



NATIONAL OPEN UNIVERSITY OF NIGERIA

COURSE CODE : DAM 205

COURSE TITLE: DATA COLLECTION METHODOLOGY

COURSE GUIDE

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DAM 205

COURSE TITLE

DATA COLLECTION METHODOLOGY

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INTRODUCTION

Data collection methodology is a two credit unit first semester course available to first semester course available to students of Bachelor of Education (B.Ed) Library and Information science.

Research involves data collection, any discipline of the social sciences, education and even the sciences needs a sound knowledge of research; how to conduct research, ethics of research and generally to write a report or design a study.

The use and importance of research cannot be overemphasized. All students undergoing any form of degree programme is required to write a project, thesis or dissertation. This course offers a complete guide to such write ups including statistical techniques in sampling measurements and ethics of research.

What you will learn in this course

The course consist of units and a course guide which informs you briefly what the course is all about, what course materials you will be using and how you can work with these materials. In addition, it advocates some general guidelines for the amount of time you are likely to spend on each unit of the course in order to complete it successfully.

It gives you guidance in respect to your Tutor-marked Assignment, which will be available in the assignment file. Regular tutorial classes will be conducted in relation to the course. It is advisable for you to attend these tutorial sessions. The course will prepare you for the challenges you will meet in the field of social research.

Course Aims

The course aims at providing you with a sound knowledge of research in the social sciences with emphasis on

- i. How to conduct a research?
- ii. Ethics of research
- iii. How to design a research or a study

To achieve the above listed aims, the course has a set of objectives. Each unit specifies a set of objectives at the beginning, read, them carefully before you study the unit. You may wish to refer to them during your study to check on the progress you are making. Always look at the unit's objectives after completion of each unit, to be assured you have followed the instruction in the unit. Here are comprehensive objectives of the entire course. By meeting these objectives you should have achieved the aims of the entire course. In addition to the aims stated above, this course sets to achieve some objectives. Thus, after undergoing the course, you should be able to;

- Explain the concept of social research, its uses and purposes.
- Explain the concept of knowledge and its sources
- Ethics of research and ethical dilemmas and conflicts.
- Understand the principles of right to know and right to protection
- Conduct literature review and research questions.

- Understand library resources
- Explain sampling designs
- Design studies and measurement
- Define operations

To complete this course, you are required to read each study unit, read the textbooks and other materials which may be provided by the National Open University of Nigeria.

Each unit contains self assessment exercises and at certain points in the course you would be required to submit assignments for assessment purposes. At the end of the course there is a final examination. The course should take about 17 weeks to complete. You will find listed below all the components of the course, what you have to do and how to allocate time to each unit in order to complete the course on time and successfully. The tutorial sessions will give you the opportunity to compare your knowledge with others. You are therefore advised to attend them and to spend a lot of time reading and pursuing your studies.

The course materials

The main components of the course are;

1. The course guide
2. Study units

3. References/further readings
4. Assignments
5. Presentation schedule

Study units

There are three modules in this course; each comprises at least 2 units of topics that you are expected to complete in 2 hours. The three modules and their units are stated below.

Module 1: Purposes/Uses of Research

Unit 1: Concept of Research

Unit 2: Sources of Knowledge

Module 2: Sampling and Measurement

Unit 1: Basic Terminologies in Research

Unit 2: Sampling Design

Unit 3: Study Design and Measurement

Module 3: Literature Review, Library Resources and Ethics

Unit 1: Literature Review and Library Resources

Unit 2: Ethics of Research

Presentation Schedule

Your course materials have important dates for the early and timely completion and submission of your TMAs and for attending tutorials. You should remember that you are required to submit all your assignments by the stipulated time and date. You should guard against falling behind in your work.

Assessment

There are three aspects to the assessment of the course. First is made up of self assessment exercises, second consists of the tutor-marked assignment and third is the written examination/end of course examination.

You are advised to do the exercises. In tackling the assignments, you are expected to apply information, knowledge and techniques, gathered during the course. The assignment must be submitted to your facilitator for formal assessment in accordance with the deadlines stated in the presentation schedule and the assignment file. The work you submit to your tutor for assessment will account for 30% of your total course work. At the end of the course you will need to sit for a final or end of course examination of about a three hour duration. This examination will count for 70% of your total course marks.

Tutor-Marked Assignment

The TMA is an important component of your course. It will be given four (4) TMAs to answer.

Three of these number before you are allowed to sit for the end of course examination. The TMAs would be given to you by your facilitator and returned after you have done the assignment. Assignment questions for the units in this course are contained in the assignment file. You will be able to complete your assignment from the information and materials contained in your reading,

references and study units. However, it is desirable in all degree level of education to demonstrate that you have read and researched more into your references, which will give you a wider view point and may provide you with a deeper understanding of the subject.

Make sure that each assignment reaches your facilitator on or before the deadline given in the presentation schedule and assignment file. If for any reason you cannot complete your work on time, contact your facilitator before the assignment is due to discuss the possibility of an extension. Extension will not be granted after the due date unless there are exceptional circumstances.

Final Examination and Grading

The end of course examination for Data Collection Methodology will be for about 2 hours and it has a value of 70% of the total course work. The examination will consist of questions, which will reflect the type of self-testing. Practice exercise and tutor-marked assignment problem you have previously encountered. All areas of the course will be assessed.

Use the time between finishing the last unit and sitting for the examination to revise the whole course. You might find it useful to review your self-test, TMAs and comments on them before the examination. The end of course examination covers information from all parts of the course.

Course Marking Scheme

Assignment	Marks
Assignment 1-4	Four assignment, best three marks of the four count at 10% each – 30% of course marks.
End of course examination	70% of overall course marks
Total	100% of course materials.

Facilitators/Tutor and Tutorials

There are ___ hours of tutorials provided in support of this course. You will be notified of the dates, times and location of these tutorials as well as the name and phone number of your facilitator, as soon as you are allocated a tutorial group.

Your facilitator will mark and comment on your assignments, keep a close watch on your progress and any difficulties you might face and provide assistance to you during the course. You are expected to mail your Tutor Marked Assignment to your facilitator before the schedule date (at least two working days are required). They will be marked by your tutor and returned to you as soon as possible.

Do not delay to contact your facilitator by telephone or e-mail if you need assistance.

The following might be circumstances in which you would find assistance necessary, hence you would have to contact your facilitator if;

1. You do not understand any part of the study or the assigned readings
2. You have difficulty with the self-tests
3. You have a question or problem with an assignment or with the grading of an assignment.

You should endeavor to attend the tutorials. This is the only chance to have face to face contact with your course facilitator and to ask questions which are answered instantly. You can raise any problem encountered in the course of your study.

To gain much benefit from course tutorials prepare a question list before attending them. You will learn a lot from participating actively in discussions.

Summary

Research methodology is a course that intends to provide concept of the discipline and is concerned with how to collect data and conduct research. It teaches you how to sample when to use what method, ethics of research e.t.c

Upon completion of this course, you will be equipped with enough knowledge and guide to conducting a research, how to find necessary materials and writing or design a report or a study.

In additions, you will be able to answer questions of the type.

1. What is research?

2. Show diagrammatically the research process
3. Explain the uses/purpose of social research
4. What do you understand by the ethnics of research?
5. How do you conduct a literature review
6. What do you understand by library resources?
7. Explain the principles of right to know you should be able to answer these and many more questions. To gain the most from this course, endeavour to apply the principles, you have learnt to your understanding.

I wish you success in the course and I hope you will find it both interesting and useful not only in the course of your study but in life.

MODULE 1: PURPOSES/USES OF RESEARCH**UNIT 1: Concept of Research**

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1.0 INTRODUCTION

Research is conducted for a reason, primarily, “finding out” .NO matter what you want to find out, you need to plan. First, specify as clearly as possible what is it you want to find out and secondly, determine the best way to do it. In this unit, we shall examine the three purposes of research.

2.0 Objectives.

By the end of this unit, you should be able to:

- define research
- Know three of the most common and useful purposes of research
- See reasons why and thus the uses of social research,

3.0 What is research?

To understand research, we need to understand science because research is science and a researcher is a scientist invariably. This is in the sense of one now articulates complex theories a thinker who quotes, profusely, the brilliant ideas of other thinkers and makes use of them to advance knowledge and improve the lot of humanity. We can understand science here to means the activity involving gathering and use of information if it follows the scientific method (see module 2 unit 1). Looking at the scientific method, we see that this is what research actually does. We can therefore

define research as any organized enquiry that aims at providing information for solving identified problems.

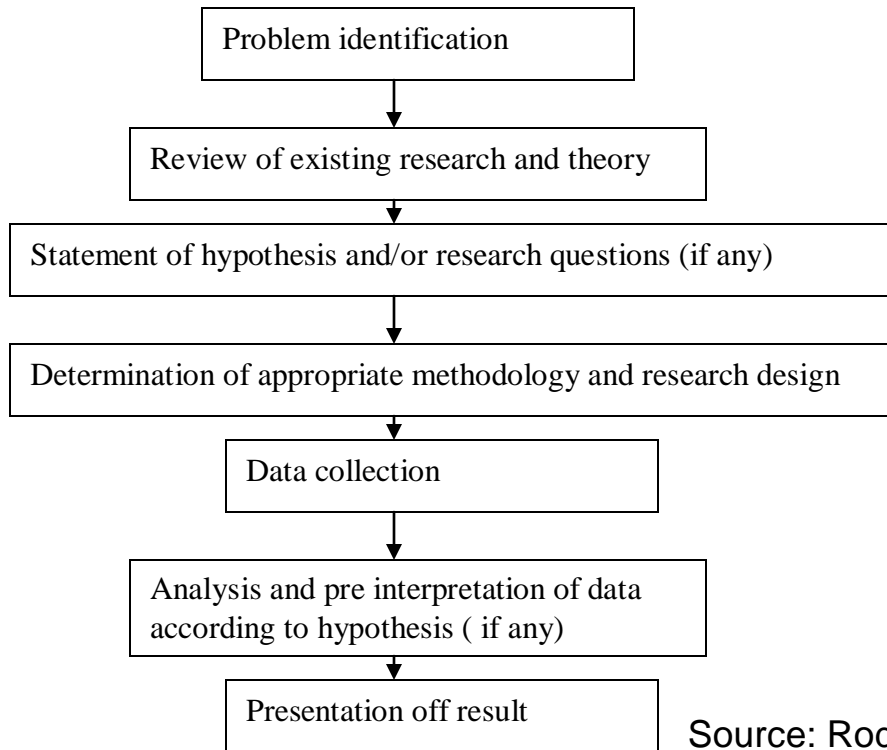
Let's look at different definitions.

- Longman's dictionary of contemporary English defines Research as "a serious and detailed study of a subject aimed at learning new facts, scientific laws and testing ideas"
- Richard (1988) defines research as "to search again, to repeat the process of looking in order to verify or expand the first result".
- Encyclopedia Americana views research to be derived from the word to "search" meaning "looking for"

3.1 The Research Process

Research is a systematic activity directed towards discovering and the development of an organized body of knowledge. So, we can say that the research process is a systematic and objective process of investigation, through which generalizations, principles and theories are developed resulting in the prediction and possible solution to problems or control events.

The research process is shown diagrammatical



Source: Rodney S. (1987)

3.2 PURPOSE OF RESEARCH

Three of the most common and useful purposes of social research are:

- (i) Exploration,
- (ii) Description and
- (iii) Explanation.

A given study or research can have more than one of these purposes and social research serves many other purposes. We shall consider the three purposes separately.

3.2.1 EXPLORATION

A subject of study like juvenile delinquency, women's right, child abuse etc is conducted to explore the topic. Lets consider child abuse for example, there is much out cry on child abuse, organizations, individuals and the government are all crying out against as a social research topic, you may want to learn more about it, what constitutes child abuse, How widespread is it? What levels and degrees of child abuse are there within the community? What actions are taken to prevent it? What punishment(s) if any are given to child abusers? To the, what help and how are they rehabilitated. An exploratory study could help you find at least approximate answers to some of these questions.

Exploratory studies are appropriate for more persistent phenomena and are sometimes pursued through the use of focus groups or guided small-group discussions. This technique is frequently used in market research. Exploratory studies are most typically done for three purposes.

1. To satisfy the researcher's curiosity and desire for better understanding
2. To test the feasibility of undertaking a more extensive study
3. To develop the methods to be employed in subsequence study

Exploratory studies are quite valuable in social scientific research. They are essential whenever a researcher is breaking new ground, and they almost always yield new insights into a topic for research. They are also a source of grounded theory.

The shortcomings of exploratory studies include:

- They seldom provide satisfactory answers to research questions.
- They are seldom definitive because of representativeness

3.2.2 Description

Many social scientific studies are done to provide a description of situations and events. The researcher observes and then describes what was observed. Consider the 2005 census in Nigeria. The goal of the census is to describe accurately and precisely a wide variety of characteristics of the population in wards, local government and states that is why the census included number of electronic appliances etc. Other examples of descriptive studies includes, crime rates for different states and a product marketing survey that describes the people who use or would use a particular product. A researcher who carefully documents or reports the events that take place during riot serves a descriptive purpose.

Many qualitative studies aim primarily at description, but researchers usually go on to examine why the observed patterns exist and what they imply

3.2.3 EXPLANATION

Once a descriptive study has been conducted, a researcher tries to explain why certain patterns exist and what their implications are. Descriptive studies answer questions of what, where, when and how explanatory studies address questions of why.

For instance, reporting the voting intentions or directions of an electorate is descriptive but reporting why some people plan to vote for one candidate and others for another is explanatory. Reporting why crime rates in big cities like Lagos and Kaduna is higher than in cities like Zaria involves explanation; identifying variables that explain why some cities have higher crimes than others is also explanatory.

3.3 REASONS/USES OF RESEARCH

Research is needed and as such useful to generate information for decision making. It is needed to collect data or generate information on certain (social) subjects or events from which results will be obtained and thus decisions will be made. There is need to make rational choice based on valid criteria among alternative resources, practices and procedures.

Rapid changes in social and technological fields, innovation and demonstrability in the conventional assumptions and practices necessitate carrying out research.

1. The impact of modern technology such as computer, engineering appliances and other modern information systems which call for quantifiable information, logically defined concepts, verifiable and valid objectives necessitates research.
2. It also finds use in extending the frontiers of knowledge in a given area with immediate application to existing problems. This is the case of basic research which is aimed at discovering basic truths or basic principles and not for direct practical utilization of the findings as in projects, thesis/dissertations carried out in academic institutions.
3. It provides quantifiable answers to problems and also allows users to evaluate the findings by providing a detailed account of how the results were obtained. This makes it paramount to acquire the following
 - i. a sound knowledge of research design
 - ii. a good understanding of the techniques of measurement
 - iii. A grip of methods of statistical analysis and the ability to interpret statistical tables.

- Research helps to formulate policies knowledge grows through a process of demolishing old theories and erecting new ones, especially as yesterday's solutions may not adequately answers today's questions.

Thus we can see that social research is of paramount importance to any society which desires to develop and to grow.

Self Assessment Exercise

Briefly explain the following

- (i) Research
- (ii) Research method
- (iii) Exploration

4.0 CONCLUSION

Social research is conducted for various purposes as we have seen and no society can function successfully without social research for then there will be no room for the growth of that society.

5.0 SUMMARY

In this unit, we have learnt that

4. research is an organized enquiry aimed at providing information for solving identified problems amongst others
5. research follows a sequence of steps
6. There are three (3) main purposes of research viz: exploration, description and explanation.
7. Research is very useful to the growth of any society, haven seen the various reasons why research is conducted.

6.0 TUTOR MARKED ASSIGNMENT

- a. Diagrammatically show the various steps followed in research
- b. Why is research necessary?
- c. Explain the uses of research

Further Reading/References

Razaq B. and Ajayi O. () Research methods & statistical analysis

Rodney S.(1987)

Richard (1988)

Encyclopedia Americana

Longman Dictionary

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1.0 Introduction

How can we define knowledge? How do we come about the things we know? These questions and many more are answered in this unit.

2.0 Objectives

By the end of this unit, you should be able to:

- Define knowledge
- Explain the various sources of knowledge

3.0 DEFINITION OF KNOWLEDGE

According to John Locke (1689) Book of knowledge and probability. Knowledge is the perception of the agreement or disagreement of two ideas. This gave the first hint of what knowledge is all about. Since then, others have tried to refine it.

Davenport and Prusak (1998, p.5) define knowledge as “a fluid mix of framed experience, contextual information, values and expert insight that provides a framework for evaluating and incorporating new experience and information. This definition consist of two parts

1. The first is content, “a fluid mix of framed experience, contextual information, values and expert insight” This includes a number of things that we have within us, such as experiences, belief, values, how we feel, motivation and information.
2. The secondly part defines the function or purpose of knowledge, “that provides a framework for evaluating and incorporating new experiences and information. This relates to locke’s definition – we have within us a framework (one idea) that we use for evaluating new experiences.

According to Peter F. Drucker () in the New Realities. Knowledge is information that changes something or somebody- either by becoming grounds for actions or by making an individual (or an institution) capable of different or more effective action.

Finally, we look at oxford English Dictionary definition of knowledge, as

- i. expertise, and skills acquired by a person through experience or education; the theoretical or practical understanding of a subject
 - ii. what is known in a particular field or in total; facts and information
- or

- iii. Awareness or familiarity gained by experience of a fact or situation.

There is no single agreed definition of knowledge presently, nor is there a prospect of one, but there is numerous competing theories as we have seen. We can however say that knowledge acquisition involves complex cognitive processes: perception, learning, communication, association and reasoning. The term knowledge is also used to mean the confident understanding of a subject with the ability to use it for a specific purpose if appropriate.

3.1 SOURCES OF KNOWLEDGE

Knowledge can be acquired in many ways there are however four basic methods available for knowledge acquisition in a given society. They are

1. Method of tenacity (tradition)
2. Method of authority
3. Method of intuition
4. The scientific Method

3.1.1 METHOD OF TRADITION

Knowledge acquisition in this method is through societal belief systems like superstition, taboos, etc which is accepted or believed by members of a community or society. These belief systems are passed down from

generation to generation and they vary from culture to culture. This is rated as the crudest or most localized way of acquiring knowledge, as such is not encouraged in gathering data for contemporary educational or behavioral research.

3.1.2 METHOD OF AUTHORITY

This is a process of acquiring knowledge through established authority. An example is religions knowledge, if the Bible or Qur'an proclaims something, it is taken to be true on faith. Another example is science, a scientist proclaims that every atom has a nucleus, and there can be no doubt about the proclamation. A lot of human progress is made by acquiring knowledge through this method as shown by evidence. Authoritative statements of science include:

- Archimedes principle
- Bohr's atomic theory
- Piaget's developmental psychology
- Darwin's theory of evolution

3.1.3 Method of Intuition (Or a priori methods)

When knowledge is acquired by chance of circumstances, when an understanding of certain events or situations or problems or the truth of certain event or situation suddenly comes to light without reasoning and

logical series or unconscious knowledge is acquired suddenly. Intuition is said to be at work.

Thus the method of intuition is a self revealing and self-convincing process which occurs in a convincing manner. Priorists normally believe that truth is through intuition without any search or further proof of what is being considered as the truth.

3.1.4 Method of Science (scientific method)

Is the process acquiring knowledge through systematic and organized investigation. This method is considered to be the most superior compared to the other three methods of gaining knowledge because of the following reasons.

1. Scientific investigation follows a definite procedure;
2. Aims at similar ultimate conclusions while investigating common problems ;
3. Is self regulating as well as self-correcting;
4. Has been proved to be very objective and highly develop;
5. Has a way of constantly checking and cross-checking the works of science;
6. Propositions in science are subjected to empirical tests before acceptance or refutation;

8. Scientists believe in testing alternative hypotheses even if an Earlier one has been supported with empirical evidence;
9. The entire science community concurs that any testing procedure should be open to public examination and criticism.

Self Assessment Exercise

Sources of data

3.2 Primary and secondary

Data are classified as either primary or secondary according to the possible sources of data that exist. When data results from direct observation of an event, ,manipulation of variables, researches like conducting experiments and responses to questionnaires then the data are said to have been obtained from primary sources and as such are primary. Data thus obtained need refinement in the form of classification, publication or analysis. All data in the above motioned forms create another source-secondary source.

Data collected from a secondary source are called secondary data.

In module 2 unit 2, we studied how research designs are used to generate primary data. This is because direct observation of events, phenomena or an experiment is involved. It is from processing these primary data we obtain secondary data. Secondary data cannot be obtained from observation. For instance, when students are given questionnaires to ascertain those who like mathematics, the data gathered through this exercises are from a primary source and as such are primary data.

If some statistical analyses are done on these data to show the percentage ratio of male to female who like mathematics say with charts etc. showing the analysis we obtain secondary data. Any research using this typed or printed or recorded information on any media is collecting secondary data from a secondary source. Secondary data are also called second hand information.

3.3 Differences between primary and secondary sources

	PRIMARY SOURCE	SECONDARY SOURCE
1.	Gives primary data	Gives secondary data
2.	Results from observation manipulation of variables, research- - experiments, questionnaire etc e.g Utensils, building etc.	Results processing primary data
3.	Include documents like official records, files, wills, diaries, minutes of meeting, research reports etc	Include items with no direct being to an event i.e. no physical relationship with events under study e.g. quoted materials, textbooks, documents relics, prints etc.

4.0 Conclusion

Knowledge is an integral part of human beings, we possess knowledge we do not even know we possess, or how we came about it. No matter how it is acquired, knowledge acquisition or the thirst for knowledge differentiates man from animals.

5.0 Summary

In this unit, we have learnt that:

- There are four sources of knowledge, of which the scientific method is the most superior
- The scientific method follows a definite procedure
- Data are obtainable from either the primary or the secondary source

6.0 Tutor Marked Assignment

1. Explain why the scientific method is considered the best method of acquiring knowledge.
2. Differentiate between primary and secondary sources

7.0 Further Reading/ References

MODULE 2 : SAMPLING AND MEASUREMENT

Unit 1: Basic Terminologies in Research

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1.0 INTRODUCTION

In research, certain technical terms are used in presenting information for conciseness and precision. Some of the more commonly used terms we shall attempt to define and explain in this unit. These include terms like Element, Population, Sample, Data Variables etc.

2.0 OBJECTIVES

- By the end of this unit, you should be conversant with various terms used in research.
- Sampling terminologies
- Statistical terms in sampling and
- Operational definition

3.0 Definitions

3.0.1 ELEMENT

Any individual case of a given population is an element of that population. According to Richard (1988) and, William (1981) an element is an object on which a measurement is taken. For instance, a student of a school is an element of that school. A measurement on an element could be whether he is a first or second class student of that school depending on the issue in question.

3.0.2 POPULATION

A population is the set or collection of all elements, objects or events of interest or on which an inference is desired. It is a collection or set of individuals or objects whose properties are to be analyzed. It can be finite or infinite.

A finite population is one whose elements are finite or could be physically listed and an infinite population is one whose elements are unlimited or infinite.

Example: collection of all the people in Nigeria. The measurement is sex and age for census. All students in Nigerian university.

- All business men/woman
- All debates in secondary schools.

3.0.3 STRATUM (STRATA)

A stratum (singular form) is a sub-group within a given population constituted on the basis of sex, class, race, profession size etc. Thus, it is possible to have different strata (Plural form) within a given population.

Example:

- All male students/all female students in Nigerian universities.
- All foreign students in Nigeria.

3.0.4 Variables

Variables are certain characteristics of objects which are amenable or subject to change and can take on different values at any given time depending on the condition(s) imposed on them. For instance, the age, height or scores of students X can take values 1 to 9 as shown in table 3.0 above.

In research, variables may be classified into five (5) major types, namely:

- Independent variable
- Dependent variable
- Moderate variable
- Intervening/Extraneous/concomitant variable.
- Control variable.

Independent Variable

The characteristic of an object in a study that may be selected manipulated or measured by a researcher in order to determine the relationship established with an observed variable (dependent variable) is what we call an independent variable. Often referred to as treatment (stimulus) variable include:-

- Teaching method

- Type of textbook
- Colour of ink or size of print
- a drug e.t.c

DEPENDENT VARIABLE

Is the characteristic of an object that is observed and measured in order to determine the effect of the manipulated or selected variable. It is also known as response variable. Examples of dependent variable

- Learning measured by test score.
- Divorce measure by juvenile delinquencies
- Educational qualification and occupation
- The relationship between two variables X and Y, whereby, we manipulate X, inducing a change in Y. We say that Y depends on X. Mathematically, we write $Y=f(X)$

3.0.4 Data

Data is a set of measured or described observations like the sex of students (male and female) or age of students and height or weight or hot or cold etc.

Data are a set of research information expressed in quantifiable forms for the purpose of statistical analysis.

Example:

- The heights of 50 students.
- Age of 100 students.
- Examination scores of 1000 students.
- Sales record.

Below is a table showing sales record frequency distribution

Item	No of sale (bag, carton)
Rice	10
Milk	50
Soap	70
Milo	25

The raw scores of 20 students' achievement in mathematics are given by 2,5,4,5,3,2,6,5,2,3,1,1,3,4,7,9,4,6,7,9 and could be arranged thus,

Frequency Distribution

Scores (x)	Frequency f	Cumulative frequency CF
1	2	2
2	3	5
3	3	8
4	3	11
5	3	14
6	2	16
7	2	18
8	0	18
9	2	20

Table 3.0

3.0.5 Frequency

The most basic format of presentation and analysis of univariate (one variable) data is a frequency distribution. It shows the number of times a particular event or value of a variable occurs in an obtained data. In table 3.0, the number of students who score 4 is 3, so

When $x = 4$, $f = 3$

$$x = 6, f = 2$$

While the cumulative frequency is the sum of the successive frequencies.

Self Assessment Exercise

Based on table 3.0

- i. What is the frequency for $X = 1$ and $x = 8$
- ii. How many students score 3?

3.1 Sampling Terminologies

Here, we shall learn about terms use in sampling; these include sample, sampling units, a frame, random etc.

3.1.1 Sampling

The process of selecting units e.g people, organizations, objects e.t.c from a population of interest so that by studying the sample we may fairly generalized our results back to the population from which they were chosen.

3.1.2 Sampling units

Are non-overlapping collections of elements from the population that cover the entire population. A household (collection of elements) may be considered as a sampling unit in voting, in which case, it must be defined so that no voter may be sampled more than once. That is each voter has a chance of being selected in the sample.

3.1.3 A Frame

A frame is a list of sampling units. If we specify a unit, a list of voters may serve as a frame for an opinion poll. If we take household as a sampling unit, then a telephone directory, a city directory or a list of household heads obtained from census data can serve as a frame.

3.1.4 A sample

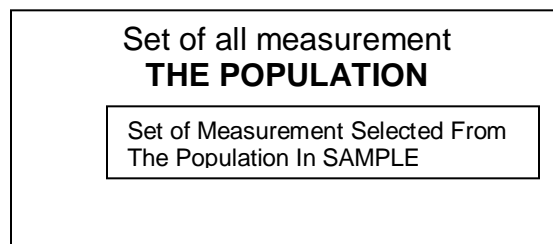
Is a collection of sampling units drawn from a frame or frames, and can be defined as a selected group which is a fair representation of the entire population of interest. That is a subset of a population. Alternatively, A sample is a subset of a population from which data for a study is collected. If the sample is a good representative of the population from

which it is drawn it is called an unbiased sample otherwise it is said to be a biased sample in relation to the population in question.

Examples

- Student representative or Governing Body of a given polytechnic/college or university is a fair representation of the entire population of said institution.
- Each legislator of a ward/district determines a fair representation of the House of Legislators.

Population and sample



3.1.5 RANDOM

When selection is done in such a way that the chosen one is a fair representation of the target population then the choice is said to be random. Randomness means that there is no known law capable of being

expressed in a language that correctly describes or explains events and their sample.

3.2 OPERATIONAL DEFINITION

Operational definition can be defined as the concrete and specific definition of something in terms of the operation(s) by which observations are to be categorized. We have seen the meaning of variables and how variables stand for certain quantities, depending on our definition of them.

We also studied in module in unit in the (4) four sources of knowledge. We learnt that knowledge can be acquired through scientific method. Three main elements can be identified in the traditional model of science; theory, operationalization and observation. A scientist conceives of an idea, theorizes, defines operations and then observes.

Operationalization is the process of developing operational definitions or specifying the exact operations involved in measuring a variable.

Theory: The scientific method begins with a theory, from which hypotheses that can be tested are derived. For example, we theorize about the causes of juvenile delinquency, and arrive at the hypothesis that

delinquency is inversely related to social class. That is the higher the social status of a family the less likely delinquency.

Hypothesis: An hypothesis is a tentative about empirical reality, involving a relationship between 2 or more variable.

Operationalization: This is where hypothesis testing comes in, to test a hypothesis; we need to specify the meanings of all the variables involved: social class and delinquency in the case above. If we define delinquency as “being arrested for a crime” etc. and in this study, we define social class or status as family income, then for testing our hypothesis, the meaning of our variables is exactly as defined. For a researcher testing a hypothesis, the meaning of variables is exactly and only what the **Operational Definition** specifies. Next, we need to specify how to measure the variables we have defined. Operationalization literally means the operations involved in measuring a variable. We might decide to Operationalized delinquency in the form of the question “Have you ever stolen anything?” or “Have you even been convicted of any crime?” those who respond positively are classified as delinquents and those who respond negatively are classified as non-delinquents.

In the same way, we operationalize family income by asking respondents, “What was your family’s income last years?” then

categorizing family income under N50,000, N50,000- N100,000, N100,000- N300,000 and N300,000 and above. Our Operationalized hypothesis is that the highest incidence of delinquents will be found among respondents who select the lowest family category (under N50, 000).

OBSERVATION: This is the final step in the traditional model of sciences. It involves actual observation, looking at the world and making measurements of what is seen.

Lets suppose our findings are:

<u>Category</u>	<u>Percentage Delinquents</u>
Under N 50, 000	20
N 50, 000- N 100, 000	15
N 100, 000- N 300, 000	10
N 300, 000 and above	005

This data would support our hypothesis, if however our findings are:

<u>Category</u>	<u>Percentage Delinquents</u>
Under N 50, 000	15
N 50, 000- N 100, 000	15
N 100, 000- N 300, 000	15
N 300, 000 and above	15

Then our hypothesis is disconfirmed. Disconfirmability is an essential quality of any hypothesis, if there is no chance that our hypothesis will be **disconfirmed then it hasn't said anything meaningful.**

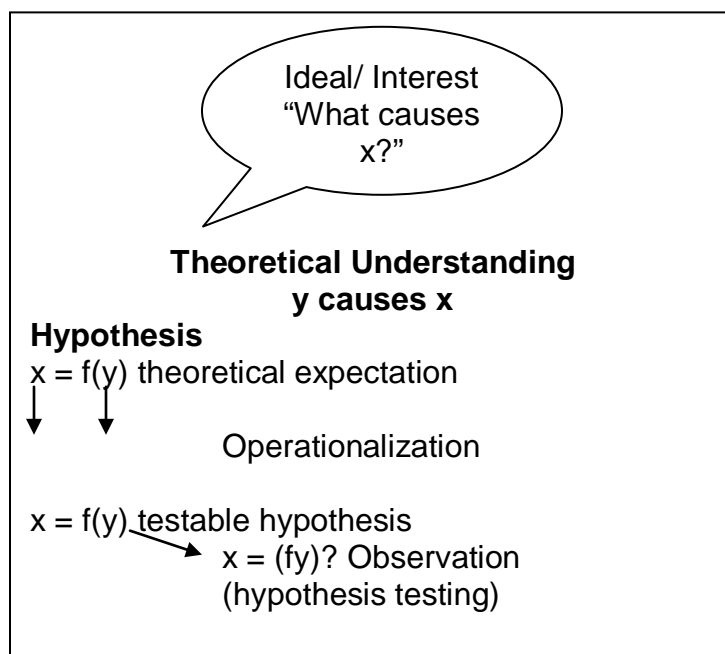


Fig. 3.2 The traditional image of science

The above figure provides a schematic diagram of the traditional model of scientific inquiry, beginning with a scientist's conceptualization of an ideal. Next is the development of a theoretical understanding, which results in a hypothesis or an expectation about the way things ought to be in the world if the expectations are correct. In our example with delinquency, uppercase denote theoretical expectation of delinquency (X)

is a function of family income (Y) where the lowercase x stands for concrete indicate of x i.e. what obtains in the real world.

Thus operationalization process results in the formation of testable hypothesis. Spss and micro case allows you to skim data sets to learn the kinds of variables that might be operationalized in social research.

Self Assessment Exercise

1. How would you define operational definition and operationalization?

4.0 Conclusion

Definition of operations is an integral part of any research. This can determine the success or failure of a research.

5.0 Summary

In this unit we learnt that

- An element is a unit of a given population
- A population is a set or collection of elements, finite or infinite
- A stratum is a sub-group within a given population
- An operation definition is the concrete and specific definition of something in terms of operations to be categorized
-

6.0 Tutor Marked Assignment

1. Define the following terms
 - a. Stratum
 - b. Sample
 - c. Population
 - d. Variables
 - e. Frequency
2. Select a social problem of interest to you, like child abuse, sexual discrimination racism etc. define the main variables and operation on them.

7.0 Further Reading/References

www.socialresearchmethods.net

Razaq B. and Ajayi O. () Research methods & statistical analysis

Richard (1988)

William (1981)

MODULE 2: SAMPLING AND MEASUREMENT

Unit 2: Sampling Design

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1.0 Introduction

In unit 1, we defined certain sampling terminologies, sampling inclusive. Now that we know what sampling is, we shall learn various methods of sampling, probability and non probability sampling methods.

2.0 Objectives

By the end of this unit, you should know the:

1. Characteristics of a good sample
 - Probability sampling techniques
 - Non-Probability sampling techniques

3.0 Reasons for sampling

Sampling is done for a purpose or reason and whether we sample from a finite or infinite population, it can be a tedious, expensive and time consuming task. Some of the reasons why sampling is done include.

1. If we study a sample of a population, we can obtain sufficient knowledge of what obtains in the entire population.
2. Sampling is sometimes the only way to estimate population characteristics
3. It is cheaper than studying the entire population
4. Sampling is more thorough and affords us better supervision than with a complete coverage of the entire population.
5. Quicker results are obtained than with a complete coverage

3.1 Characteristic of a Good Sample

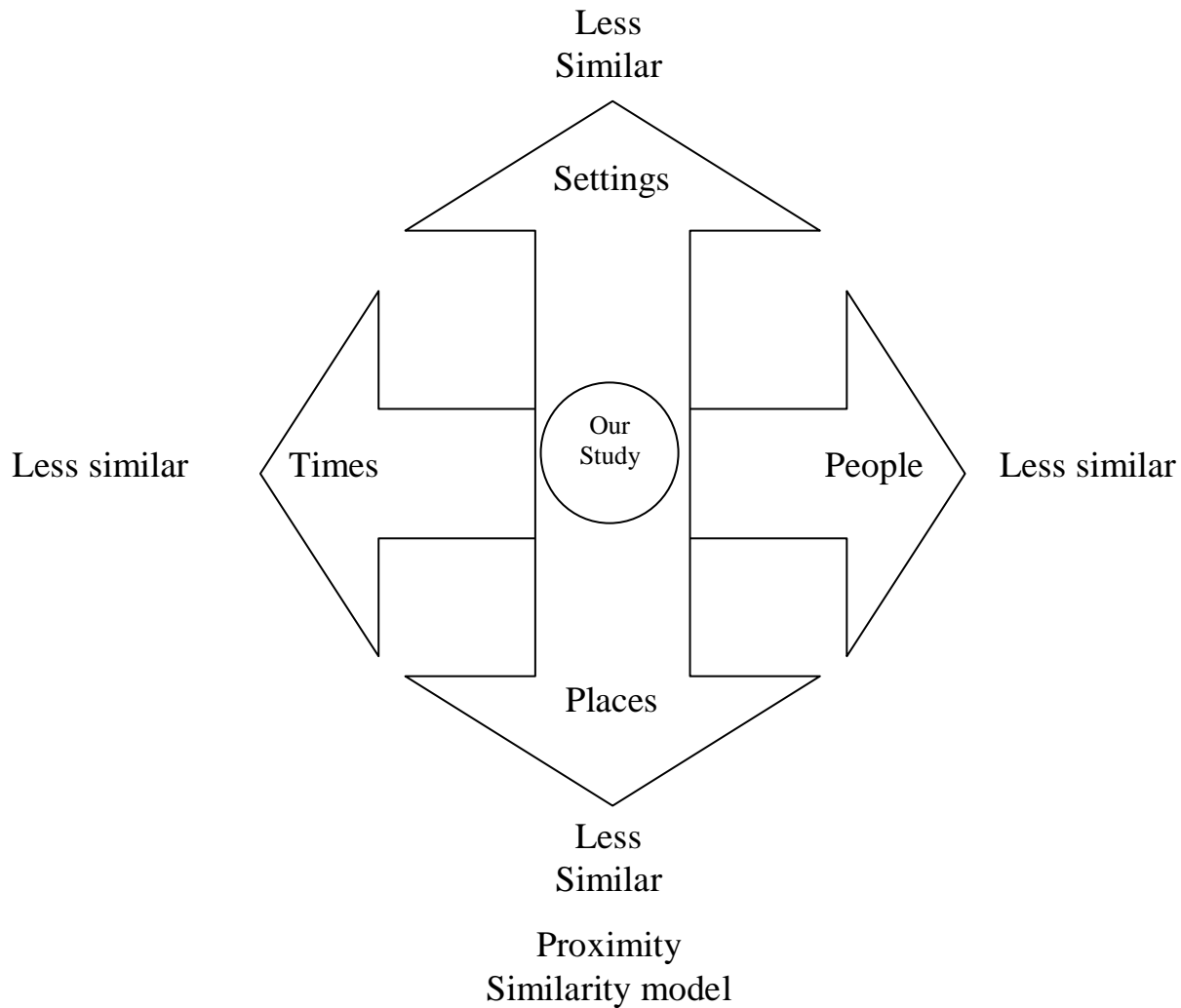
Through sampling, the researcher tries to estimate, as accurately as possible, the characteristics of a population. If the sample is a complete representation of the population from which it is drawn then its estimate is 100% accurate.

- Representativeness is the hall mark of the best sample. That is, a sample which is a complete census of the population itself because every element in the population is represented in the sample is said to be representative of the population. Representativeness is related to;
 1. Precision: Minimal sampling error or error variance and random fluctuations
 2. Absence of sampling bias; known or unknown influence that causes the scores to tend more to one side than the other.

3.2 External Validity

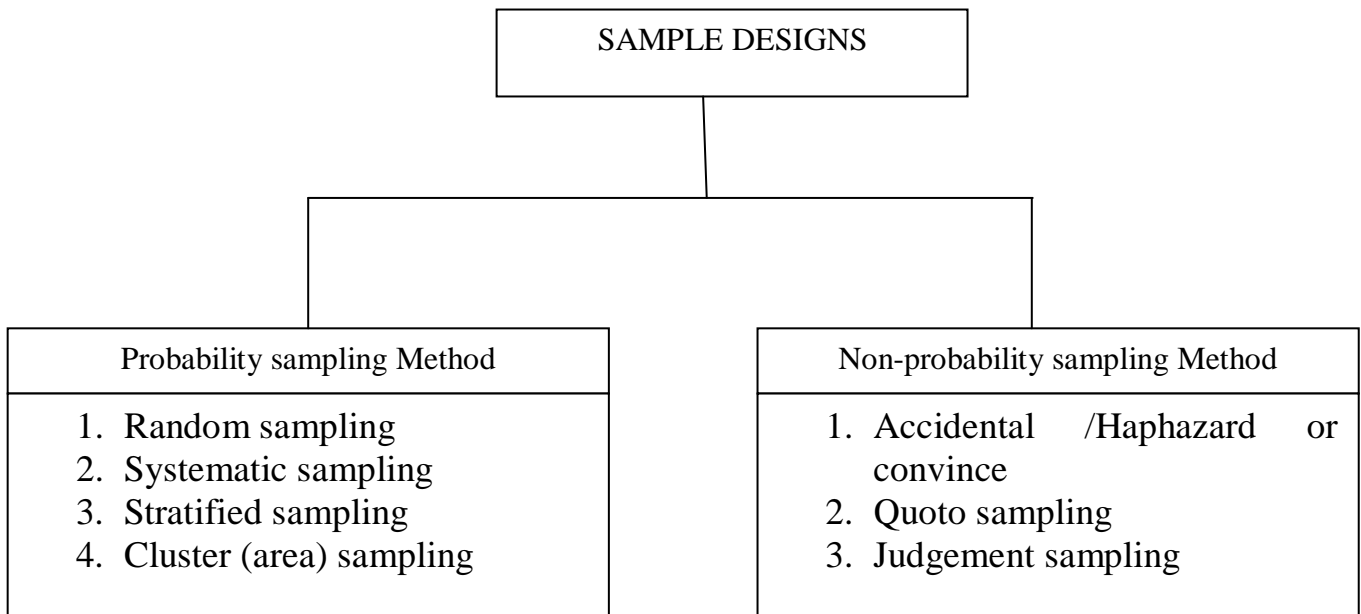
Validity refers to the approximate truth of propositions, inferences or conclusion, so, external validity refers to the approximate truth of conclusions that involves generalizations. It is the degree to which conclusions in the study would hold for other persons in other places and at other times. In the sampling model approach, you start by identifying the populations to which you generalize back to. Then a fair sample is drawn from the population. The other approach is called proximal similarity model. Here, we think of different generalizability contexts and develop a theory about which contexts are more like our study and

which are less so. We generalize the results of our study to other persons, places or time that are more like (proximally similar) our study. Generalization in this case can be done with certainty.



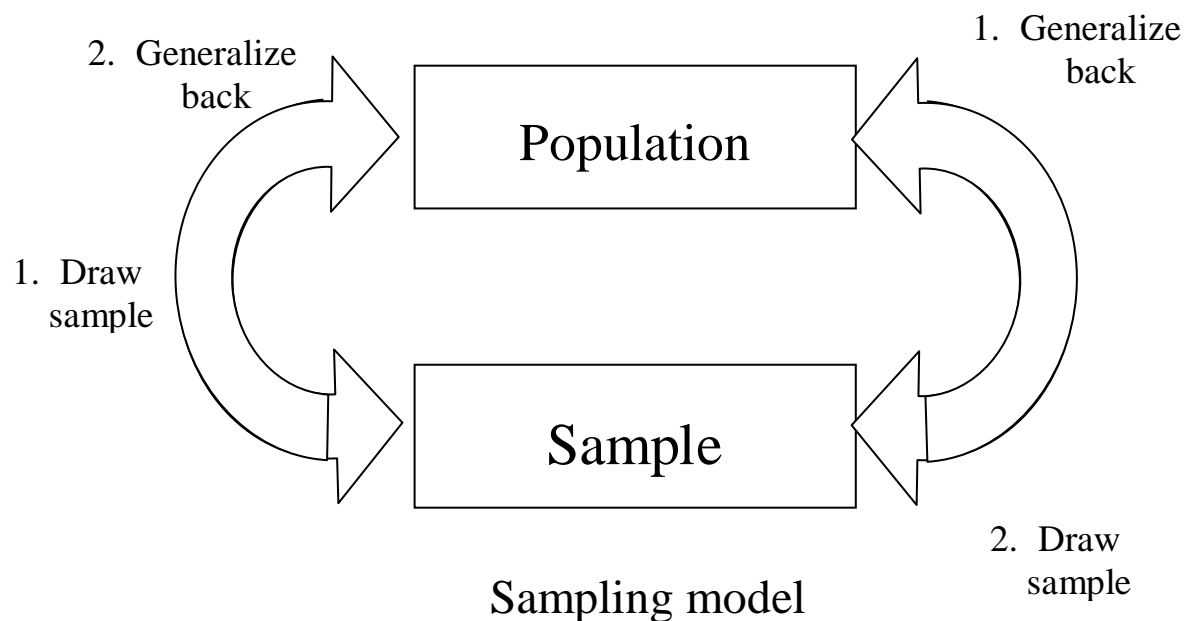
3.3 Sampling design

There are two types of sampling designs or models, probability and non – probability sampling methods.



3.3.1 Probability Sampling

Any method of selection that uses some form of random selection is called probability sampling. That is, the sampled items or subjects are chosen randomly and every item in the population has equal probability of being chosen. Human beings have for long been practicing various forms of random selection, like, picking a name out of a hat or choosing a short straw. These days, we use computers as the mechanism for generating random numbers which the basis for random selection.



Symbols

- N = The number of cases in the sampling frame
- n = The number of cases in the sample
- ${}^N C_n$ = The number of combination (subsets) of n from N .
- f = n/N = The sampling fraction.

Method of probability selection includes

- Random sampling
- Systematic sampling
- Stratified sampling

3.3.1.1 Simple Random Sampling

Simple random sampling is the simplest form of random sampling, it uses the principle of randomization which is a procedure of giving every subject in a population an equal chance of appearing in the selection.

Objective of simple random sampling: To select n units out of N such that each ${}^N C_n$ has an equal chance of being selected.

Procedure: Use a table of random numbers a computer random generator, or a mechanical device to select the sample.

We can use one of the following methods.

- Method of Shuffling cards: Imagine that an organization comprising 20 top officials desires to select a chairman, director an accountant and a secretary. Each top official has an equal chance of being selected for each position. One method is to write the names of each official on a card and shuffle the cards, then take the top card each time the cards are shuffled, continuously until all the positions are filled. Here, the cards are randomized and each time a position is filled, that card is not placed back into the deck to avoid one person being selected twice to different positions. Now, there are four (4) positions to be filled, we have a sample size of n from a population of twenty (20) N . the sampling fraction $f = n/N = 4/20 = 1/5$ or 20%. Another mechanical technique is to use a ball machine, like the ones use in lotteries.

All these methods are tedious and the quality of the sample would depend on how thoroughly you mix them up. Neither of these methods is very feasible. Here is a simple procedure that is very useful if the names are already on the computer. Many computer programmes can generate a series of random

numbers. You can copy and paste the list into a column in an excel spread sheet. In the next column paste the function.

= RAND () which is Excel's way of putting a random number between 0 and 1 in the cells. Then sort both columns _the list of names and the random number_ by the random numbers. This rearranges the list in random order from the lowest to the highest random number. All we have to do next is to take the first four and assign to the position in that order. Simple random sampling is a fair way to select a sample, it is easy to generalize the results from the sample back to the population. It is however not the most statistically efficient method of sampling and a good representation of sub groups of the population may not be obtained.

Another method is the use of a table of randomly numbers. Here there is a minimum of sampling bias due to the way the table is compiled. A table of random numbers contains numbers chosen entirely without human intervention. Thus every number 1,2,3,4,5,6,7,8,9,0 has a chance of appearing in the selection.

How to use a table of random numbers.

Suppose you are required to randomly select a sample of 100 units from a finite population of 7000. The population is a four digit number and therefore any four digit number is out of this population.

Table of Random numbers (partial)

95457 30566 65482

95276 17894 63564

66954 52324 64776

10457 36872 83214

03704

To choose the 100 units, first of all list all the items in the population serially 1, 2, 3.....7000 next, circle any one to four digits each with a value less than the population size 7000 as shown above. Finally, go to the serially numbered population and pick the numbers represented by the selected random digits. The above example shows that we selected 954th, 6695th, 1045th, 46th, 3th e.t.c.

The limitation in this method is that it can only be used in a finite population where all the items or subjects can be listed and numbered serially.

3.3.1.2 Systematic sampling

To achieve a systematic random sampling,

- Number the units in the population from 1 to N
- Decide on the n (sample size) that you want to need
- $K = N/n =$ the interval size
- Randomly select an integer between 1 and k
- Then take every kth unit

For example, to select 5 from a sample of 40 i.e $N = 40$ and $n = 5$.

To use systematic sampling, we list the population in a random order. The sampling fraction $f = 5/40 = 1/8 = 12.5\%$

Interval size $K = N/n = 40/5 = 8$

We select an integer from 1 to 8, say 3.

To select the sample, start with the 3rd unit in the list and take every k^{th} unit (8 unit) so we sample 3, 11, 19, 27.

$N = 40$

$n = 5$

$N/n = 8$

Select K between 1 to 8 (select 3)

Start with #3 and take every 8th unit

1	<i>11</i>	21	31
2	12	22	32
<i>3</i>	13	23	33
4	14	24	34
5	15	25	<i>35</i>
6	16	26	36
7	17	<i>27</i>	37
8	18	28	38
9	<i>19</i>	29	39

10	20	30	40
----	----	----	----

3.3.1.3 Stratified sampling

In this method, the population is grouped under definite characteristics called strata. From these, strata, the sample is chosen using random selection technique on each stratum. We divide the population into non-overlapping strata $N_1 + N_2 + \dots + N_i = N$. Then we do a simple random sample of $f = n/N$ in each stratum.

Stratified random sampling assures that key subgroups of the population especially small minority groups are represented.

Suppose we want to research on the misuse of drugs in Nigeria. We stratify thus

- Educated/literate/professionals
- Illiterate working class
- Illiterate nonworking class

We then proceed to select samples from each stratum randomly. The number of people chosen from a particular stratum or level must be proportional to the stratum's share of the total population. By using extra methods of representativeness, we first identify certain characteristics that are being researched and then use them as a basis for further random sampling of the entire population, this makes stratified sampling superior to the simple random sampling and the systematic sampling methods.

3.3.1.4 Area/cluster sampling

This method is mainly used in geographically distributed population, where the distribution is in pockets or clusters of settlements. The clusters are then use as a basis for selection. So that each cluster will represent its share of the entire population, if the sub-population represented by each cluster is known, this can be used as a basis for proportional selection of samples. For instance, we select a student union representative for ABU Zaria so that both males and females are equally represented. We identify clusters or areas in student hostels.

Amina Hall female Hostel

Suleman Hall Male Hostel

Alexandra Hall Female Hotel

Dan fodio Hall Male Hostel

We can now use this clustering as a basis for our sample selection. Random sampling is also used here to select the sample subjects from each cluster, making it as effective as stratified sampling.

Steps involved.

1. Identify the population to be sampled (all students in ABU Zaria)
2. Identify salient characteristics you think would enhance representativeness e.g gender.

3. Locate the areas where units or subjects with the characteristics cluster and know their respective sizes (population subsets).
4. Select using random sampling from each cluster making sure that the number of units selected from each cluster is proportional to the cluster's share of the total population.

3.3.2 Non-Probability/Sampling

The sampling in which personal judgment not randomness determines which units of the population are selected is called non-probability sampling. In some social research situations, the types of probability samples used in large scale social surveys is not permissible, as such, non-probability sampling methods have to be used. Take for instance a study of homelessness, where does one obtain a list of all the homeless people in Nigeria for instance and then randomize to take a sample. We shall look at three main types of non-probability sampling techniques.

- . Accident/convenience/snowball sampling
- . Quota sampling
- . Judgmental/purposive sampling

3.3.2.1 Accidental/Convenience/snowball sampling

Is a non probability sampling method used often in field research, whereby each person interviewed may be asked to suggest additional people for interviewing and so on and so forth hence the name “snowball” sampling. Looking at our example of the study on homelessness, one way of sampling is to stand by a supermarket, a church or a mosque and “accidentally” meet homeless individuals to interview, then ask them where to find more. A researcher who wants to have a feeling or an idea of a phenomenon of interest may find it convenient to stand (like news correspondent for NTA or Radio Nigeria) at a street corner with a cameraman and interview anybody he sees regarding opinions about certain measures like ASUU strike, monetization e.t.c. this type of sampling, as is the case with all other non-probability sampling methods lacks precision. It is accidental and convenient and therefore cheap and easy to use, but may lead to unreliable results. When a researcher is on little or no budget and is interested in having a smattering idea of a phenomenon of interest, this method is the best to use.

3.3.2.2 Quota Sampling

In this method, units are selected based on pre-specified characteristics, so that the total sample will have the same distribution of characteristics assumed to exist in the population under study, thus representativeness is some what assured. The method is similar to stratified sampling in probability sampling. In

a study along religious line on a campus for a example, if our population is say 10,000 students.

We may find the population breakdown as follows:

. Muslims	-	45%
. Christians	-	40%
. Traditionalist	-	15%

The researcher then selects the sample by assigning quota as follows

Muslims	4500	or	45%
Christians	4000	or	40%
Traditionalists	<u>1500</u>	or	<u>15%</u>
	<u>10,000</u>		<u>100%</u>

Although quota sampling resembles probability sampling, it has some associated problems;

- .The quota frame (proportion of each cell or sector) must be accurate
- . Selection of sample elements may be biased even though its proportion of the population is accurate.

3.3.2.3 Judgmental/Purposive Sampling

Here, the sample units are selected based on individual's judgment on which ones you consider representative of the population. For instance, on a study of birth control, using one's judgment, it is feasible not to interview men on this

issue, for they don't know much on this subject. Old men and women are also out, the decision to interview young girls and women between 16-40 is judgmental.

In some instances, it is desired to study a subset of a population where they are easily identifiable like top management, but it is not feasible to define and sample all top management in an organization. So, sufficient data for the purpose may be collect.

A major advantage of purposive sapling is that data from respondents who are difficult to locate but crucial to the study are obtained. A major draw back however lies in the fact that no assurance that the sample selected is a fair representation of a clearly specified population.

3.3.2.4 When to use non-probability sampling

Probability sampling is preferable to non probability sampling, but it may not be feasible some times, so non probability sampling techniques come in:

- . When the population is infinite or cannot be reached or can only be imagined

- . The type of statistical analysis also determines whether or not to use non probability sampling. Non parametric statistics is used by statisticians for analysis of data gathered through probability sampling method.
- . Where generalization of results is not necessary or may not be intended, representativeness is not important so the use of non probability sampling techniques does not matter.

Self Assessment Exercise

1. Describe or define the following
 - a. Probability sampling
 - b. Non – probability sampling
2. Advance reasons for sampling

4.0 Conclusion

Sampling whether probability or non-probability sampling involves selecting a sample from a population which should be representative to the population.

5.0 Summary

In this unit, we learnt that

- * We sample to obtain sufficient knowledge so we can generalize back to the entire population.
- * A sample should be precise and unbiased

- * We have two types of sampling designs_ probability and non-probability sampling
- * Despite the fact that probability sampling may be superior, some situations call for non-probability sampling techniques.

6.0 Tutor Marked Assignment

- Q1a. A university institution in Abuja is interested in studying absenteeism of various categories of staff including academic, non academic, casual workers and hospitals staff. If the institution employs a total of 5000 staff, whom live in different areas of Abuja, some are married with children with ages ranging from 19 to 65 and some live on campus, Gwagwalada metropolis, Nyanya, Suleja, Wuse and Maitama. How will you choose a sample of 1000 staff representative of all the characteristics of the population.
- b. Explain external validity

7.0 Further Reading/References

Earl B. () The basics of social research

Nnamidi A. () Research Methodology in the Behavioral sciences.

Razaq B. and Ajayi O. () Research methods and statistical Analyses

www.socialresearchmethods.com.

MODULE 2: SAMPLING AND MEASUREMENT

Unit 3: STUDY DESIGN AND MEASUREMENT

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1.0 Introduction

Study design refers to the methodological design of the research, where the researcher reports on his/her findings and then concludes. The worth of all scientific findings depends very much on the manner in which data were collected and analyzed. The following should always be included in any reporting of the design and execution of a survey the population, the sampling frame, the sampling method, the completion rate, and the method of data processing and analysis. Details of comparison should be given of other methods are used. These details can be given in a short space by an experienced researcher without omitting anything that is required for an evaluation of the study by the reader.

2.0 Objectives

By the end of this unit, you should be able to

- Define study design and measurement
- Design a project/thesis
- Know all about validity and reliability

3.0 Study Design

We present here a format for organizing and presenting reports of university degree project, theses and dissertations in business administration,

social sciences and other studies of problems in human services. This format may vary according to each student's supervisor's academic orientation and background, but it is generally accepted by most schools and faculty members.

Use of headings and sub-headings. Apart from the major heading every chapter of a report has a heading and several sub-heading. Sub-headings help to kindle or generate more interest in the reader apart from serving as a guide.

The undergraduate project does not require the writing of a research proposal, at best the supervisor asks the student to produce a one page proposal which is a statement of the problem.

Below is an outline of the presentation of a completed work (degree project, master's thesis or doctoral dissertation. Chapter 2, the literature review can be used with some flexibility.

Table of contents

Chapter 1: Introduction

- i. Introduction/general description of the area of study
- ii. Problem analysis
- iii. Purpose of the study/significance
- iv. Relevant research questions (tentative)
- v. Statement of the terms/concepts
- vi. Delimitation (scope) of the study
- vii. Significance of the research problem and justification for investigating it.

viii. References: Chapter 1

Chapter 2: Literature Review/Review of Literature

i. Historical background

ii. Model(s) and/or theories relevant to the research questions and hypothesis.

iii. Current literature based on each of the relevant variables of the model or theory.

iv. Summary of chapter

v. References: chapter 2

Chapter 3: Methodology

i. Introduction: A brief outline of the chapter

ii. Restatement of the research questions and hypothesis

iii. Research design

iv. Characteristics of the study population

v. Sampling design and procedures

vi. Data collection instrument

vii. Pilot study, test of validity and reliability of study instrument

viii. Administration of the data collection instrument

ix. Limitations of the methodology

x. References: chapter 3

Chapter 4: presentation and Analysis of data

- i. Introduction: A brief introduction to the chapter
- ii. Criterion group returns respondents characteristic and classifications
- iii. Presentation and analysis of data according to test of hypotheses
- iv. Presentation and analysis of data according to test of hypotheses
- v. Analysis of other data
- vi. References: chapter 4

Chapter 5: Summary, Conclusion and recommendations

- i. Summary or synopsis of the study including a comprehensive summary of findings
- ii. Conclusion drawn from the findings including how the study has answered the research questions and tested the hypothesis
- iii. Recommendations based on conclusion
- iv. Suggestions for further studies
- v. References: Chapter 5

Appendices: Bibliography

As enumerated above, we have five main chapters in a project in addition to appendices and bibliography. A project will not be complete without the following distinct parts.

Preliminary pages

* **Title page**

Or the cover page as it is called includes the title of the study written in the upper half of the page followed by the author's full names.

The lower half is a statement which reads. "A dissertation (thesis or project) presented to the faculty (or department or post graduate school of discipline in partial fulfillment of the requirement for the award of the degree of (Bachelor of Science, Business Administration, computer science e.t.c Master of Science e.t.c Doctor of Philosophy) of the University ofthis layout is standardized for every department, faculty of university but does not deviate extensively from what is given above.

*** Certification page**

This comes after the title page. Provisions are made here for signature of all the members of the project or thesis or dissertation committee or supervisors, dean of faculty or of the post-graduate school as the case may be in the institution in question.

The standard format goes thus this thesis (project or dissertation) written by _____ under the guidance of _____ and approved by _____ has been submitted and accepted by its members (has been submitted and accepted by the post graduate school of the university of) _____ in partial fulfillment of the requirement for the degree of master of science (Marketing), or Doctor of Philosophy Bachelor of Science (Accounting) e.t.c

Date _____.

Dissertation (thesis or project) committee

Chairman

Name

Member

Name

Member

Name

Dean

Dedication page

The author expresses some words of gratitude to those he holds dear or those who have been of immense help to him in his life but may not have contributed directly to the work for example.

Dedicated to my loving parent

Who did everything possible to ensure my education.

Although a whole page is devoted to dedication, the statement is kept brief and simple (Two or three indented lines).

* **Acknowledgement page**

All those who contributed directly are acknowledged in this page. Like the supervisor(s) for his assistance and guidance, other teachers, friends, parents typist e.t.c.

• **Abstract page**

This is a synopsis of the entire work which gives the reader a clear and precise idea of the whole study. It is done in about 100-200 words containing the problem investigated the objective, the type of subjects and instruments used, the plans, major results e.t.c.

* **Table of contents**

Is basically an outline of the report which indicates on which page each chapter or major heading and sub-headings can be found, enabling the reader to locate without difficulty any topic of interest in the research work. It also gives an overview of all the topics that have been covered by the report.

* **List of tables**

This gives the number and title of each table and the page it can be found. And it is usually presented on a separate page.

* **List of Figures**

Like the list of tables, it gives the number and title of each figure and the page it can be found and it is also presented on a separate page. Care should be

taken to ensure that the entries listed in the table of content should be the same with the headings and subheading in the report.

List of Appendices

Appendices showing the titles and indicating the pages where they appear should also be listed.

The body of the report

This is most commonly divided into five (5) basic chapters or sectors introduction, review of literature description of the methodology, a presentation and analysis of results a summary, conclusion and recommendations. These are written in capital letters and at the centre of the page without underlining, while the sub-titles/topics under them start from the edge of the margin and underlined. For example.

CHAPTER 1

INTRODUCTION

This chapter introduces the reader to the research problem. According to Van Dalen (1973), this is the first chapter of the report and it serves as an orientation to the introduction. The introduction is followed by background to the study, including the goals of the study, educational importance, isolation of areas of needs and concerns and basic difficulties with the existing facts on the problem. Then there is the significance of the study, which should convince the reader of the potential application of the findings to day-to-day practice. It touches on the motivating factor, for whom and for what the research was conducted unfamiliar terms are also defined in definition of conceptual and operational terms used in the report. Definitions must be arranged in logical order.

Research questions in variable terms leading to possible hypotheses follow. If the hypotheses are stated, they should have been generated from the questions asked under the research questions.

CHAPTER 2

LITERATURE REVIEW

This chapter deals mainly with review of related literature, previous works in related studies, steps taken and the findings in light with the gap filled and contribution to be made by your own study. It is the bedrock of any meaningful and purposeful research. Sources are usually in educational/business journals, newspapers, magazines, books, past research projects theses and dissertation. In literature review, a summary is made in the researchers own words of earlier studies and then injects one's comments where appropriate, by way of appraisal.

To conclude the chapter, a summary of the entire review is made to conclude the chapter. In some studies the research question or hypotheses are stated at the end of the literature review.

CHAPTER 3

METHODOLOGY

This phase is called the method of attack (Van Dalen, 1973) and the plan of attack (Ary, D, Jacobs, L.C. and Razavieh, A. 1979). For the problem under investigation it refers to the general strategy and logistics that are employed in the conduct of the study, and precisely in the gathering and analyzing of the data needed for answering research questions or hypotheses formulated to direct the study. It should clearly state the type of design, characteristics of the sample, including number, sex, and age-range and sampling procedure.

The researcher should also carefully explain the instruments used to obtain the data and outline step by step description of how the study was conducted (procedure). The data obtained are then collated and analyzed. Limitations in research designs and procedures are highlighted.

CHAPTER 4

RESULTS AND DISCUSSIONS

This chapter is usually devoted to the detailed description of the statistical methods employed to analyze data, and the presentation of results. The consensus of empirical researchers is to present results as much as possible in form of tables, charts, graphs lists of figures to which the reporter refers when stating the results. The tables, charts e.t.c should however be clearly labeled and explained so that the readers may understand the report.

Where possible, empirical results that carry out statistical tests of significance should include all statistical formulation that led to the rejection or non-rejection(acceptance) of the stated hypotheses. Results should be highlighted per hypothesis, where relevant.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMEDATION

Chapter five in most research reports is taken to be the concluding chapter, here the discussions are those from the findings of the study. It is

wrong to discuss a concept which does not come up in the result obtained. Inferences, meaningful conclusions based on the results obtained serve as the conclusions of a given study. Conclusion must be substantiated with the evidence presented in the results of the study.

Recommendations for further work should be logical and properly related to the findings of the just concluded studies.

Referencing

Is the final stage in reporting. References made to related works from the beginning to the end of the project are acknowledged and listed in one of different forms or styles of writing that is required by the institution.

3.1 Measurement

3.1.1 Introduction

The concepts of reliability and validity are very important in scientific research and they are closely tied to the concept of measurement. Under this topic we shall, examine what measurement is, what is measured and the types of measurement scales. All of these will lead us to the concepts of reliability and validity in research which will be discussed below.

3.1.2 Definition of Measurement

Measurement according to Nnamdi (2002; 50) is the assignment of numbers or qualitative attributes to objects, according to some specified

rules. Abdulsalami (2008:85) says "measurement is the assignment of numbers to attributes, properties or objects.

Therefore measurement procedure is a set of rules by which numbers can be assigned to attributes. For example let us say that a man is 6ft tall, he is very handsome and he is fairly intelligent. Here, we are saying that we have measurement, his height, appearance and intelligence using some yardsticks and in accordance with some specified rules for measuring those attributes. Thus measurement involves both numbers e.g. 6ft and abstract qualitative attributes e.g. very handsome, and non-abstract qualitative attributes, e.g. intelligence

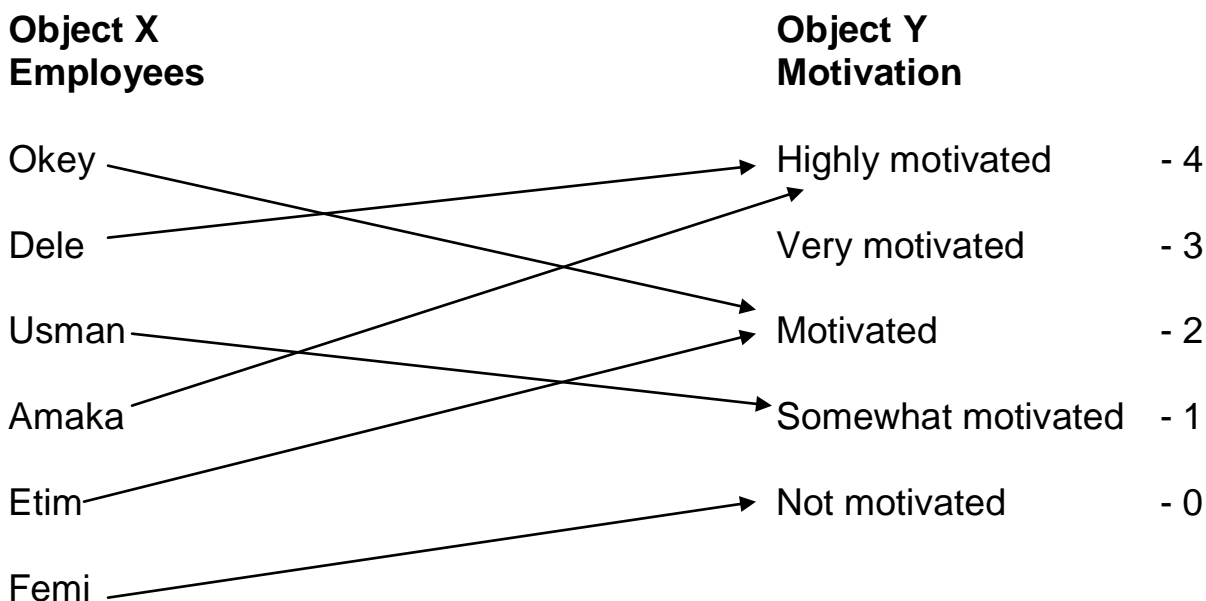
3.1.3 Rules of measurement

Actually, measurement involves mapping a characteristic of an object on a corresponding characteristic of another object according to a specified rule. Thus, we are dealing with a set having a domain and a range and the task of measurement is to match the domain with the range. Example if X = the domain and Y = the range our task is to match the characteristics of the object X , with characteristics of the range Y .

For example a researcher may want to study how much of an abstract quality, motivation each company's employees possess. He designs a motivation scale and states rules that the highest motivation will attract (4)

four points on the scale and no motivation will attract 0 point on the scale.

The rule of the measurement and the outcome will look thus



In the above illustration we have mapped out the employees motivation on a motivation scale using a rule which is a guide to the manner of assigning the characteristics of the other object the scale (i.e. numbers) to the characteristics of the other object (i.e. motivation of the individuals)

In stating the rules of measurement or mapping, one is guided by the following measurement postulates which are based on comparisons among the object of measure or the possession of objects of measurement (i.e. the attributes). Let us assume that we are measuring three (3) objects (or the possession of them) a , b, c. we are not only interested in measuring a,b,c. we are not interested in measuring in a,b,c, but also in knowing their relative

positions on the measurement scale. Thus, we shall have the following possible relationship among a , b , c .

1. $A = b = c$ or $a = b = c$
2. $A > b$; $b > c$ then $a > b > c$
3. $A > b$ $b = c$ then $a > c$ and so on

There can be many such possibilities like the ones stated above which are of immense importance in research. Postulates 1 and 3 enables the researcher put the objects of measurement in different category in other words the researcher uses these postulates to rate or categorize the objects of measurement.

Postulate 2 enables the researcher to rank order the objects. If a is greater than b and b is greater than c then a is ranked highest, b next highest and c lowest. Both rating and ranking are very useful tools in statistical analysis of research results.

3.1.4 WHAT IS MEASURED

We have earlier indicated that objects or the possession of objects are measured. This is putting the facts in their simplest form in practice; it is the concept that is measured.

Let us examine the following concepts height and person, in terms of measurement, height can increase from zero to any length a person is always a person and cannot increase or decrease. The much we say about a person is

that, he is either male or female, in other words we cannot measure a person but we can categorize them basically into male or female.

Statistics and research we describe those concepts that vary as variables and those that do not vary as constants. Thus, we measure variables and we categorize constants. Categorization is however, a form of measurement for instance we categorize a person into Male and female, and for purpose of analysis we assign the number 0 to female and 1 to male, we are in effect involved in a form of measurement which we shall discussed shortly.

In order of measure variables, and possibly constants, the researcher must construct or use existing measurement scales that suit every types of variables or constant. Therefore main types of measurement scale available to the researcher.

3.1.5 Measurement Scale

In designing a measurement scale we should bear in mind that a scale must have either (i) an origin (ii) an order or (iii) a distance, or all these. The best scale possesses all these characteristics and the lower level, inferior scale possesses only one or none of these characteristics.

- Origin: An origin marks a specific beginning of a scale. An origin may be zero one or any number. The best scale being with the origin which is absolute zero.

- An Order: Ordering is the end product of a good measurement because it enables the researcher to put the variables or objects in proper position on the scale, thus making conclusion possible and easy.
- Distance: Distance specifies relative positions of objects or variables on a given scale. Number along does not signify the existence of distance. For as distance to exist the meaning of the number must be specified.

We can now discuss the four types of scale used in measurement in the behavioral science. These are;

3.1.5.1 Normal Scale

This is the lowest level and crudest form of measurement. It classifies attributes into categories. A universe or population can be divided into categories in such a way that now two categories have the same element. Normal scale is, therefore only a label. The numbers are labels having no distance, origin or order except the one defined for it by the researcher. The commonest example of the use of normal scale is in the researcher's attempts to differentiate between male and female respondents. He may establish the following measurement rule; assign 0 if respondent is female and assign 1 if respondent is male. No arithmetic that could be performed on cardinal numbers except to say that one category is equivalent to another one if and only if they have the same number of elements.

Interestingly normal scales are widely in business research, in psychology and other behavioral science measurements. However, they cannot be used in most statistical analyses. Because it involves categorization into groups or cells, the normal scale can permit only the following; statistical analysis X^2 (chi square) contingencies coefficients of correlations and percentages among measures of central tendency, only modal analysis involving cross tabulation can make use of nominal scales.

3.1.5.2 Ordinal Scale

Ordinal scales are those scales with order, but no distance or specific origin. Ordinal scales are an improvement on normal scales because they have a definite order. The order or ordering is based on clearly defined characteristics. Ordinal scales are widely used in management research as well as in other behavioral science research, because.

Most business and behavioral science research is behavioral and generates qualitative response, which are best ranked before they can be assigned numbers to reflect their relative positions on the ranks scales;

The ranks or number assigned to characteristics are a reflection of the intensity of the feelings of the respondents. Because of this no serious meaning can be attached to the numerical value of the number. Examples of ordinary scales include;

1. Ordinal scale with no origin

In a given questionnaire designed for the study of brand loyalty among consumer of beverage drinks, the respondents were asked to rank the drinks numbered $x_1, x_2, x_3, x_4, x_5, x_6$ and x_7 .

Here the researcher is interested in the ranks for his analysis or in the relationship among ranks. The ranks are 7, 2, 3, 5, 1, 6 and 4 for response and 3, 1, 4, 6, 5, 7 and 2 for response two.

2. Ordinal scale with assumed Origin

Typically, an ordinal scale has no origin. However, an origin, zero may be assumed for it for the purpose of more meaningful analysis take for example the following structured response.

Very good	Good	Neutral	Bad	Very bad
2	1	0	-1	-2

The above shows an origin 0 is a five point ordinal scale measuring response between two extremes, very good to very bad.

Statistical analysis of ordinal measurement involving interval between two points on the ordinal scale are not standardized. Thus, ordinal scale enable researcher to have fair appreciation of the feelings or the perception of the respondents for the objects or characteristics.

Ordinal scale deals with rank ordering which makes it useful for statistical analysis requiring ranging or rank ordering e.g median, spearman rank order correlations and Kendals T. e.t.c.

3.1.5.3 Interval Scale

Interval scale are scale with both order and distance but no specific origin interval scales have both order and distance but are without origin unless one is assumed for them. The most attractive aspect of interval scale is the equidistance between the distance between 1 and 2 is equal to the distance between 5 and 6 and this is equal to 1.

Interval scale is the second best scale in measurements in behavioral science research. It advantages include

- It is very precise and present no ambiguity in its interpretation
- It can lead itself to various statistical manipulation and analysis
- It can be used in both natural and behavioral science research. Because of its precision, very powerful statically tools can be used with interval measurements.

3.1.5.4 Ratio scale

Ratio scales are scales that have order distance and specific origin. This is acclaimed to be the best measurement scale available to research. It has all the attributes of a good scale definite order, standardized distance and specific origin, i.e about Zero. Ratio scales are widely use in physical and natural science,

accounting and finance areas. Examples include interest rate, depreciation rate of return, financial ratio e.t.c.

Ratio scale defines the absence of an object or characteristics as absolute zero and graduates the presence or the possession of it from any value 0 to 100% or 1 as the case may be. It further shows that equal distance separate any two real numbers. If one precedes the other on the same scale. Thus $2-1 = 99-98 = 1$ and $1.7-16 = 30.3-30 = 0.1$.

Statistically, ratio scale defines all elements in a population as 100% or unity and this enables us to statistically manipulate them for useful results in addition, it has the advantage of other scales.

Statistically analyses of ratio measurement are many. It is probably better to say that ratio scales can be used in all statistical analyses. This property makes it the most powerful scale in research.

3.2 Validity

A good measuring instrument such as questionnaires, interview, and observation e.t.c should have high validity and reliability. It should also be practically usable in terms of convenience, appropriateness, storability and interpretability.

3.2.1 Definition of Validity

Validity is defined by Nnamdi (2002; 69) as the degree to which a measuring instrument measures what it is designed to measure.

While, Bello and Ajayi (2002; 57) says a measuring instrument is valid when it measures truly and accurately the quality or ability it is designed to measure.

So therefore, every research design may be said to be valid if it enables a researcher elicit the correct responses from the sample subjects;

3.2.2 Types of Validity

There are different types of validity, depending on the specific purpose of the measuring instrument. Namely face validity, content validity, construct validity and criterion related validity.

3.2.2.1 Face Validity

Face validity is simply defined as whether the test looks valid on the face of it. This is ascertained by simply showing the instrument to people (experts) and asking them to identify its purpose. An instrument that has face validity leaves one in no doubt as to what type of information it requires. Example of face validity is recognizing a mathematics achievement test such by mere inspection.

3.2.2.2 Content Validity

This refers to the extent to which the instrument accurately samples the domain interest to the study, for instance, how well the mathematics achievement test covers aspects in the mathematics syllabus to which testees have been exposed. To ensure that the test is content valid, a carefully prepared table of specification

must be used in selecting items for the test. No statistical value is reported for the content validity.

On the other hand content validity deals with course contents.

3.2.2.3 Construct Validity

This deals with how well an instrument gives information on the personality traits and other effective behavior of a person e.g attitude, interest, value, temperament e.t.c.

Construct validity is about the most sophisticated method of instrument validation. It is often use in research in areas where knowledge is so limited that other validation method not effective. Construct validity attempts to explain what variables in the study mean and then the test reflect the actual meaning of the variables (construct) or not. For instance of respondents throughout testing period keep information concerning respondents confidential and use it for research purpose.

The fact that researcher need to be well grounded in the procedures and ethics involved in constructing and using research instrument can therefore, not be stressed too much. Brief overviews of such procedures are presented in this section. Prospective instruments developers are enjoined to consult other measurement and evaluation text for more detailed guide.

4.0 CONCLUSION

The primary purpose of research is to make objective decision about human beings object etc such decision if accurate enhance accurate judgement and precise decisions,

5.0 SUMMARY

In this unit we have learnt that

- iv. Measurement is the assignment of numbers to attributes properties or objects.
- v. Object or the possession of objects are measured
- vi. In designing measurement scale we should bear in mind that a scale must have either an origin an order or a distance, or all of these
- vii. The types of measurement are nominal scale ordinal scale interval scale and ratio scales
- viii. Validity is the degree to which a measuring instrument measured what it is designed to measure
- ix. Types of validity consist face validity content validity construct and criteria

6.0 Tutor Marked Assignment

1. Explain study design.
2. What are the rules of measurement?
3. Differentiate between the different types of scales.
4. What do you understand by validity? Write short notes on two types of validity.

7.0 Further Reading/References

Nnamdi A. () Research Methodology in the Behavioral sciences.

Razaq B. and Ajayi O. () Research methods and statistical Analyses

www.socialresearchmethods.com.

MODULE 3: LITERATURE REVIEW, LIBRARY RESOURCES AND ETHICS

Unit 1: Literature Review and Library Resources

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1.0 Introduction

The review of literature relevant to the study one is intending to investigate is an important aspect of designing and carryout research work. Review of literature begins as soon as a research problem or topic is selected. The process of literature review is a continuous one (i.e. literature is updated always), until the final work is approved and accepted for award of the certificate.

2.0 Objectives

By the end of this unit, you will know

- What literature review is
- Why literature is conducted
- The benefits of literature review
- Research questions
- Library resources e.t.c.

3.0 What is Literature Review?

According to S.U Jen (2002;26) said "literature review has to do with careful and systematic location, documentations, analysis and reporting of information of all

available existing work, which are relevant, related and useful to the proposed research work”.

Also J.A Badeson (2006:24) emphasized that review of related literature or literature review is a summary of the writings of recognized authorities and precious research findings relating to the research problem one intends to investigate.

Therefore, literature review or review of literature can therefore be defined as a summary of information which are related, relevant and useful to the present research work being undertaken. The review of literature is expected to provide factual clarifying information as well relevant and useful information. The information should summarize the contribution of recognized authorities or experts and previous research works related to the research problem to be investigated. Furthermore, when the study is completed, findings should be contrasted with some of the major references (works) reviewed.

3.1 Purpose Need or Reason for Literature Review

There are many reasons for reviewing literature in Research. Some of the purposes for literature review are as follows.

- i. To determine and critically evaluate the current state of the art in the area of study under investigation

- ii. To clarify some fundamental concepts and identify the research work done in the area of proposed study.
- iii To expose the gaps or missing links that exist after previous studies, which the study being undertaken, is meant to bridge. It may be in terms of the research technique, research focus and choice of methods.
- iv To discover or uncover the research work(s) carried out in the area of the study in order to prevent unnecessary duplication and waste of time.
- v To build up information bank about a particular subject for its usefulness in extending the frontiers of knowledge.
- vi To document reviewed information locally, critically and analytically for proper interpretation.
- vii To use empirical information from the library system referencing and retrieval for decision making.

3.2 Benefits and Importance of Literature Review

The followings are some of the importance and benefits of literature review;

- i. It ascertains the extents to which previous research addressed the problem being investigated. Established findings are noted thus preventing redundant, irrelevant or wasteful research.

- ii. It saves the researcher time because the previous studies will provide inputs, information, mistakes, problem encountered and further suggestions.
- iii. It uncovers a funnel of existing data that the researcher might not have known.
- iv. It helps to avoid unnecessary duplication and a waste of time and resources.
- v. It guides in adopting different and better research methodology than may have been planned earlier by the researcher. In other words, it leads to improved research methodology.
- vi. It helps in providing or justifying theoretical framework for the study.
- vii. It enriches and refines research questions hypothesis instrument and references.
- viii. It helps the researcher to delimit the research being handled to manageable size, like the choice of smaller geographical area, a smaller sample size, the administration of fewer instrument or the study of fewer variables and the organization of literature review.

3.0 Research Question

Research questions are the major questions which the researcher seeks to provide answers to in the course of investigation. They are guided questions

for collecting relevant data in order to find solution to the research problem. Research questions are directly related to the purpose of the study. They are invariably, the purposes of the study transformed into questions. Once a research establishes the purpose of the study these are turned into questions. Research question must therefore correspond with the purpose of the study. The number of research question should neither be too large to result in unmanageable size nor too small to exclude important questions, should the number depend on the topic or nature of the problem being investigated. Moreover, it also depends on the direction of the research and the level of the research.

3.4 Basic Consideration about Research

1. Research questions should not lend themselves to only 'yes' or 'no' answers or general purpose questions.
2. Probing question which begin with words such as what, which, where, when, how, why should be used in structuring research questions rather than words, like, are, was, is, were which should be used for questionnaires items.
3. The language of research questions should be clear and simple for precise questions.

4. Research question should seek answer to only one thought or one question. In other words research question should not be doubled barreled in order to avoid confusing the respondents.
5. Research questions should not be confused with questionnaire items question. They are research questions that guide the researcher in constructing the questionnaire which elicit information necessary for answering the research questions.
6. Research question should be developed in perspective to the statement of the problem and not outside it.

3.5 Sources of Research Topics and Questions

There are virtually unlimited sources available in searching for a research topics or Questions, they includes academic journals, magazine, periodicals research abstracts, professional trade publication everyday encounters e.t.c can provide a wealth of ideas.

Arising from the above, this can further be classified into (2) two namely; primary sources and secondary sources. Which has been dealt with in module 1, unit 2.

The primary sources

This contains original accounts of events report or phenomenon given by some one that actually observed or witnessed and reported the event. Example

of primary source is the research abstract, academic journals, professional trade publications, periodicals, conferences proceedings e.t.c.

The Secondary Sources

The secondary source contains account of an event or phenomenon by someone who did not actually witnessed or observed the event or phenomenon. Examples of secondary sources are text books, newspaper, encyclopedia. Magazine e.t.c.

3.6 Conducting literature review

This involves the procedures or step in carrying out a good literature review. This involves the followings.

1. The researcher should identify and select all the key words to be used to access related and relevant studies. Thus, it will also lead to effective use of library facilities.
2. The selected key words should be use to access useful references from library catalogue current index and other referencing services such as computer, internet e.t.c.
3. Using the list of references the researcher should make preliminary consultation with the librarian, classmates and his/her supervisor for review materials. There after libraries and other depositions should be consulted to access the reference and locate the actual materials.

4. The Researcher first sought for primary sources of information and consults most recent references. The primary sources are said to provide fresh and comprehensive first hand information, while recent materials provide information or major ideas that may super side or embrace those in earlier research works.
5. The researcher should then read and record all relevant information on his/her personal index cards. The relevant materials may include theoretical discussion and empirical name, date of publication, title of the work and the full citation of the work should be recorded. All pages numbers to be cited should be well noted. In order to save time the researcher should first read abstract and summary of any reference material(s) he/she has obtained.
7. Finally, all information recorded should be organized and linked appropriately in accordance with the sub theme or sub headings of the propose research. Furthermore all information reviewed should relate to existing knowledge in that field and to the proposed research being undertaken.

* **Organization of Literature Review**

Organization and presentation of literature review is very challenging because of the difficulties in organizing and reporting the reviewed literatures. It

requires the same commitment and carefulness since the collection from various sources is requires.

In order to have an organized literature review, the following guidelines are suggested.

1. The research questions should be arranged property into sub-headings and related section. For example if the research topic “importance of Biological Science to the study of plant and Animal” is to be undertaken, then the sub-headings may be as follows
 - The nature of Biological science
 - The constraints involved in teaching Biological science
 - Ways of improving the study of Biological
2. Ensure that the sub-headings relate to the topic of the research.
3. Review and report materials in accordance with the subheadings of the proposed research.

3.7 Library Resources

It is very important that a researcher use the library. The library is the store house of knowledge and wisdom. The wide variety of materials found in any library demands a high organization, and involves a good system of classification. It is not expected that the researcher will attain the proficiency of a librarian, but facility in the use of the library and its materials is the key to research studies. The researcher should be able to locate common sources quickly and efficiently

and that he should be able to extract the information contained in them accurately.

Other libraries in Nigeria where information can be sourced apart from libraries of various educational institutions are;

3. Libraries of embassy such the British council
4. Libraries of Educational bodies such as NBTE, NCCE, ITF, NUC e.t.c.
5. National Libraries.

3.8 Sources of Preliminary Library Information

These are sources of preliminary library information which researcher should essentially be familiar with, they includes;

1. The Card Catalogue

There are two types of catalogue namely; the subject catalogue and the author catalogue these catalogues provides required information leading to the location and retrieval of books in a library.

2. The Index

There are subject index and the author index which leads to retrieval of articles published in journals, rare books e.t.c one is arranged alphabetically by the surname of the author and the other also arranged alphabetically by the title of the documents.

3. The Abstract

These are brief summaries or short account of research work done previously. This enables researchers to keep abreast with current research in certain areas without going to the original reports. An abstract report gives a clear picture of the problem and scope of the study. In general a good abstract is enough to allow a researcher to decide whether material is worth reading or not.

Information is necessary for the retrieval of the work and others such as name of author, title of work/journal, volume, number, page and date are provided therefore, there are many abstract, some of which are, the Dissertation Abstract international (DA), Psychological Abstract, sociological Abstract e.t.c.

3.9 Organizing a library search

A library search becomes fruitful if a researcher organizes his or her search for information before embarking on it, the researcher should consider the following step in conducting a library search.

- After identifying the broad topics of the study the researcher should list the variables to be studied
- If the library has encyclopedia, the researcher should locate the latest version and look up for each variable and topic.
- The research should also look up each variable and topic in the recent version of the encyclopedia, journals e.t.c.
- Consult education indexes using the variables and as a major topics

- As the search get to specific books and journal article the researcher should look at the bibliography of the book and articles as suggested above.

Finally, the researcher should continue to narrow down the search at each step as the amount of information begins to grow. If the researcher finds an important reference that is not available in the library he should consider ordering the document through inter library loan. At each step of the library search, the researcher may wish to record some information. This also, should be done in an organized manner.

3.10 Sources of Published Data

Instead of looking up the guides first, a research may wish to be familiar with the major sources of data so that he can find the desired information directly from the sources and thus saves time. The followings are the most important sources of published materials that can be found in most libraries, although they are by no means to be considered as a complete list of sources.

a. Government Agencies

Government agencies provide the majority of published statistical information available to researcher. Nearly every level of government (local, state, federal) agencies publishes some sort of statistical data that are needed by researchers.

b. Trade Associations

Trade associations are organized by business men/women engaged in similar industries or occupation. They frequently published quantitative information concerning activities of the trade they represented (production, sales, prices, shares, stocks wages, employment e.t.c.

c. Magazine and Trade Periodicals

The publishers in this category are not the headquarters of trade association but are either independent publisher or some profession.

d. Newspapers and Almanac

Newspaper gives extensive daily report on prices and stocks and bonds, sales and production of certain commodities and other useful materials almanacs which are published mostly by large newspapers and other organization also gives important statistical data information.

e. International Organizations

International organization makes foreign and international materials available to readers. There materials are usually obtained from public and universities libraries.

f. Books and Text Books Materials

Regular books are most systematically and extensively covered by bibliography services. Any book published in West Africa or any English speaking countries can be located if the researcher known the author, the title or even the approximate data of publication. Example is the commutative book index.

g. General References

There are number of good references books with which researcher using the library facilities should be familiar with. This include the encyclopedia, dictionaries would almanac and dissertation abstracts.

h. Business and Education Organization

There are many businesses and educational organizations which publish useful statistical information example are chamber of commerce, public corporations, banks and business research bureau of universities frequently, some of unpublished materials, reports are available in this type of organization.

4.0 CONCLUSION

A good literature review is very important in a research. It shows and guides the direction of the research, a good researcher should avail himself to the resources in the library.

5.0 Summary

In this unit we learnt that:

- Literature review has to do with investigation, documentation and analysis of existing work related to the research
- We have two sources of data_ primary and secondary
- Library resources are available to any researcher, including where and how to find them

6.0 Tutor Marked Assignment

1. Explain literature review
2. Advance reasons for or need for conducting literature review
3. What are the sources of library information?

7.0 Further Reading/References

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MODULE 3: LITERATURE REVIEW, LIBRARY RESOURCES AND ETHICS

Unit 2: Ethics of Research

1.0	Introduction.....
2.0	Objectives.....
3.0	Definition of ethics of research.....
3.1	Importance of Adherence to Ethical Norms in Research.....
3.2	Ethics: Principles of Research.....
3.3	Ethical Decision Making In Research.....
3.4	Principles Of Right To Know.....
3.5	Principles of right to know and protection.....
3.6	Ethical Dilemma and Conflicts.....
4.0	Conclusion.....
5.0	Summary.....
6.0	Tutor Marked Assignment.....
7.0	Further Reading/References.....

1.0 INTRODUCTION

When most people think of ethics (or morals) they think of rules for distinguishing between right and wrong, such as the Golden Rule (“Do unto others as you would have them do unto you”), a code of professional conduct like the Hippocratic oath (“first of all, do not harm”) a religious creed like the ten commandment (“Thou shall not kill.....”) Ethics.

Ethics are norms for conduct that distinguish between acceptable and unacceptable behavior. It is the method, procedure or perspective for deciding how to act, and for analyzing complete problems and issues.

2.0 OBJECTIVES

By the end of this unit you should be able to:

- Define ethics of research
- Distinguish between what is ethical and un ethical in research
- Know ethical principles of research
 - Access principles of right to know and right to protection
- know ethical dilemmas and conflicts

3.0 Definition of ethics of research

Ethics of research or research ethics involves the application of fundamental ethical principles to a variety of topics involving scientific research. These include the design and implementation of research. This involving human experimentation animal experimentation, various aspects

of academic scandals including scientific misconduct (such as fraud fabrication of data and plagiarism)

Many different disciplines, institutions and professions have norms for behavior that suit their particular aims and goals. These norms also help members of that discipline to coordinate their actions or activities and to establish the public trust of the discipline. Ethical norms also serves the aims and goals of research, applicable to people who conduct scientific research and other creative activities according to a specialized discipline, research ethics, which studies these norms.

3.1 IMPORTANCE OF ADHERENCE TO ETHICAL NORMS IN RESEARCH

First, some of the norms promote the aims of the research, such as knowledge, truth, and avoidance of error. For example, prohibitions against fabricating, falsifying or misrepresenting research data promote the truth and avoid error.

Secondly, since research often involves a great deal of co-operation and coordination among many different people in different disciplines and institutions, many of these ethical standards promote the values that are essential to collaborative work, such as trust, accountability, mutual respect and fairness.

Thirdly, ethical norms in research help to build public support for research people who are more likely to fund research project if they can trust the quality and integrity of the research.

Many of the ethical norms help to ensure that research can be held accountable to the public.

Finally, many of the norms of research promote a variety of other important moral and social values, such as social responsibilities, human rights animal welfare compliance with the law, health and safety.

3.2 ETHICS: PRINCIPLES OF RESEARCH

These are specific codes, rules, and policies relating to research ethics adopted by different professional associations, government agencies and universities for the conduct of research. The following are some ethical principles'

1. HONESTY

A researcher should strive for honesty in all scientific communications, honesty regarding data, methods and procedures, and publication status. Do not fabricate, falsify, or misrepresent data. Do not deceive colleagues, granting agencies, or the public.

2. OBJECTIVITY

Research should strive to avoid bias in experimental design, data analysis, data interpretation, peer review, personal decisions, grant writing, expert testimony and other aspect of research where objectivity is expected or required. A researcher should avoid or minimize bias or self- deception and should disclose personal or financial interest that may affect research.

3. INTEGRITY

Keep your promises and agreements; act with sincerity; strive for consistency of thought and action.

4. CAREFULNESS

Avoid careless errors and negligence; carefully and critically examine your own work and the work of your peer researcher. He should keep good records of research activities, such as data collection, research design and correspondence with agencies or journals.

5. OPENNESS

A researcher should share data, results, ideas, tools and resources and should be open to criticism and new ideas.

6. RESPECT FOR INTELLECTUAL PROPERTY

A researcher should honour patents, copy rights and other forms of intellectual property and should not use unpublished data, methods, or result without permission. He should give credit where necessary and also

give proper acknowledgement or credit for all contributions to research and he should never plagiarize.

7. CONFIDENTIALITY

A researcher should protect confidential communications, personnel records, trade or military secrets and patient's records.

8. RESPONSIBLE PUBLICATION

Researchers should publish their work in order to advance research and scholarship, not just to advance his/her own career alone. A researcher should avoid wasteful and duplicative publications.

9. RESPONSIBLE MENTORING

Researchers should help to educate mentor and advice students, promote their welfare and allow them to make their own decisions.

10. RESPECT FOR COLLEAGUES

Researchers should respect their colleagues and treat them fairly.

11. SOCIAL RESPONSIBILITY

Researchers should strive to promote social good and prevent or mitigate social harms through research; public education and advocacy

12. NON DISCRIMINATION

Researchers should avoid discrimination against colleagues or students on the basis of sex, race, ethnicity, or other factors that are not related to their scientific competence and integrity.

13. COMPETENCE

Researchers should maintain and improve their own professional competence and expertise through life long education and learning. They should take steps to promote competence in science as on whole.

14. LEGALITY

Researcher should know and obey relevant laws and institutional and governmental policies.

15. ANIMAL CARE

Researcher should show respect and care for animal when using them in research. Researcher are advice not to conducts unnecessary or poorly designed animal experiments

1.5 HUMAN SUBJECT PROTECTION

When conducting research on human subjects researcher should minimize harms and risks they should maximize benefits, respect human dignity, privacy and autonomy, take special precautions with vulnerable

populations, and should strive to distribute the benefit and burdens of research fairly.

3.3 ETHICAL DECISION MAKING IN RESEARCH

Although codes, policies and principals are very important and useful like any set of rules they do not cover every situation that arises in research, they often conflict, and they require considerable interpretation. It is therefore important for researchers to learn how to interpret f or researchers to learn how to interpret asses and apply various research rules and how to make decisions about how to act in various situations. The vast majority of decisions that people must make in the conduct of research involve the straight forward application of ethical rules

3.4 PRINCIPLES OF RIGHT TO KNOW

These principles set out standards for national and international regimes which give effect to the right to freedom of information. They are designed primarily for national legislation on freedom of information or access to official information, but are equally applicable to information held by inter-governmental bodies such as United Nations African union European Union.

3.5 Principles of right to know and protection

The regional law and standards evolving state practice (as replied, inter alia, national laws and judgment of National courts), and the general principles of law recognized by the community of nations. The principles are product of a long process of study analysis and consultations; drawing on extensive experience and works with partner organizations in many countries around the world. The following contains the principles.

- **Principle 1: Maximum Disclosure**

The principle of maximum disclosure establisher's presumption that all information held by public bodies should be subject to disclosure and that this presumption may be overcome only in very limited circumstances.

- **Principle 2: Obligation to publish**

Freedom of information implies that not only that public bodies accede to request for information but also that they publish and disseminate widely documents of significant public interest subject only to reasonable limits based on source and capacity.

- **PRINCIPLE3: PROMOTE OF OPEN GOVERNMENT**

Informing the public of their right and promoting culture of openers within government are essential if the goals of freedoms of information legislation are to be realized.

- **Principle 4 limited scope of exceptions**

All individuals request for information from public bodies should be met unless the public body can show that the information falls within the scope of the limited regime of exception. A refusal to disclose information is not justified unless the public authority can show that the information meets a three part test.

- i. The information must relate to legitimate aim listed in the law;
- ii. Disclosure must threaten to cause substantial harm to that aim; and
- iii. The harm to the aim must be greater than the public interest in having the information's

- **Principles 5 processes to facilitate access**

A process for deciding upon request for information should be specified at three different levels: within the public body; appeals to an independent administrative body; and appeals to the courts. Where necessary provision should be made to ensure full access to information for certain groups, for example those who cannot read or write those who do not speak the language of the record or those who suffer from disabilities such as blinders.

- **Principle 6 open meetings**

Freedom of information includes the public rights to know what the government is doing on its behalf and to participate in decision-making processes. Freedom of information legislation should therefore establish a presumption that all meetings of governing bodies are open to the public.

- **Principle 7 costs**

These established that there should be no charge for accessing information. However, if the cost of retrieve during and providing the information exceeds the appropriate limit there is no duty on the authority to comply with the request.

3.6 Ethical Dilemma and Conflicts

An ethical dilemma is a situation that will often involve an apparent conflict between moral imperatives in which to obey one would result transgressing another. This is also called an ethical paradox, since in moral philosophy paradox plays a central role in ethics debates. For instance an ethical admonition to “love thy neighbor as thy self” is not always just in contrast with, but sometimes in contradiction to an armed neighbor actually trying to kill you; if he or she succeeds you will not be able to love him or her. But to primitively attack them or restrain them is not usually understood loving. This is one of the clean examples of an ethical decision clashing or conflicting with an organismic decision, one that would be made only from

the perspective of animal survival: an animal is thought to act only in its immediate perceived bodily self interest when faced with bodily harm and to have limited ability to perceived alternatives.

4.0 Conclusion

Any one involve in social scientific research need to be aware of the general agreements shared by researchers about what is proper and improper in the conducts of social scientific inquiry. More so, be aware of their rights in conducting research and ethical dilemmas.

5.0 Summary.

In this unit we have learnt that:

- Ethics of research are set of rules or conducts guiding that distinguish between acceptable and unacceptable behavior in conducting scientific research.
- The ethical principles in the conducts of research includes the followings; honesty, objectivity, integrity, confidentiality, carefulness, openness, non-discrimination competence, legality, human subject protection, Animal care, Responsible publication, Respect for colleagues Respect for intellectual property, Responsibility mentory social responsibility.

- Ethical dilemma and conflicts which involves an apparent conflict between moral imperatives in which to obey one would result in disobeying the other.
- Principle the principles of right to kind and protection are set of rules or principles which protect researcher in accessing official information
- These principles includes, maximum disclosure, obligation to publish, promotion of open government limited scope of exceptions, processes to facilitate access cost, open meetings, disclosure takes precedence and protection of whistle blowers

6.0 Tutor Marked Assignment

1. Define ethics of research.
2. What do you understand by ethical principles of research?
State and explain five (5).
3. Explain ethical dilemma and conflicts.
4. Explain the importance of adhering to ethical norms in research.

7.0 Further Reading/References

- 1 Shamo, A Resmia, D. (2003) Responsible conducts of Research
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