect the characteristics of the study population; for example, age, gender, education and income.

Suppose a study is designed to measure the relative effectiveness of three teaching models (Model A, Model B and Model C). The structure and contents of these models could vary and any model might be tested on any population group. The contents, structure and testability of a model on a population may vary from researcher to researcher. On the other hand, a researcher does not have control on the characteristics of the students' population such as their age, gender and motivation to study. These characteristics of the study population are called attribute variables. However, a researcher has the ability to control or change the teaching models. A researcher can decide what constitutes a teaching model and on which group of the population it should be tested.

C. Classification on the basis of the unit of measurement – from the view point of unit of measurement, there are two ways of categorizing variables.

i. Whether the unit of measurement is categorical (as in nominal or ordinal scale) or continuous in nature (as in interval or ratio scale);

ii. Whether it is qualitative (as in nominal and ordinal scales) or quantitative as in (interval and ratio scales).

The variables thus classified are called categorical and continuous, and qualitative and quantitative. On the whole, there is very little difference between categorical and qualitative and between continuous and quantitative variables. The slight differences between them are as follows;

Categorical variables are measured on nominal or ordinal measurement scales, whereas for continuous variables the measurements are made either on an interval and ratio scales. Categorical variables can be of three types;

- ✓ Constant
- ✓ Dichotomous
- ✓ Polytomous

When a variable has only one value or category, for example taxi or water, it is known as a constant variable. When a variable can have only two categories as in yes/no, good/bad and rich/poor, it is known as a dichotomous variable. When a variable can be divided into more than two categories, for example: religion (Christian, Muslim, Jew); political parties (UPND, PF, MMD) and attitudes (strongly favourable, favourable, uncertain, unfavourable, strongly unfavourable), it is called a polytomous variable.

Continuous variables are variables which have continuity in their measurement; for example, age, income and attitude score. They can take on any value on the scale on which they are measured. Age can be measured in years, months and days. Similarly, income can be measured in kwacha and ngwees.

In many ways qualitative variables are similar to categorical variables as both use either nominal or ordinal measurement scales. However, there are some differences. For example, it is possible to develop categories on the basis of measurements made on a continuous scale such as measuring the income of people on a continuous scale in kwacha and ngwee and then developing categories such as low, middle and high income. The measurement of income in kwacha and ngwee is classified as the measurement of a continuous variable, whereas the subjective measurement in categories such as low, middle and high income groups is a qualitative variable.

It is important to understand that the way a variable is measured determines the type of analysis that can be performed, the statistical procedures that can be applied to the data, the way the data can be interpreted and the findings that can be communicated. The way you measure the variables in your study determines whether a study is qualitative or quantitative in nature.

c. Types of measurement scale

Measurement is central to any inquiry. The greater the refinement in the measurement of a variable, the greater the confidence one can place in the findings. One of the main differences between physical and social science is the units of measurements used and the degree of importance attached to them. In the social sciences, the scales of measurement of variables used are those classified by Stevens. Stevens has classified the different types of measurement scales into four categories:

- ✓ Nominal or classificatory scales
- ✓ Ordinal or ranking scales
- ✓ Interval scales
- ✓ Ratio

The nominal or classificatory scale

The nominal scale enables the classification of individuals, objects or responses based on a common / shared property or characteristic. These people, objects or responses are divided into a number of subgroups in such as way that each member of the subgroup has a common characteristic. A variable measured on a nominal scale may have two or more subcategories depending upon the extent of variation. For example water and tree has only one subgroup whereas gender can be classified into two subcategories: male and female. Political parties in Zambia can be divided in many subcategories such as UPND, PF, MMD, NAREP, ABZ, People's Party, New Generation Party and others. Classifications on the basis of nominal scale ensure that individuals, objects or responses within the same subgroup have the same characteristic and basis of classification. The sequence in which the subgroups are listed makes no difference as there is no relationship among subgroups.

The ordinal or ranking scale

An ordinal scale has all the properties of a nominal scale plus one of its own. Besides categorizing individuals, objects, responses or property into subgroups on the basis of a common characteristic, it ranks the subgroups in a certain order. They are arranged either in an ascending or descending order according to the extent a subcategory reflects the magnitude of variation in the variable. For example, income can be measured either quantitatively (in kwacha and ngwee) or qualitatively, using subcategories: above average, average and below average. These subcategories of income are related to one another in terms of magnitude of people's income but the magnitude itself is not quantifiable and hence the difference between above average and average or between average and below average subcategories cannot be ascertained. Therefore, an ordinal scale has all the properties/characteristics of a nominal scale in addition to its own. Subcategories are arranged in the order of magnitude. Also, the difference between the subcategories is not equal as there is no quantitative unit of measurement.

The interval scale

An interval scale has all the characteristics of an ordinal scale; that is, individuals or responses belonging to a subcategory have a common characteristic and the subcategories are arranged in an ascending or descending order. In addition an interval scale uses a unit of measurement that enables the individuals or responses to be placed at equally spaced intervals in relation to the spread of the variable. This scale has a starting and a terminating point that is divided into equally spaced units or intervals. The starting and terminating points and the number of units/ intervals between them are arbitrary and vary from scale to scale.

Celsius and Fahrenheit scales are examples of the interval scales. In the Celsius system the starting point (considered as freezing point) and the terminating point (considered as boiling point) is 100ºC. The gap between freezing and boiling points is divided into 100 equally spaced intervals, known as degrees. In the Fahrenheit system, the freezing point is 32ºF and the boiling point is 212ºF, and the gap between the two points is divided into 180 equally spaced intervals. As the starting and terminating points are arbitrary, they are not absolute; that is you cannot say 60ºC is twice as hot as 30ºC or 30ºF is three times hotter than 10ºF. This means that while no mathematical operations can be performed on the readings, it can be performed between

readings. For example, if the difference in temperature between two objects, A and B, is 15ºC and the difference in temperature between two other objects, C and D, is 45ºC, you cannot say the difference in temperature between C and D is three times greater than that between A and B.

The interval scale is relative; that is, it plots the positions of individuals or responses in relation to one another with respect to the magnitude of the measurement variable. Hence, an interval scale has all the properties of an ordinal scale, plus it has a unit of measurement with an arbitrary starting and terminating point. Therefore, it is relative in nature. It helps to place individuals or responses in relation to each other with respect to the magnitude of the measuring variable. As it is a relative scale, no mathematical operations can be performed on its readings.

The ratio scale

The ration scale has all the properties of nominal, ordinal and interval scales, plus its own property: the zero point of a ration scale is fixed, which means it has a fixed starting point. Therefore, it is an absolute scale – the difference the intervals is always measured from a zero point. This means ratio scales can be used for mathematical operations. The measurement of income, weight and height are examples of this scale. A person who is 40 years of age is twice as old as a 20 year old. A person earning K 4,000.00 per month earns four times more than a person earning K 1,000.00.

3.9 Constructing Hypotheses

The second important consideration in the formulation of a research problem is the construction of hypotheses. Hypotheses bring clarify and specificity to a research problem, but are not essential for a study. You can conduct a valid study without constructing a single formal hypothesis. On the other hand, within the context of a research study, you can construct as many hypotheses as you consider appropriate. Hypotheses arise from a set of hunches that a tested through a study. However, one can conduct a valid study without these hunches or speculations.

A hypothesis may be defined as a hunch, assumption, suspicion, assertion or an idea about a phenomenon, relationship or situation, the reality or truth of which you do not know. A researcher calls these assumptions, statements, assertions or hunches hypotheses and they become the basis of an inquiry. There are many definitions of a hypothesis, according to

Kerlinger (1986), is a hypotheses is a conjectural statement of the relationship between two or more variables. Thyer (1993), define a hypothesis as a tentative statement about something, the validity of which is usually unknown. Grinnell (1995) state that a hypothesis is written in such a way that it can be proven or disproven by valid and reliable data, it is in order to abtain these data that we perform our study. From the above definitions, it is certain that a hypothesis has certain characteristics:

- ✓ It is a tentative preposition.
- ✓ Its validity is unknown.
- ✓ In most cases, it specifies a relationship between two or more variables.

1. The functions of a hypothesis

Specifically, a hypothesis serves the following functions.

a. The formulation of a hypothesis provides a study with focus. It tells you what specific aspects of a research problem to investigate.
b. A hypothesis tells you what data to collect and what not to collect thereby providing a focus for your study.
c. As it provides a focus, the construction of hypotheses enhances objectivity in a study.
d. A hypothesis may enable you to add to the formulation of a theory. It enables you to conclude what is true and what is false.

2. Characteristics of a hypothesis

a. A hypothesis should be simple, specific and conceptually clear. Ambiguity in the construction of a hypothesis will make the testing of the hypothesis impossible. A hypothesis should only test one relationship or hunch at a time. The more insight you have in an area, the easier it is to construct a hypothesis.
b. A hypothesis should be capable of verification. Methods and techniques must be available for data collection and analysis.
c. A hypothesis should be related to existing body of knowledge. It is important that your hypothesis emerges from the existing body of knowledge and that it adds to it as this is an

important function of research. This can only be achieved if the hypothesis has its roots in the existing body of knowledge.

d. A research hypothesis should be operationalised. This means that it can be expressed in terms that can be measured. If it cannot be measured, it cannot be tested hence no conclusion can be drawn.

3. Types of hypothesis

As explained earlier, any assumption that you seek to validate through an inquiry is called a hypothesis. Hence, theoretically there should be only one type of hypothesis, that is, the research hypothesis – the basis of your investigation. However, because of the wording used in the construction of a hypothesis, hypothesis can be broadly classified into two categories:

a. Research hypothesis
b. Null hypothesis

A research hypothesis is a hypothesis which a researcher is interested in testing in order to prove or disapprove it. A null hypothesis is an antithesis or opposite of the research hypothesis. The function of a null hypothesis is a convention in scientific circles. Its main function is to explicitly specify the relationship that will be considered as true in case the research hypothesis proves wrong.

3. Errors in hypothesis testing

As already mentioned, a hypothesis is an assumption that may prove to be either correct or incorrect. It is possible to arrive at an incorrect conclusion about a hypothesis for a number of reasons. Incorrect conclusions about the validity of a hypothesis may be drawn if:

- ✓ The study design selected is faulty.
- ✓ The sampling procedure adopted is faulty.
- ✓ The method of data collection is inaccurate.
- ✓ The analysis is wrong.
- ✓ The conclusions drawn are inaccurate.

Any, some or all of these aspects of the research process could be responsible for the inadvertent introduction of error in your study, making conclusions misleading. Hence, in the testing of a hypothesis, there is always the possibility of errors attributable to the identified reasons. In drawing conclusions about a hypothesis, two types of errors can occur.

a. Types I error. This is the error of rejecting a null hypothesis when it is true.
b. Type II error. This is the error of accepting a null hypothesis when it is false.

UNIT FOUR: THE RESEARCH DESIGN

Having decided what you want to study about, the next question is how you are going to conduct your study. What procedure are you going to follow to obtain answers to research questions? What should you do and what should you not do in the process of undertaking the study? These are some of the questions that need to be answered before you can proceed with the study. Answers to these questions constitute the core of a research design.

4.1 The definition of a research design

A research design is a procedural plan that is adopted by the researcher to answer questions vividly, objectively, accurately and economically. Thyer (1993) notes that, a research design is a blueprint or detailed plan of how a research can be conducted. Furthermore, Kerlinger (1986) states that, a research design is a plan, structure and strategy of investigation so conceived as to obtain answers to research questions or problems. A research design is thus a complete scheme or program of the research. It includes an outline of what the researcher will do from writing the hypothesis up to the final analysis of data.

4.2 The functions of a research design

The above definitions suggest that a research design has two main functions. The first relates to the identification and / or development procedures and logistical arrangements necessary to undertake research, and the second emphasizes the importance of quality in these procedures to ensure their validity, accuracy and objectivity. Hence through research design you:

- ✓ Conceptualize an operational plan to undertake the various procedures and tasks requires to complete your study;
- ✓ Ensure that these procedures are accurate to obtain valid, objective and accurate answers to the research questions

The first function of the research design which relates to the overall plan of the study details all the procedures and tasks the researcher will perform to obtain answers to the research questions. One of the most important requirements of the research design is to specify everything clearly so that a reader will understand what procedures to follow and how to follow them. A research design therefore should do the following:

1. Name the study design per se – that is, cross – sectional, comparative, before and after, etc.
2. Provide detailed information about the following aspects of the study
   - ✓ Who will constitute the study population?
   - ✓ How will the study population be identified?
   - ✓ Will a sample or the whole population be selected?
   - ✓ How will consent be thought?
   - ✓ What methods of data collection will be used and why?
   - ✓ How will data be collected using the stated instruments?
   - ✓ How will ethical issues be considered?

4.3 Selecting a study design

There are various kinds of study designs. The designs can be classified by examining them from three different perspectives.

- ✓ The number of contacts with the study population.
- ✓ The reference period of the study.
- ✓ The nature of the investigation.

1. Study designs based on the number of contacts

Based on the number of contacts with the study population, designs can be classified into three groups; cross-sectional studies; before and after studies and longitudinal studies.

a. The cross – sectional study design

Cross – sectional studies, also known as one-shot or status studies are most commonly used designs in the social sciences. This design is best suited to studies aimed at finding out the prevalence of a phenomenon, situation, problem, attitude or issue, by taking a cross – section of the population. They are important for obtaining an overall picture as it stands at the time of the study. Such studies are cross-sectional with regard to both the study population and the time of investigation.

A cross-sectional study is extremely simple in its design. You decide what you want to find out, identify the study population, select a sample (if you need to) and contact your respondents to find out the required information. Cross-sectional studies involve only one contact with the study population, they are comparatively cheap to undertake and easy to analyze. However, their biggest disadvantage is that they cannot measure change. To measure change, it is necessary to have at least two data collect points – that is at least two cross-sectional studies, at two points in time, on the same population.

b. The before-and –after study design

A before-and-after study can be described as two sets of cross-sectional data collection points on the same population to find out the change in a phenomenon or variables between two points in time. The change is measured by comparing the differences in the phenomenon or variables before and after the intervention. A before- and- after study is carried out by adopting the same process as a cross-sectional study except that it comprises two cross-sectional observations, the second being undertaken after a certain period. This sort of design is commonly used in evaluative studies. The difference between the two data collection points is considered to be the impact of the program. Examples of topics which can be studied using this design: The impact of incentives on productivity of employees in an organization; The impact of increased funding on the quality of teaching in universities; The impact of administrative restructuring on the quality of services provided by an organization and; and the impact of advertising on the sales of a product.

The main advantage of the before-and-after study is its ability to measure change in a phenomenon or to assess the impact of an intervention. However, it has disadvantages such as; it is expensive and more difficult to implement; the time lapse between the two may results in attrition in the study population; it cannot ascertain whether change can be attributed to the independent variable or extraneous variables; maturation effect and; reactive effect.

c. The longitudinal study design

This is a study design used to determine the pattern of change in relation to time. A longitudinal study is used when you wish to study the proportion of people adopting a program in relation to time. Longitudinal studies are also useful when you need to collect factual information on a

continuing basis. In longitudinal studies, the study population is visited a number of times at regular intervals, over a long period to collect the required information. These intervals are not fixed so their length may vary from study to study. Irrespective of the size of the interval, the information gathered each time is identical. Although the data collected in from the same population, it may or may not be from the same respondents. A longitudinal study can be seen as a series of repetitive cross-sectional studies.

The main advantage of a longitudinal study is that it allows the researcher to measure the pattern of change and obtain factual information, requiring collection on regular or continuing basis, thus enhancing its accuracy. However, longitudinal studies have the same disadvantages as the before-and-after studies. In addition, longitudinal studies can suffer from the conditioning effect. This describes a situation where the same respondents are contacted frequently, they begin to know what is expected of them and may respond to the questions without thought.

The three major types of longitudinal studies are:

- ✓ Trend studies – these are studies in which the research studies changes within some general population overtime. For examples, somebody studying opinion polls to determine political candidate preferences over the course of campaigns
- ✓ Cohort studies - a cohort is a group of people with shared characteristics, for example a group of PAS 2014 students. These studies tend to focus on specific samples of the population as they change overtime.
- ✓ Panel studies – these share the same characteristics with cohort studies because they focus on the same set of people. The difference is that cohort focus characteristics of people but different sets of people while panel studies focus on same sets of people with same characteristics.

2. Study designs based on reference period

The reference period refers to the time frame in which a study is exploring a phenomenon, situation, event or problem. Studies within this perspective are thus classified as: retrospective; prospective and; retrospective-prospective.

a. Retrospective study design

Retrospective studies investigate a phenomenon, situation, problem or issue that has happened in the past. They are usually conducted either on the basis of the data available for the period or on the basis of respondents' recall of the situation.

b. The prospective study design

Prospective studies refer to the likely prevalence of a phenomenon, problem, situation, attitude or outcome in the future. Such studies attempt to establish the outcome of an event or what is likely to happen in future. Experiments are usually classified as prospective studies as the researcher must wait for an intervention to register its effects on the study population.

c. The retrospective-prospective study design

Retrospective-prospective studies focus on past trends in a phenomenon and study it into the future. A study is classified under this category when you measure the impact of an intervention without having a control group. In a retrospective-prospective study a part of the data is collected retrospectively from existing records before the intervention is introduced and then the study population is followed to ascertain the impact of the intervention.

3. Study designs based on the nature of the investigation

On the basis of the nature of the investigation, studies may be classified as: experimental; non experimental and; and quasi or semi experimental. To understand the difference, let us look at one example. Suppose you want to find out the impact of a particular teaching method on the level of students' performance. In such a situation there is cause and effect relationship. The first involves the researcher or (someone else) introducing the intervention that is assumed to be the cause of change and waiting until it has produced – or has been given sufficient time to produce-the change. The second involves the researcher observing a phenomenon and attempting to establish what caused it. In this instance, the researcher starts from the effects or outcome and attempts to determine causation. If a relationship is studied in the first way, starting from the cause to establish the effects, it is classified as an ***experimental study***. If the second option is followed - that is, starting from the effects to track the cause – it is classified as a ***non experimental study***. In the case of an experimental study, the independent variable can be

observed, introduced, controlled or manipulated by the researcher. Whereas in a non experimental study this cannot happen as the assumed cause has already occurred. Instead, the researcher retrospectively links the causes to the outcomes. A quasi or semi experimental study has the properties of both the experimental and non experimental studies; part of the study may be experimental and the other part non experimental.

a. Experimental designs

These are research designs in which you can prove causality. In an experimental study, individuals are randomly assigned to the experimental and control groups and the researcher makes observations. The main characteristic of an experimental design are;

- ✓ Manipulation- the researcher does something to the experimental group.
- ✓ Control-the researchers introduces one or more control groups then compares.
- ✓ Randomization- subjects are assigned to the experimental or control group.
- ✓ Matching- this is similar to randomization; it aims at removing the influence of other factors.

b. Quasi or semi experimental design

This is a kind of research design where one characteristic of the experimental design is missing. It is either the use of control or randomization or both but manipulation is always present. In terms of its structure, it resembles the experimental design as it uses one or more control groups and the same procedures are followed.

c. Non-experimental design

This is a kind of research design where the researcher just describes and analyses the research subjects and the situation in which they are found without any intervention. The researcher undertakes the research in the situation as it found.

4. Others-some commonly used study designs.

a. Case studies –The case study method is an approach to studying social phenomenon through a thorough analysis of an individual case. The case may be a person, individual,

process, community, episode, society or any other unit of social life. All data relevant to the case are gathered and organized in terms of social life. It provides an opportunity for the intensive analysis of many specific details often overlooked by other methods. This approach rests on the assumption that the case being studied is typical of cases of a certain type, that it, through intensive analysis; generalizations may be made that will be applicable to other cases of the same nature.

b. Descriptive studies – these studies involve the systematic collection and presentation of data in order to have a very clear picture of a given situation or problem. Descriptive studies require a greater degree of accuracy and precision in the manner in which you report events.
c. Analytical studies- these studies attempt to establish the causes of risk factors for certain problems. They seem to unravel factors underlying a particular problem.
d. Evaluation studies. Evaluation studies are concerned with the description or explanation of programs and policies. Evaluation deals with assessing programs that have been implemented. Not only do evaluation studies add knowledge, but they also assess in order to take a particular action to correct the situation. Evaluation studies have no methodology of their won but use the same techniques used in research. The difference with other research studies is in the purpose and objectives. Evaluation is undertaken based on the following criteria: effort; efficiency; effectiveness; and impact.

UNIT FIVE: CONSTRUCTING INSTRUMENTS FOR DATA COLLECTION

5.1 Methods of Data collection

There are two major approaches to gathering information about a situation, person, problem or phenomenon. Sometimes information required is already available and need only to be extracted. However, there are times when the information must be collected. Based upon the broad approaches to information gathering data are classified as:

- ✓ Secondary data
- ✓ Primary data

Information gathered using the first approach is said to be collected from secondary sources whereas the sources used in the second approach are called primary sources. Examples of secondary sources include the use of census data to obtain information on the age, sex and structure of the population; the use of hospital records to find out the morbidity or mortality patterns of a community; the use of an organization's records to ascertain its activities and the collection of data from sources such as journals, magazines, books, articles and periodicals to obtain historical and other types of information. On the other hand, finding out first-hand the attitudes of a community towards health services, ascertaining the health needs of a community, evaluating a social program and ascertaining the quality of services provided by a worker are examples of information collected from primary sources. Therefore, primary data provides first hand information while secondary data provides second hand information.

5.2 Collecting data using primary sources

Several methods can be used to collect primary data. The choice of a method depends on the purpose of the study. In selecting data collection methods, the socio-economic and demographic characteristics of the study population play an important role: some populations for example may not feel at ease with a particular method of data collection (such as being interviewed) or comfortable to express opinions in a questionnaire. Furthermore, people with little or no education may respond differently to certain methods of data collection compared to highly educated people. Another important determinant of the quality of your data is the way the

purpose and relevance of your study is explained to potential respondents. Whatever method of data collection is used, make sure that respondents clearly understand the purpose and relevance of your study. The following are some of the methods of collecting primary data:

1. Observation

Observation is a purposeful, systematic and selective way of watching and listening to an interaction or phenomenon as it takes place. There are many situations in which observation is the most appropriate way of data collection; for example, when you want to learn about the interaction in a group, ascertain the functions performed by a worker, or study the behavior and personality traits of an individual. It also appropriate in situations where full information cannot be obtained through a questionnaire, because respondents either are uncooperative or are unaware of the answers because it is difficult for them to detach themselves from the interaction. In summary, when you are more interested in the behavior than in the perceptions of individuals or when subjects are so involved in the interaction that they are unable to provide objective information about it, observation is the best approach to collect the required information.

There are two types of observations; participant observation and non-participant observation.

a. Participant observation – this is when you as a researcher, participate in the activities of the group being observed in the same way as its members, with or without their knowing that they are being observed. For example, you might want to examine the reactions of the general population towards people in wheelchairs. You might study their reaction by sitting in a wheelchair yourself. Or you might want to study the life of prisoners and pretend to be a prisoner in order to do this.
b. Non-participant observation – this is where the researcher does not get involved in the activities of the group but remains a passive observer, watching and listening to its activities and drawing conclusions from this. For example, you might want to study the functions of a nurse in a hospital. As an observer, you could watch, follow, and record the activities as they are being performed. After making a number of observations, conclusions could be drawn about the functions nurses carryout in a hospital. Any occupational group in any setting can be studied in the same manner.

The advantages of observations are that; they provide first hand information as the researcher gets insight of the context in which things happen. However, the disadvantages of observations are that individuals tend to act when they know that they are being watched hence the observer might have a distorted view of things (the Hawthorne effect); there is a possibility of bias as the observer may only record things of interest to him/her and eliminating things not seen to be of interest; and observations are time consuming and the information gathered may be subjective.

2. Interviews

Interviews are a commonly used method of collecting information from people. In many walks of life, we collect information through different forms of interaction with others. Any person – to -person interaction between two or more individuals with a specific purpose in mind is called an interview. On the one hand, interviews may be flexible, when the interviewer has the freedom to formulate questions as they come to mind around the issue being investigated; and on the other hand, it can be rigid, when the investigator has to stick strictly to the questions decided before hand. Therefore, there are two main types of interviews, unstructured interviews and structured interviews.

a. Unstructured interviews

The strength of unstructured interviews is the almost complete freedom they provide in terms of content and structure. You are free to order these in whatever sequence you wish. You also have complete freedom in terms of the wording you use and the way you explain questions to your respondents. You may formulate questions or raise issues on the spur of the moment, depending on what occurs to you in the context of the discussion.

There are several types of unstructured interviews; for example: in-depth interviews, narratives and oral histories.

i. In-depth interviews

In-depth interviews are a repeated face to face encounter between the researcher and the informant directed towards understanding the informants' perspective on their lives, experiences or situations as expressed in their own words. Because of the extended length of time spent with an informant, it is assumed that the rapport between the researcher and the informant will be

enhanced and the corresponding understanding between the two will lead to in-depth and accurate information.

ii. Focus Group Discussions (FDGs)

The difference between a focus group discussion and an in-depth interview is that the former is undertaken with a group and the latter with an individual. In a focus group discussion, you explore the perceptions, experiences and understandings of a group of people who have some experiences in common with regard to a situation or event. In a focus group discussion, broad discussion topics are developed before hand, these provide a frame for the discussion which follows. Members of the group express their opinions while discussing these issues. In a focus group discussion, an interview guide is used by the researcher and as a researcher; you need to ensure that whatever is expressed by the informants is recorded.

iii. Narratives

The narrative technique of gathering information has even less structure than the focus group discussion. Narratives have almost no pre-determined contents except that the researcher seeks to hear the personal experience of a person with an incident happening in his or her life. Essentially, the person tells his or her story about an incident or situation and you as the researcher listen passively. Narratives are a very powerful method of collecting data for situations which are sensitive in nature. As with focus group discussions, the researcher needs to choose a recording system that suits him/her best.

iv. Oral histories

Oral histories like narratives involve passive and active listening. Oral histories are however commonly used for learning about a historical event or episode that took place in the past or for gaining information about a cultural, custom or story that has been passed from generation to generation. Narratives are more about personal experiences whereas historical, social or cultural events are the subjects of oral histories.

Data collected through unstructured interviews is extremely useful in situations where either in-depth information is needed or little is known about the area. The flexibility allowed to the interviewer helps in the acquisition of comprehensive information during the interview. On the

other hand, since unstructured interviews do not list all the specific questions to be asked of respondents, the comparability of questions asked and responses obtained may become a problem. As a researcher gains experience during the interviews, the questions asked of respondents change; hence, the type of information obtained from those who are interview at the beginning may be different from those who are interviewed towards the end. Using an interview guide as a means of data collection requires much more skill on the part of the researcher than does using a structured interview.

b. Structured interviews

In a structured interview the researcher asks pre-determined questions, using the same wording and order of questions as specified in the interview schedule. An interview schedule is a written list of questions, open-ended or close-ended, prepared for use by an interviewer. One of the main advantages of a structured interview is that it provides uniform information, which ensures the comparability of data. Structured interviews require fewer interviewing skills than unstructured interviews.

i. The Questionnaire

A questionnaire is a written list of questions to which the respondents have to provide answers. In a questionnaire, respondents read the questions, interpret what is expected and then write down the answers. The major difference between an interview schedule and a questionnaire is that in the former, it is the interviewer who asks the questions and records the respondents' reply on the interview schedule, and in the latter, replies are recorded by respondents themselves. In the case of a questionnaire, as there is no one to explain the meaning of questions to respondents, it is important that questions are clear and easy to understand. Also, the layout of questions should be in such a way that it is easy to read and the sequence of questions should be easy to follow.

The advantages of a questionnaire are that; it is less expensive when self administered; it offers greater anonymity thus in situations where sensitive questions are asked, it enables respondents to answer freely. However, the disadvantages of a questionnaire are that: When self administered, its application is limited to a study population that can read and write; the

opportunity to clarify issues by the researcher is lacking; and it is possible that a respondent may consult other.

The cover letter

It is essential that your questionnaire has a cover letter. The letter should briefly: introduce you and the institution you are representing; describe in full or few sentence the main objectives of the study; explain the relevance of the study; convey any general instructions; indicate that participation in the study is voluntary if respondents do not want to respond to the questionnaire they have the right to; assure respondents of confidentiality of the information provided by them; and thank them for their participation in the study.

Types of questions

Open and close –ended questions

In an interview schedule or questionnaire there are two types of questions namely open ended and close ended questions. In open ended questions the possible responses are not given. In case of a questionnaire, the respondent writes the answer in his or her own words whereas in the case of an interview schedule the investigator (researcher) records the answer either verbatim or in a summary describing the respondent's answer. In close ended questions, the possible answers are given in the questionnaire or interview schedule and the respondent or investigator (researcher) ticks the response that best describes the respondent's answer.

The advantages of open ended questions are that; they provide in-depth information if used by an experienced interviewer; respondents are given an opportunity to express themselves freely and are thus not conditioned to answer in a certain way; and as they allow the respondent to answer freely, they eliminate the possibility of investigator bias. The disadvantages of open ended questions are that; the analysis of open ended questions is more difficult; since respondents are not give option, there is a possibility that some respondents may not be able to express themselves so information may be lost; and there is greater chance of interviewer bias.

The advantages of close ended questions are that: they are easy to analyze; they are easy to answer; because response categories are provided, they ensure that the information needed by the researcher is obtained. However, the disadvantages of close ended questions are that: the information obtained lacks depth and clarity; there is a greater possibility of investigator (researcher) bias because the researcher might only list responses that of interest to him/her; and answers provided may not reflect the respondent's opinion.

Background questions

These are the first set of questions in a questionnaire which elicit information about the background information of the respondent. These question capture information on demographic, (e.g age, sex), social (e.g level of education, marital status, religious affiliation) and economic (i.e employment, income) characteristics of respondents.

Filter questions

These are questions which apply only to a certain segment of the population. They lead to contingency question those which are contingent upon the response from the filter question. For example: Q8. Are you a member of any political party? 1. Yes ( ) 2. No ( ). If your answer to Q8 is No, skip question Q9. The questionnaire can then have a follow up question which can read as: Q9. Which political party do you support? In this example, Q8 is a filter question while Q9 is a contingency question.

Contingent questions

A contingent question is a question which is dependent on how one has answered a preceding question. Whether a respondent has to answer a question is dependent (contingent) on how he/she has answered the preceding (filter question). Answering Q9, Which political party do you support? Is contingent (dependent) on your answer to Q8, Are you a member of any political part?

Rating questions

These are questions in which respondent are allowed to make judgements in terms of sets of ordered categories. For example: How happy are you with your conditions of service?

1. Very happy ( )

2. Happy ( )

3. Neither happy nor unhappy ( )

4. Unhappy ( )

5. Very unhappy ( )

Matrix questions

A matrix question is a question which has a large number of questions with similar response categories which are grouped together.

For example: How would you describe the following infrastructure at your school?

Q13. How would you describe the following infrastructure at your school?					
	Very Good	Good	Average	Bad	Very Bad
A. Library					
B. Hostel					
C. Classrooms					
1. Canteen					

Considerations in formulating questions

The wording and tone of your questions are important because the information obtained and its quality largely depends on these factors. It is therefore important to be careful about the way you

formulate questions. The following are some considerations to keep in mind when formulation questions:

- ✓ Always use simple and everyday language – your respondents may not be highly educated and even if they are they still may not know some of the simple technical jargon that you are used to. Particularly in a questionnaire, take extra care to use words that your respondents will understand as you have no opportunity to explain questions to them. A pre-test should show you what is and what is not understood by your respondents.
- ✓ Do not use ambiguous questions – an ambiguous question is one that contains more than one meaning and that can be interpreted differently by different respondents. This will result in different answers making it difficult to draw any valid conclusion from the information. For example, 'Are you satisfied with your canteen?'1. Yes ( ) 2. No ( ). This question is ambiguous as it does not ask respondents to indicate the aspect of the canteen which they may be satisfied or dissatisfied with. Is it with the services? The attitude of staff or the quality of meals? Respondents may have any of these aspects when answering the question.
- ✓ Do not ask double - barreled questions. A doubled – barreled question is a question within a question. The main problem with this type of question is that one does not know which particular question a respondents has answered. Some respondents may answer both questions and some may only answer one of them. For example, 'How often and how much time do you spend in a queue at the clinic?' In the type of question, some respondents may answer the first part, whereas other may answer the second and some may answer both parts.
- ✓ Do not ask leading questions – a leading question is one which by its content, structure or wording, leads the respondent to answer in a certain way. Such questions are judgemental and lead respondents to answer either positively or negatively. For example, 'Unemployment is increasing, isn't it?' With such a question, a respondent may think to disagree with it is to be in the wrong. The feeling that there is a right answer can force people to respond in a way that is contrary to their true position.
- ✓ Do not ask questions that are based on presumptions – in such questions, the researcher assumes that respondents fit into a particular category and seeks information based upon that assumption. For example, 'How many cigarettes do you smoke in a day?' This

question is asked without ascertaining whether or not the respondents are smokers. In situation like this, it is important to first ascertain whether or not a respondent fits into a category about which you are inquiring.

5.3 Collecting data using secondary sources

There are occasions when the information required by your study has already been collected by someone else and you only need to extract the purpose of your study. There are many categories of secondary data, among them are the following;

- ✓ Government or non - government publications – there are many government and non - governmental organisations that collect data on a regular basis in a number of areas and publish it for use by members of the public and other interest groups. Some common example are the census, labour force surveys, health reports, reports by commissions of inquiry, reports by parliamentary select committees, reports by government ministries, departments and reports by civil society organizations.
- ✓ Earlier research – for some topic, an enormous number of research studies that have already been done by other can provide you with the required information
- ✓ Mass media – reports published in newspaper, magazines, internet and so on may be another good source of data.

1. Problems with using secondary data

When using secondary data, you will need to be careful as there may be certain problem with the availability, format and quality of data. The extent of these problems varies from source to source. While using such data, some issues you should keep in mind are:

a. Validity and reliability – the validity of the information may vary from source to source. For example, information from a government agency or a reputable civil society organization is likely to be more valid and reliable than that obtained from a personal diary.
b. Personal bias – the use of information from personal diaries, newspapers and magazines may have a personal bias as these writers are likely to exhibit less rigorousness and objectivity than one would expect in research reports.

c. Availability of data – it is common for researchers to assume that the required data will be available, but you should not make this assumption. Therefore, it is important to make sure that the required data are available before proceeding further with your research.

UNIT SIX: SAMPLING

6.1 The concept of sampling

Let us take a very simple example to explain the concept of sampling. Suppose you want to estimate the average age of the students in your class. There are two ways of doing this. The first method is to contact all students in the class, find out their ages, add them and then divide the answer by the number of students. The second method is to select a few students from the class, ask them their ages, and add them up and the divide by the number of students you have asked. From this you can make an estimate of the average age of the class. Take another example: Suppose you want to find out the average income of families living in a city. You could follow the procedure described above, but imagine the amount of effort and resources required to go to each family in the city to find out their income. You could follow the second method by selecting a few families to become the basis of your inquiry, and then, from what you have found out from the few families, make an estimate of the average income of families in the city. A further example would be the outcome of an election: the results are decided after voting on election day, but predictions about the outcome are usually made on the basis of the outcomes of opinion polls. These polls are based upon a very small group of people who are asked about their voting preferences. On the basis of these results, a prediction is made about the outcome.

Sampling is a process of selecting a few (a sample) from a bigger group (the sampling population) to become the basis for estimating or predicting the prevalence of an unknown piece of information, situation or outcome regarding a bigger group. A sample is the subgroup of a population you are interested in.

This process of selecting a sample from the population has advantages and disadvantages. The advantages are that it serves time as well as financial and human resource. However, the disadvantage is that you do not find out the information about the population's characteristics of interest to you but only estimate or predict them. Hence, the possibility of an error in your estimation exists.

Sampling is thus a trade- off between certain gains and losses. While on one hand you serve time and resources, on the other hand you may compromise the level of accuracy in your findings. Through sampling, you only make an estimate about the actual situation prevalent in the total

population from which the sample is drawn. If you collect a piece of information from the total sampling population and if your method of inquiry is correct, your findings should be reasonably accurate. However, if you select a sample and use this information as the basis for estimating the situation in the total population, an error is possible. Tolerance of this possibility of error is an important consideration in selecting a sample.

6.2 The concept of sampling in qualitative research

In qualitative research the issue of sampling has little significance as the main aim of most qualitative inquiries is either to explore or describe the diversity in a situation, phenomenon or issue. Qualitative research does not make an attempt to either quantify or determine the extent of this diversity. You can select even one individual as your sample and describe whatever the aim of your inquiry is. A study based upon the information obtained from one individual, or undertaken to describe one event or situation is perfectly valid. In qualitative research, to explore the diversity, you need to reach what is known as ***saturation point*** in terms of your findings; for example, you go on interviewing or collecting information as long as you keep discovering new information. When you find that you are not obtaining any new data or the new information is negligible you are assumed to have reached saturation point. Some researchers prefer to select as sample with non-probability designs and to collect data till they have reached saturation point. Keep in mind that saturation point is subjective judgement which you, as a researcher, decide.

6.3 Sampling terminologies

Let us, again, consider one example from those used above. Our main aim is to find out the average age of the class. Let us assume that we adopt the second method- that is, to select a few students to achieve these aims. In this process, there are a number of aspects:

- ✓ ***Population or study population.*** The class from which you select a few students to ask questions in order to answer your research questions is called the study population or population and is usually denoted by the letter (N)
- ✓ ***Sample***. The small group of students from whom you collect the required information to estimate the average age of the class.
- ✓ ***Sample size***. This is the number of students from whom you collect the required information. Sample size is usually denoted by the letter (n)

- ✓ Sampling design or strategy. The way you select students to include in the sample is called sampling design or strategy.
- ✓ ***Sampling unit or sampling element***. Each student that becomes the basis for selecting your sample is called a sampling unit or element.
- ✓ ***Sampling frame***. A list of all the students in a class is the sampling frame. If all the elements in a study population cannot be individually identified, you cannot have a sampling frame for that study population.
- ✓ ***Sample statistics***. These are findings based on the information obtained from your respondents (sample). Your sample statistics become the basis for estimating the prevalence of a situation or phenomenon in the population.
- ✓ ***Population parameters*** / ***population mean***. The main aim of sampling is to find answers to your research questions and not for the sample you collect answers from. In the case of the example on the average age of students in a class, from the sample statistics, we make estimate of the answer to the research question in the study population. The estimates arrived at from sample statistics are called population parameters or population mean. Values obtained from a sample are called statistics while values obtained from the study population are called parameters.

6.4 Principles of sampling

The theory of sampling is guided by three principles. To effectively explain these, we will take an extremely simple example. Suppose there are four individuals A, B, C and D. A is 18 years of age, B is 20, C is 23 and D is 25. As you know their ages, you can find out (calculate) their average age by simply adding 18 + 20 +23 + 25 = 86 and dividing by 4. This gives the average age of A, B, C and D as 21.5 years.

Now let us suppose that you want to select a sample of two individuals to make an estimate of the average age of the four individuals. If you adopt the theory of probability, we can have six possible combinations of two: A and B; A and C; A and D; B and C; B and D; and C and D. Let us take each of these pairs to calculate the average age of the sample:

1. A + B = 18 + 20 = 38/2 = 19.0 years;
2. A +C = 18 +23 = 41/2 = 20.5 years;

3. A +D = 18 + 25 = 43/2 = 21.5 years;
4. B + C = 20 + 23 = 43/2 = 21.5 years;
5. B + D = 20 + 25 = 45/2 = 22.5 years;
6. C + D = 23 + 25 = 48/2 = 24.0 years

Notice that in most cases the average age calculated on the basis of these samples of two (sample statistics) is different. Now compare these sample statistics with the average of all four individuals – the populations mean (population parameter of 21.5 years). Out of a total of six possible sample combinations, only in the case of two is there no difference between the sample statistics an population mean. Where there is a difference, this is attributed to the sample and is known as ***sampling error***. Again, the size of the sampling error varies markedly. Let us consider the difference in the sample statistics and the population mean for each of the six samples.

Sample	Sample average (sample statistics) 1	Population mean (population parameter) 2	Difference between (1) and (2)
1	19.0	21.5	-2.5
2	20.5	21.5	-1.5
3	21.5	21.5	0.0
4	21.5	21.5	0.0
5	22.5	21.5	+1.0
6	24.0	21.5	+2.5

This analysis suggests a very important principle of sampling:

Principle 1, in a majority of cases of sampling there will be a difference between the sample statistics and the true population mean, which is attributed to the selection of the units in the sample.

To understand the second principle, let us continue with the above example, but instead of a sample of two individuals, take a sample of three. There are four possible combinations of the three that can be drawn.

1. A +B + C = 18 + 20 +23 = 61/3 = 20.33 years;
2. A +B +D = 18 + 20 + 25 = 63/3 = 21.00 years;
3. A + B + D = 18 + 23 + 25 = 66/3 = 22.00 years;
4. B + C + D = 20 + 23 + 25 = 68/3 = 22.67 years

Now, let us compare the difference between sample statistics and the population mean.

Sample	Sample average (sample statistics) 1	Population mean (population parameter) 2	Difference between (1) and (2)
1	20.33	21.5	-1.17
2	21.00	21.5	-0.5
3	22.00	21.5	+0.5
4	22.67	21.5	+1.17

Compare the difference between the differences calculated in the first and second table. In the first table, the difference between the sample statistics and the population mean lies between -2.5 and +2.5 years, whereas in the second table it is between -1.17 and +1.17 years. The gap between the sample statistics and the population mean is reduced in table two. This reduction is attributed to the increase in the sample size. This, therefore, leads to the second principle:

Principle 2, the greater the sample size, the more accurate will be the estimate of the true population mean.

The third principle of sampling is particularly important as a number of sampling strategies, such as stratified and cluster sampling, are based on it. To understand this principle, let us continue with the same example but use slightly different data. Suppose the ages of four individuals are markedly different: A = 18, B = 26, C = 32 and D = 40. In other words, we are visualizing a population where the individuals with respect to age – the variables we are interested in – are markedly different.

Let us follow the same procedure, selecting samples of two individuals at a time and then three. If we work through the same procedures (described above we will find that the difference in the

average age in the case of two samples ranges between -7.00 and +7.00 years and in the case of a sample of three ranges between -3.67 and +3.67. In both cases the range of the differences is greater than previously calculated. This is attributable to the greater difference in the ages of the four individuals – the sampling population. In other words, the sampling population is more heterogeneous in regards to age.

Principle 3, the greater the difference in the variable under study in a given population for a given sample size, the greater will be the difference between the sample statistics and the true population mean.

These principles are crucial to keep in mind when you are determining the sample size needed for a particular level of accuracy, and in selecting the sample strategy best suited to your study.

6.5 Types of sampling designs

There are various types of sampling strategies and these can be categorized a follow:

- ✓ Random / probability sampling designs;
- ✓ Non random / non – probability sampling designs
- ✓ Mixed sampling designs

To understand these designs, we will discuss these individually.

1. Random / probability sampling designs

For a sampling design to be called random or probability sample, it is imperative that each element in the population has an equal and independent chance of selection in the sample. Equal implies that the probability of selection of each element in the population is the same; that is, the choice of an element in the sample is not influenced by other consideration such as personal preferences. The concept of independence means that the choice of one element is not dependent upon the choice of another element in the sampling; that is, the selection or rejection of one element does not affect the inclusion or exclusion of another.

A random sample can be drawn using methods such as fishbowl draw, computer program and a table of random numbers. A fishbowl method involves numbering each element in your study population using a separate slip of paper for each element, put all the slips into a box, and then

pick them out one by one without looking, until the number of slips you have selected equals the sample size you decided upon. Computer programs or software can also be used to select elements randomly from the sampling frame which is entered into the software by the researcher. The researcher commands the computer to randomly select a number of elements equal to his sample size.

a. Types of random / probability sampling designs

There are three commonly used types of random / probability sampling designs:

i. Simple random sampling (SRS) – this is the most commonly used method of selecting a probability sample. In line with the definition of randomization, whereby each element in the population is given an equal and independent chance of selection, a simple random sample is selected by the following procedure. Firstly, identify by a number all elements or sampling units in the population, secondly decide on the sample size (n) and thirdly select (n) using either the fish bow draw, the table of random numbers of a computer program.

To illustrate, let us gain take our example of a class. There are 80 students in the class, and so the first step is to identify each student by a number from 1 to 80. Suppose you decide to select a sample of 20 using a simple random technique. Use either the fish bow draw, the table for random numbers or a computer program to select the 20 students. These 20 students become the basis of your inquiry.

ii. Stratified random sampling – As discussed, the accuracy of your estimate largely depends on the extent of variability or heterogeneity of the study population with respects to the characteristics that have a strong correlation with what you are trying to ascertain (principle 3). It follows, therefore, that if the heterogeneity in the population can be reduced by some means for a give sample size you can achieve greater accuracy in your estimates. Stratified random sampling is based upon this logic. In stratified random sampling, the researcher attempts to stratify the population in such as way that the population within a stratum is homogeneous with respect to the characteristic on the basis of which it is being stratified. It is important that the characteristics chosen as the basis of the stratification are clearly identifiable in the

study population. For example, it is much easier to stratify a population on the basis of gender than on the basis of age, income or attitude. It is also important for the characteristic that becomes the basis of stratification to be related to the main variable that you are exploring. Once the sampling population has been separated into non-overlapping groups, you select the required number of elements from each stratum, using the simple random technique. There are two types of stratified sampling: proportionate and disproportionate stratified sampling. With proportionate stratified sampling, the number of elements in each stratum in relation to its proportion in the total population is selected, whereas in disproportionate stratified sampling, consideration is not given to the size of the stratum.

iii. Cluster sampling – simple random and stratified sampling are based on the researchers' ability to identify each element in a population. It is easy to do this if the total sampling population is small, but if the population is large, as in the city, state or country, it becomes difficult and expensive to identify each sampling unit. In such cases, the use of cluster sampling is more appropriate. Cluster sampling is based on the ability of a researcher to divide the sampling population into groups, called clusters, and then to select elements within each cluster, using the simple random selection technique. Cluster can be formed on the basis of geographical proximity or a common characteristic that has a correlation with the main variable of a study (as in stratified sampling). Depending on the level of clustering, sometimes sampling can be done at different levels. These levels constitute the different stages (single, double, multi) of clustering.

b. Non random / non probability sampling design

Non probability sampling designs do not follow the theory of probability in the choice of elements from the sampling population. Non – probability sampling designs are used when the number of elements in the population is either unknown or cannot be individually identified. In such as situation, the selection of elements is dependent upon other considerations. There are four non random designs, each based on a different consideration, which are commonly used in qualitative and quantitative research:

- ✓ Quota sampling;

- ✓ Purposive sampling
- ✓ Snowball sampling
- ✓ Convenience sampling

i. Quota sampling. The main consideration directing quota sampling is the researcher's ease of access to the sample population. In addition to convenience, the researcher is guided by some visible characteristic, such as gender or race, of the study population that is of interest to the researcher. The sample is selected from a location convenient to the researcher, and whenever a person with these visible relevant characteristics is seen, that person is asked to participate in the study. The process continues until the researcher has been able to contact the required number of respondents (quota).There are advantages and disadvantages with this design. The advantages are: it is the least expensive way of selecting a sample; you do not need any information, such as a sampling frame, the total number of elements, their location or other information about the sampling population; and it guarantees the inclusion of the type of people you need. The disadvantages are: as the resulting sample is not a probability one, the findings cannot be generalized to the total sampling population; and the most accessible individuals might have characteristics that are unique to them and hence might not be truly representative of the total sampling population.

ii. Purposive sampling. The primary consideration in purposive sampling is the judgement of the researcher as to who can provide the best information to achieve the objectives of the study. The researcher only goes to those people who in his or her opinion are likely to have the required information and be willing to share it. This type of sampling is extremely useful when you want to construct a historical reality, describe a phenomenon or develop something about which only a little is known.

iii. Snowball sampling. Snowball sampling is the process of selecting a sample using networks. To start with, a few individuals in a group or organization are selected and the required information is selected from them. They are them asked to identify other people in the group or organization and the people selected by them become a part of the sample. Information is collected from them, and then these people are asked to identify other members of the group and, in turn, those identified become the basis of

further data collection. This process is continued until the required number or a saturation point has been reached, in terms of the information being sought. This sampling technique is useful if you know little about the group or organization you wish to study, as you need only to make contact with a few individuals who can then direct you to the other members of the group. This method of selecting a sample is useful for studying communication patterns, decision making and diffusion of knowledge within a group. There are disadvantages to this technique. The choice of the entire sample rests upon the choice of individuals at the first stage. If they belong to a particular faction or have strong bias, the study may be biased. Also, it is difficult to use this technique when the sample becomes fairly large.

iv. Convenience sampling. This is a sampling method where elements are selected because they are easily accessible and available. The findings of such a study cannot be generalized to the population because the elements in the population where not given an equal chance of being included in the sample.

UNIT SEVEN: THE RESEARCH PROPOSAL

All research endeavors in every academic and professional field are preceded by a research proposal. The research proposal informs other of your conceptualization of the total research process that you propose to undertake and examine its suitability and validity.

A research proposal is an overall plan, scheme, structure and strategy designed to obtain answers to the research questions or problems that constitute your research project. A research proposal should outline the various tasks you intend to undertaken to fulfill your research objectives, test hypotheses or obtain answer to research questions. It should also state the reason for undertaking your study. The main function of a research proposal is to detail the operational plan for obtaining answers to your research questions. In doing so, it ensures and reassures others of the validity of the methodology for obtaining answer to your research questions. Your proposal should follow the suggested guidelines and be written in an academic style. It must contain appropriate references in the body of the text and bibliography at the end.

In order to achieve this function, a research proposal must provide your readers with the following information about your study:

- ✓ What you are proposing to do;
- ✓ How you plan to proceed and;
- ✓ Why you selected the proposed strategy

7.1 The format of PAS 2014 research proposal

Your research proposal for PAS 2014 should contain the following information:

- ✓ Title

  CHAPTER ONE
- ✓ Introduction
- ✓ Statement of the Problem
- ✓ Study objectives
- ✓ Overall objective of the study
- ✓ Specific of the study
- ✓ Research questions

- ✓ Hypothesis to be tested (if applicable)
- ✓ Conceptual / operational definition of concepts/ variable
- ✓ Conceptual framework or theoretical framework
- ✓ Literature review

CHAPTER TWO

- ✓ Study design
- ✓ Study site and study population
- ✓ Sampling size and sampling design
- ✓ Data collection instruments
- ✓ Data processing procedure
- ✓ Problems and Limitations
- ✓ Ethical issues involved (if any) and how you propose to deal with the
- ✓ Bibliography
- ✓ Appendices
- ✓ Appendix A: Proposed time frame for the project.
- ✓ Appendix B: Questionnaire (s)
- ✓ Appendix C: Interview guide (s)

7.2 Contents of the research proposal

1. Title

The research proposal should have a title. The title conveys what the research is about. The title should be expressed in a single sentence and must contain the major construct or action terms to be used in the research. The research topic is derived from the research problem, situation or phenomenon that you want to investigate. For example: **The relationship between social environment and the academic achievement**. The title should be in bold letters on the cover page of your proposal

2. Introduction

The introduction provides a context of the study problem or problem situation. It should start with a very broad perspective of the main study area before gradually narrowing down to the central problem under investigation. It should provide specific examples of the nature of the

problem and cite data around the problem. It should give an overview of the of the trends in terms of prevalence if applicable, the theoretical and practical issues relating to the central problem under study, theoretical and ideological issues relating to the topic and other relevant information.(*The introduction for your proposal should not exceed three pages*). Suppose you want to study the relationship between social environment and academic achievement. The introduction would include:

- ✓ The role of education in society.
- ✓ Major changes in the philosophy to education.
- ✓ The development of education in the country.
- ✓ Trends in education participation in the country with particular reference to the area in which the study is being carried out.
- ✓ Role of parents and peers in academic achievement.
- ✓ Impact of social environment on academic performance.
- ✓ Etc.

3. Statement of the problem

The statement of the problem must describe what is wrong out there which needs to be investigated. By so doing, you must cite relevant data as evidence to the existence of the problem. The situation, issue or problem you are investigating should be derived from reality hence the need for relevant data to support its existence. Having provided a broad introduction to the area under study, now focus on issues relating to its central theme, identifying some of the gaps in the existing body of knowledge. Specifically this section should: identify the issues that are the basis of your study; specify the various aspects of or perspectives on these issues; identify the main gap(s) in the existing body of knowledge; and raise some of the main research question(s) that you want to answer through your study.

4. Objectives of the study

In a research you have an overall objective which indicated the thrust of the research study and t specific which identify the specific issues you intend to examine.

Overall Objective

The overall objective clearly states what the researcher wants to investigate. It contains a relationship of the key variables in the study. The general objective is best stated in a single sentence.

Specific objectives

Specific objectives describe the sub-objectives or specific tasks the researcher intends to carryout in order to fulfill the overall objective of the study. Specific objectives should be presented using action oriented verbs.

Examples of objectives

Overall Objective

To examine the relationship between social environment and academic achievement

Specific Objectives

To find out the relationship, if any, between self esteem and a student's academic achievement.

To ascertain the association between parental involvement in a student's studies and academic achievement.

To examine the link between a student's peer group and academic achievement.

To explore the relationship between the attitude of a student towards teachers and academic achievement.

5. *Research questions*

Research questions guide the research process as they assist in pointing to specific concerns. The research question should enable you answer the research objectives.

Examples of research questions

Is there a relationship between self esteem and a student's academic achievement?

What is the relationship between parental involvement and a student's academic achievement?

Is there a link between a student's peer group and academic achievement?

Is there a relationship between a student's attitude towards teachers and academic performance?

6.Hypotheses (if necessary)

A hypothesis is a statement of your assumption about the prevalence of a phenomenon or about a relationship between two variables that you intend to test within the framework of the study. If you are going to test hypotheses list them in this section. You must be acquainted with the correct way of formulating them. In a study, you can have as many hypotheses as you want to test. However, it is not essential to have a hypothesis in order to undertake a study – you can conduct a perfectly satisfactory study without formulating a hypothesis.

Example of hypotheses

H1: A student's self esteem and academic achievement are positively correlated.

H2: The greater the parental involvement in a student's studies, the higher the academic

achievement.

H3: A student's attitude towards teachers is positively correlated academic achievement

7. Rationale / Significance

Under the rationale of the study, you have to outline the value of the research results to intended users

8. Conceptual / operational definition of concepts/ variable

Under the conceptual or operational definition of concepts, you have to list the concepts in your study and give an operational definition for each, that is, how these concepts will be used within the context of your study. The concepts / variables you operationalise are derived from the research objectives or questions. In the examples of specific objectives, the first one is, *to find out the relationship, if any, between self esteem and a student's academic achievement*. The

researcher should therefore define the concept o *self esteem* and *academic achievement* by stating what they mean within the context of the research and how they will be measured.

9. Conceptual framework or theoretical framework

The conceptual or theoretical framework which constitutes the basis for your study should be clearly explained. A conceptual framework is a mental construct of how the variables are put together to explain the problem under investigation. Through literature review, observations or experience, you can come up with a conceptualization to explain the dependent variable which represents the research problem. A theory on the other hand is a generalization which tries to explain reality. There are many theories which can be used to explain various issues, phenomena or situations. In your research, you either use a conceptual framework or a theory to explain what you want to investigate.

10. Literature review

Literature review is a critical assessment of what others have written about the problem, situation or phenomenon that you want to investigate. In research, it is important to read and gather information about the topic so that you are better informed. Literature review enables the researcher to find out what other have done, prevent unnecessary duplication, provides convincing arguments on why the research should be undertaken and familiarizes you with different methodologies that might be useful for your research. Sources of literature include books, articles, reports, abstracts, indices, research reports, theses/dissertations, databases, statistical bulletins, newspaper, magazine and other. Literature can be accessed from libraries, internet, workshops, archives, government departments and other.

When reviewing literature, first state the name(s) of the author(s) , year of publication, and the title of the publication. Thereafter, explain the major finding, argument or thrust of the literature (summarise the content of the work relevant to your study) and show its relevance to your study. Having done that, you should show the gaps in the literature which your study will fill. Ensure that you repeat this same procedure for every literature that you review. Also see to it that the literature you review is related to your research. ***The literature review section for your PAS 2014 proposal should not be less than ten (10) pages***.

11. Study design

The study design describes the plan you intend to use to answer your research questions. For example say whether it is a case study, cross-sectional, before – and- after or a comparative study. The research design should also state whether your study will be qualitative, quantitative or both. You should also mention whether your study will use primary data, secondary data or both. You should give a justification for every aspect of your study design.

12. Study site /study population

Under this section, briefly describe the organization, agency, or community in which you will conduct your study. If a study is about a group of people, highlight some of the salient characteristics of the group (such as its history, size, composition and structure) and draw attention to any available relevant information. If your research concerns an agency, office organization, include the following in your description; the main services provided by the agency, office or organization; its administrative structure; the type of clients served; and information about the issues central to your research. If you are studying a community, briefly describe some of the main characteristic: the size of the community; a brief social profile of the community (such as the composition of the various groups within it); and issues relevant to the central theme of your study.

13. Sampling size and sampling design

Sample size is the total number of respondents (people) whom you will ask questions in order to answer your research questions. Give a detailed explanation of the sampling design that you are going to use to select your sample and the procedure which you will follow. You should give a justification of the sample size and sampling design you have chosen.

14. Data collection instruments

Data collection instruments refer to the tools which you are going to use to collect information to answer your research question such as questionnaires, interview guides, observation forms and others. Explain in detail the tools you will use, why you will use them and how you will go about collecting the data.

15. Data Processing procedure

In general terms, describe the strategy you intend to use for data analysis. Specify whether the data will be analyzed manually or by computer. If data will be analyzed by computer, state the software which you are going to use. You have to state how the type of data your research will collect, whether qualitative, quantitative or both will be analyzed.

16. Problems and Limitations

List the possible problems (if any) which may encounter during your study and how you intend to overcome them.

17. Ethical considerations

List the ethical issue issues involved in your study (if any) and how you propose to deal with them.

Bibliography

List in full all the references which you have used in the proposal. These reference should follow the alphabetical order of the names of authors cited.

Appendices

Your proposal ought to have the following attachments:

- ✓ Appendix A: Proposed time frame for the project;
- ✓ Appendix B: Questionnaire (s) and/ or;
- ✓ Appendix C: Interview guide (s)

UNIT EIGHT: ETHICAL CONSIDERATIONS IN RESEARCH

8.1 Ethical issues in data collection

Ethics refer to the dos and don'ts or the rights and wrongs of any profession. Ethical behavior means behavior which is accordance with principles of conduct that are considered correct, especially those of a given type or group. Similarly, research has a code of conduct which should be adhered to by all researchers. The following are some of the ethical issues to consider in research:

1. Seeking consent

In research, it is unethical to collect information without the knowledge of participants and their willingness and informed consent. Informed consent implies that respondents or participants are made aware of the type of information you want from them, why the information is being sought, what purpose it will be put and how it will directly or indirectly affect them. It is important the consent should be voluntary and without any undue influence.

2. Providing incentives

Giving someone an incentive to participate so that they can provide you with the information that you need for your study is unethical. Money, gifts or presents are not supposed to be given to solicit for answers from respondents.

3. Seeking sensitive information

Information sought may cause an ethical dilemma in research. Certain types of information can be regarded as sensitive or confidential by some people and thus an invasion of privacy. Asking for this information may embarrass or upset a respondent. However, if you do not ask this information, it may not be possible for you to pursue your interest in the area and contribute to the existing body of knowledge. It is however not unethical to ask such questions provided that you tell your respondents the type of information you are going to ask clearly and frankly, and give them sufficient time to decide if they want to participate.

4. Maintaining confidentiality

Sharing information about a respondent with others for purposes other than research is unethical. Sometimes you need to identify your study population to put your findings into context. In such situation, you need to make sure that at least the information provided by respondents is anonymous. It is unethical to identify an individual respondent. Therefore you need to ensure that after information has been collected, its source cannot be known.

5. Avoiding bias

Bias on the part of the researcher is unethical. Bias is a deliberate attempt either to hide what you have found in your study, or to highlight something disproportionately to its true existence

6. Using inappropriate research methodology

A researcher has an obligation to use appropriate methodology in conducting a study. It is unethical to use a method or procedure you know to be inappropriate.

7. Incorrect reporting

To use an appropriate methodology, but to report the findings in a way that changes or slants them to serve your own or someone else's interests is unethical.

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