CHAPTER 7:

COONDUCT RESEARCH METHODS AND STATISTICS

7.1 Introduction of the Unit of Learning / Unit of Competency

This unit specifies the competencies required to conduct research in nutrition pharmacy. It involves proposal writing: identifying a research problem upon literature review, formulating objectives, hypothesis and or research questions, conducting literature review, developing research methodology, conducting data collection, conducting data analysis and presentation and preparing research report. Statistical methods: types of data, descriptive statistics, inferential statistics, confidence intervals.

7.2 Performance Standard

By the end of this unit of learning/competency, the trainee should be able to identify a suitable research topic based on the area of interest; develop a research proposal as per resource materials and institutional guidelines; carry out the research process consistent with institutional research guidelines; write a project report and do a power point presentation of the research project in accordance with organizational procedures.

7.3 Learning Outcomes

7.3.1 List of the Learning Outcomes

1. Identify terminologies in research methods and statistics

2. Develop a research proposal

3. Conduct data collection

4. Conduct data analysis and presentation

5. Preparation of reports and dissemination

7.3.2 Learning Outcome 1: Identify terminologies in research methods and statistics

7.3.2.1 Learning Activities

Learning Activity	Specific instructions
Demonstrate ability identify and describe terminologies in research methods and statistics a. Define research and research design b. Define research methodology c. Describe statistics	Define the terms research, research design and statistics Describe different types of research • Descriptive • Experimental • Case study • Correlational
Identify and describe importance of research • Identify and describe types of research • Identify and describe sources of data	Explain different types of research • Descriptive • Experimental • Case study • Correlational Explore the sources of data in research Demonstrate competency in collecting data from different sources
Identify and describe statistical methods • Discuss the types of statistical formulas	Apply different types of statistical formulas used in research Identify and calculate the sample size using different sampling formulas

7.3.2.2 Information Sheet

Definitions

Research is defined as a systematic method of inquiry for generating new knowledge, asking questions, highlighting new experiences, solving problems and understanding current situations. It is also an organized and systematic way of finding answers to questions.

Research methods: refer to a process of creating a random sequence of steps to solve a particular problem.

Research methodology: refers to a process of acquiring solutions by means of a proven method in which selected cases are considered.

Research design: the conceptual structure within which the research is conducted. It constitutes the blue print for the collection, measurement and analysis of data.

Population: an entire group of individuals, events or objects having a common observable characteristic.

Characteristics of research

Research has the following attributes;

- It is purposive

- It is systematic.

- It involves formulation and testing of hypotheses.

- It involves recording data and reporting of the findings.

- It is critical, logical and objectives

Research is usually aimed at;

- Thorough testing of theories.

- Testing hypotheses and laying solid foundations for future research and study.

- Establishing the underlying causes and relationship between different occurrences.

Objectives of research

- Research extends knowledge

- Research establishes generalizations and general laws

- Research verifies and tests

- General laws developed through research

- Research analyze inter-relationships

- Applied research aims at finding solutions

- It aims to develop tools, concepts

- Rational decision making

Importance of research

Research work has several benefits which include;

- Helping to identify research problems needing solutions.

- Helping to create new methods tools, ideas, practices.

- Discovering cures of a disease.

- Improving the quality of services offered.

- Obtaining of funding from donors to carry out the research.

- Research knowledge is transferred to the public.

The purpose of research,

To:

- Review or synthesize existing knowledge

- Investigate existing situations or problems

- Provide solutions to problems

- Explore and analyse more general issues

- Construct or create new procedures or systems

- Explain new phenomenon

- Generate new knowledge

Types of research

There are different major types of research which include;

1. Quantitative research

2. Qualitative research

3. Basic research

4. Applied research or Action research

   - Impact Assessment Research

   - Participatory action research (PAR)

   - Evaluation research

   - Marketing research

5. Analytical research

   - Historical Research

   - Philosophical Research

   - Review

   - Research synthesis (meta-analysis i.e. analysis of the review already published)

6. Experimental research

7. Descriptive research

   - Survey Research

   - The Case Study

   - Correlational Study

   - Comparative Study

8. Conceptual research

Types of Research Methods

Quantitative research

This type of research is based on measurement of quantity or amount. The emphasis of quantitative research is on collecting and analysing numerical data; it concentrates on measuring the scale, range, frequency etc. of phenomena. This type of research, although harder to design initially, is usually highly detailed and structured and results can be easily collated and presented statistically. Examples include Weighing, measuring etc. This type of research usually includes comparison studies, cause and effect relationship among others.

Qualitative research

This type focuses on phenomena relating to quality or kind e.g. character, personality and mankind are examples of variables used to measure qualitative research. Qualitative research is more subjective in nature than Quantitative research and involves examining and reflecting on the less tangible aspects of a research subject, e.g. values, attitudes, perceptions. Although this type of research can be easier to start, it can be often difficult to interpret and present the findings; the findings can also be challenged more easily. Word association test, sentence completion test are some of the examples of qualitative research.

Basic research

Also known as pure/fundamental research. It is driven by a researcher's curiosity or interest in a scientific question. It is concerned with generalizations and with the formulations of a theory. The primary motivation of this type of research is to improve man's knowledge and not to create or invent something. Basic research focuses on finding information that has a broad base of application natural phenomenon and mathematics are examples of basic research.

Basic research focuses on finding answers to questions such as:

- What are protons composed of?

- How did the universe begin?

- How do slime moulds reproduce?

Applied/Action research

This refers to scientific study and research that seeks to solve practical problems. This type of research is initiated to solve every day/immediate problems or a reflective process of progressive problem solving. It involves testing the efficacy of theories and principles. This type of research is useful in finding solutions such as cure for diseases and development of innovative technologies, rather than acquire knowledge for knowledge's sake. Also, a research aimed at finding social or political trends that may affect a particular institution is an example of applied research

Examples:

Applied researcher may investigate ways to:

- Improve agricultural crop production

- Treat or cure a specific disease

- Improve the energy efficiency of homes, offices, or modes of transportation

Analytical research

This type of research involves in-depth study and evaluation of available information in an attempt to explain complex phenomenon. Analytical research often extends the Descriptive approach to suggest or explain why or how something is happening, e.g. underlying causes of industrial action. An important feature of this type of research is in locating and identifying the different factors (or variables) involved. The researcher has to use facts or information already available and analyse these to make a critical evaluation of the material.

Descriptive research

Descriptive research include surveys and fact finding enquiries of different kinds, with an aim of studying the relationship of the variables. It can be used to identify and classify the elements or characteristics of the subject, e.g. number of days lost because of industrial action. The main purpose of descriptive research is the description of the state of affairs as it exists in present. The researcher who chooses this method has no control over the variables and he is only mandated to report what has happened or what is happening only. Quantitative techniques are most often used to collect, analyse and summarise data.

Examples include:

Do teachers hold favourable attitudes toward using computers in schools?

What kinds of activities that involve technology occur in sixth grade classrooms and how frequently do they occur?

What have been the reactions of school administrators to technological innovations in teaching the social sciences

How does competency based education and Training (CBET) compare to the conventional knowledge based approach of training?

CASE STUDIES

A case study offers an opportunity to study a particular subject, e.g. one organisation, in depth, or a group of people, and usually involves gathering and analysing information; information that may be both qualitative and quantitative.

Experimental research

In this type of research, the researcher studies the effects of the variables on each other. Experimental studies are done in carefully controlled and structured environments and enable the causal relationships of phenomena to be identified and analysed. By nature, this research type is a systematic and scientific approach to research in which the researcher manipulates one or more variables, and controls and measures any change in other variables. This type of research is commonly used in sciences such as pharmacy, medicine, chemistry, biology, food processing etc. This is because laboratories tend to offer the best opportunities for controlling the variables in a rigorous way, although field studies can be done in a more 'real world' environment.

Exploratory research

Exploratory research is undertaken when few or no previous studies exist. The aim is to look for patterns, hypotheses or ideas that can be tested and will form the basis for further research. Typical research techniques would include case studies, observation and reviews of previous related studies and data.

Sources of data for research

The sample is the section of the wider population that will be engaged in the survey and sampling is the process of identifying who you will aim to contact from that population. The word 'population' is used to describe the target group, and while this may be the national popula tion as a whole, it may also be a smaller group such as lone parents, or business members of a Chambers of Commerce in a particular location. Detailed consideration of sampling needs to be made to ensure the validity of your results, and the following issues need consideration: Who is the respondent? The first thing you need to under - stand is who your respondent is going to be. This is the person that will provide the data you are asking for. If the survey is distributed amongst households, who in particular will be filling in the survey? Do you want to specify who the survey is to be completed by? And do you understand why you are specifying this person? The same is true when surveying organisations or groups. A survey will have much greater success if it is directed to the right respondent. Identifying the person best suited to completing a survey will help to increase the response rate and generate more accurate data. What is your sampling frame? A sampling frame is a list of members of a population

from which members of a sample are then selected. A sampling frame needs to be accurate, complete, up-to-date and relevant to the purposes of the survey for which it is to be used. Once you have an established sampling frame, depending on its size you may need to adopt a sampling technique to extract your final sample. For example random sampling, simple random sampling or stratified sampling. Are response rates likely to be a problem? With any survey, you need to look at the profile of the people who did responded and satisfy yourself that they are about the same as the people who didn't respond – and also, that they're about the same as the overall population that you're sampling. If you send out a survey to a population, which is 50% male, and 50% female, but your responses are 80% from females then your findings will not represent your target population. Response rates can be low for surveys, under 20% for a postal survey is not uncommon. However, all the considerations in this section can help to improve your response rate. Statistical significance: Understanding your population, sample size, and response rates are important for calculating interval and confidence levels, which are vital in determining how many people you need to interview in order to get results that reflect the target population as precisely as needed. Secondary information – Information that is readily available. E.g. - Internet, Magazines, books,

Primary information – Information that needs to be found by conducting Survey, Observation or experimentation

Data types and statistical methods

The main types of data which should be collected include primary and secondary data. Quantitative context may involve the manipulation of statistical data. It differs from primary research techniques in that the researcher does not collect the data directly and cannot control the actual data collected, but can bring to bear new insights through interpretation or presentation.

There are a number of different types of secondary information. Some of the most common types are identified as follows:

Official statistics - This refers to national data sets relating to issues such as population, employment and unemployment and businesses. Much of this information can be acquired from the Office for National Statistics and www.neighbourhood.statistics. gov.uk;

Other statistics - A wide range of other types of numerical data can be drawn on for evaluation purposes. E.g. project monitoring information of beneficiaries, funding information, service data.

Sampling formulas

A number of formulas are available for working out sample size and examples include;

Estimating the sample size based on a proportion

To calculate the sample size based on the sample required to estimate a proportion with an approximate 95% confidence level 1, you can use the following formula:

$$nr = \frac{4pq}{d2} \qquad \text{Or} \qquad n = \frac{(1.96)^2 pq}{d^2}$$

Where nr = required sample size, p = proportion of the population having the characteristic, q= 1-p and d = the degree of precision. The proportion of the population (p) may be known from prior research or other sources; if it is unknown use p = 0.5 which assumes maximum heterogeneity (i.e. a 50/50 split). The degree of precision (d) is the margin of error that is acceptable. Setting d = 0.02, for example, would give a margin of error of plus or minus 2%.

We apply this formula in the example in the worked example below;

You are investigating the use of mobile phones for online banking and want to estimate what proportion of the population uses their phones in this way at an approximate 95% confidence level. Since no data are available on the proportion currently using their mobile phones you take the worst case scenario and set p = 0.5 (and therefore q = 1-0.5 = 0.5). As this is a preliminary study you are prepared to accept a margin of error of ± 5% so you set d = 0.05. To determine the minimum sample size you then apply the formula:

$$n = \frac{4pq}{d^2} = \frac{4 \times 0.5 \times 0.5}{0.05^2} = \frac{1}{0.0025} = 400 \quad \text{or} \quad n = \frac{(1.96)^2 \sigma^2}{d^2}$$

So your minimum sample size would be 400.

Estimating the sample size based on a mean

The second formula applies when estimating the arithmetic mean (average) of a particular variable for a population. Suppose, for example, that you wanted to know the average employee satisfaction level in your organisation.

To calculate the sample size based on the sample required to estimate a population mean with an approximate 95% confidence level2, you can use the following formula:

$$n_r = \frac{4\sigma^2}{d^2} \quad \text{or} \quad n = \frac{(1.96)^2 \sigma^2}{d^2}$$

Where nr = required sample size, σ (sigma) = the population standard deviation, a measure of the variation in the population and d = the degree of precision required by the researcher. A drawback with this formula is the need to know the population standard deviation. This may be known from prior research; if a good estimate is unavailable the formula will not be reliable. We apply this formula in the example below.

Worked example

You are investigating the average (mean) level of employee satisfaction and want to know the required sample size. You decide on a 95% confidence level. Prior studies have reported a standard deviation (σ) of 1.5 so you decide to use the same figure in your estimate. Satisfaction will be measured on a 7-point scale and you set a margin of error of ±0.25 units. To determine the minimum sample size you then apply the formula:

$$n_r = \frac{4\sigma^2}{d^2} = \frac{4 \times 1.5^2}{0.25^2} = \frac{9}{0.0625} = 144$$

So your minimum sample size would be 144

Sources of error in research

There are three broad categories;

- Errors of non-observation: coverage, sampling, non-response

- Errors of observation: survey instrument, respondent, interviewer

- Processing errors: coding, editing, adjustment

The errors in testing hypothesis may emanate from

- Selection of faulty study design selected

- Adoption of faulty sampling procedure

- Inaccurate data collection method;

- wrong analysis

- application of inappropriate statistical procedures

- drawing

Statistical analysis of data and statistical tests

Statistical analysis is a mathematical method of interrogating data. This is done by looking for relationships between different sets of data. There are two types of statistics:

- Descriptive statistics: numerical summaries of samples (what was observed);

- Inferential statistics: from samples of populations (what could have been or will be observed).

It is important to understand which type of statistics you are working with before embarking on analysis. The main statistical used in analyses of data is hypothesis test. The general idea of statistical analysis is to summarise and analyse data so that it is useful and can inform decision-making.

Descriptive statistics

These are indices that describe a given sample e.g. measures of central tendency (mean, mode, median), measures of dispersion (range, standard deviation), distributions and relationships.

Inferential statistics

This is a branch of statistics used by researchers to draw inferences about a given phenomena in the population. The inferences are based on the results from a randomly selected sample. Inferential statistics help to test hypothesis thereby enabling the researcher to generalize the results from the sample to the population.

Confidence interval

Confidence Interval: An interval with random endpoints which contains the parameter of interest (in this case, μ) with a pre-specified probability, denoted by $1 - \alpha$. The confidence interval automatically provides a margin of error to account for the sampling variability of X. With a confidence interval, we report a range of numbers, in which we hope the true parameter will lie. The interval is cantered at the estimated value, and the width ("margin of error") is an appropriate multiple of the standard error.

We can think of the margin of error as "fuzz", introduced to account for sampling variability.

Point estimates

In statistics, point estimation involves the use of sample data to calculate a single value (known as a point estimate since it identifies a point in some parameter space) which is to serve as a "best guess" or "best estimate" of an unknown population parameter (for example, the population mean). More formally, it is the application of a point estimator to the data to obtain a point estimate.

In summary

The research process is as follows;

Phase 1: Deciding what to research

    Step 1: Formulating a research problem

Phase 2: Planning a research study

    Step 2: conceptualizing a research design

    Step 3: constructing an instrument for data collection

    Step 4: selecting a sample

    Step 5: Writing a research proposal

Phase 3: Conducting a research study

Step 6: Data collection

Step 7: Processing and displaying data

Step 8: Writing a research proposal

7.3.2.3 Self-Assessment

1. Describe the meaning of research.

2. The process of acquiring solutions by means of a proven method in which selected cases are considered is called _____

    A. Research

    B. Research design

    C. Research methodology

    D. Research methods

3. The following are aims of research (indicate True/False for each statement)

    A. Enhance thorough testing of theories

    B. Establishing the underlying causes and relationship between different occurrences

    C. Testing hypothesis and laying solid foundations for future research study

    D. Enhance recording and reporting of the findings

4. The main types of data which should be collected include;

    A. Qualitative and quantitative data

    B. Primary and secondary data

    C. Reliable and unreliable data

    D. Present and past data

5. Discuss the difference between formularize and summative applied research.

6. Describe the benefits of research to the researcher and the society.

7. Describe the difference between qualitative and quantitative research.

8. State the differences between applied and basic research.

9. Give an example of a participatory action research and formative research.

10. State the difference between research methods and research methodology.

7.3.2.4 Materials and resources

Research methods textbooks

LCD projector

Stationery

Videos

7.3.2.5 References

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https://www.slideshare.net/TaBiKhAn/major-types-of-research

https://ww.slideshare.net/rem123/kinds-of-research

https://www.slideshare.net/MATEENYOUNIS/types-of-research-33967388?next_slideshow=1

Conducting surveys *http://www.oag-bvg.gc.ca/internet/English/meth_gde_e_19734.html*

7.3.3 Learning outcome 2: Develop a research proposal

7.3.3.1 Learning Activities

Learning Activity	Specific instructions

Identification of research problem/title	Identify an objective research topic which is SMART (specific, measurable, realistic and time-bound
	
	    • Brainstorm for ideas in areas of interest
	
	Review literature in your area of interest critically so as to identify the research gap
	
	    • Avoid too long and irrelevant information
	
	State the research topic ensuring it does not go beyond 25 words

Identify and describe components of research proposal	Plan research early in advance
	
	Develop a research proposal which captures the following components;
	
	    • Front matter
	
	    • Chapter one
	
	    • Chapter two
	
	    • Chapter three
	
	    • Back matter
	
	Defend the proposal developed in competent manner

7.3.3.2 Information Sheet

Research proposal: A document that is typically written by a scientist or academic which describes the ideas for an investigation on a certain topic.

Hypothesis: a proposition that is stated in a testable form and that predicts a particular relationship between two (or more) variables.

Research design: a procedural plan that is adopted by the researcher to answer questions validly, objectively, accurately and economically.

Research proposal

The research proposal outlines the process from beginning to end and may be used to request financing for the project, certification for performing certain parts of research of the experiment, or as a required task before beginning the research project.

Identifying a research topic

Finding a research topic is the first step before beginning any research. The identified research topic is converted to research questions or a problem statement. For the research to be relevant, you have to make sure that the research topic has benefits (or solutions) to a particular problem within the society country or organization

To select a research topic, you need to have ideas on what you intend to study. A gap in the understanding of phenomenon may lead to the development of a hypothesis.

A topic may be developed by a researcher so as to satisfy their curiosity. This curiosity may lead them to solving a particular practical or theoretical problem.eg; researchers in the world are still in the process of carrying out research so as to come up with a HIV/AIDS vaccine.

A topic in research may also be developed due to the unsolved problems in the nation, country or in a particular organization e.g. the effect of water pollution on the workers in a certain industry. The main aim of such is to find an immediate solution to that particular problem.

A research topic can also be developed as a result of an experience one had encountered before e.g the effect of stress during pregnancy. This may provoke the researcher to want to study on such an area so as to raise awareness and to provide possible solutions.

Trying out new methods: One may develop a research topic so as to enable them to try out a new method to see how reliable it could be as compared to the previous method e.g the use of an alternative method of drug administration. Such type of a research topic may be developed if the researcher has found shortcomings in the previous method used and want to provide a solution

Social issues may also lead the researcher to come up with a research topic e.g one may want to study the role of village elders within a society, why the youth are so rebellious to the authority, illiteracy within a country etc.

In summary, the structure of your research will be guided by the following questions;

- What are you going to do? The subject of your research.

- Why are you going to do it? The reason for this research being necessary or interesting.

- How are you going to do it? The research methods that you will use to carry out the project.

- When are you going to do it? The programme of the work.

A good research topic needs to be

- Interesting
- Researchable
- Significant
- Ethical
- Manageable
- Specific

Sources of research ideas

Sources of research ideas include literature. This further includes historical records, books, journals, scientific papers, magazines, government reports e.t.c

As you read literature, you identify missing information that may lead you to identifying the gap of knowledge that you will desire to fill, hence you come up with a research topic.

The community, nation states and society are also sources of research ideas as they have some practical problems that may require solutions e.g. unemployment, global recession education e.t.c

Introduction to proposal development

A research proposal should communicate the following contents clearly and specifically such that anyone going through it should be able to undertake all the tasks:

A good research proposal should contain the following components:

Front matter; title page, declaration, dedication, acknowledgement, table of content, acronyms, tables and figures and abstract.

Chapter One; background information/introduction, problem statement and justification, objectives, hypothesis/research questions, significance of the study, scope of the study, limitations, delimitations, conceptual frame work and operational definition of terms.

Chapter Two; literature review based on objectives.

Chapter Three; research methodology; study design, study area, study variables, sample size determination, Sampling procedures, data collection tools and procedures, Validity and reliability of data tools ethical issues in research, reference, Formulate questionnaire and other data collection tools

Back matter; Appendices; questionnaire, consent forms, budget, time frame

Introduction

Introduction helps to guide on the information listed by acquainting the researcher with the available literature in the area of study and providing information on the methods and procedures other researchers have used in past situations.

It is always good to start with a very broad perspective of the main subject area, before gradually narrowing the focus to the central problem under investigation. In doing so, cover the following aspects of your study area:

- An overview of the main area under study;

- A historical perspective (development, growth, etc.) Pertinent to the study area;

- Philosophical or ideological issues relating to the topic;

- Trends in terms of prevalence, if appropriate;

- Major theories, if any;

- The main issues, problems and advances in the subject area under study;

- Important theoretical and practical issues relating to the central problem under study;

- The main findings relating to the core issue(s).

Identification of research problem

This is also known as the research gap which the researcher intends to study or address. Although there are problems all around us, the process of identifying a research gap should be taken with a lot of keenness so that it can meet the following criteria;

- stated clearly and concisely;

- Significant i.e. not trivial or a repeat of previous work;

- Delineated, in order to limit its scope to practical investigation;

- Possible to obtain the information required to explore the problem;

- Possible to draw conclusions related to the problem, as the point of research is to find some answers.

Hypothesis

A hypothesis is written in such a way that it can be proven or disproven by valid and reliable data- it is in order to obtain these data that we perform our study. (1988: 200)

From the above definitions it is apparent that a hypothesis has certain characteristics:

1. It is a tentative proposition.

2. Its validity is unknown.

3. In most cases, it specifies a relationship between two or more variables.

A hypothesis is not very essential in research but it is important in bringing clarity to the research problem. Hypothesis serves the following functions;

- The formulation of a hypothesis provides a study with focus. It tells you what specific aspects of a research problem to investigate.

- A hypothesis tells you what data to collect and what not to collect, thereby providing focus to the study.

- As it provides a focus, the construction of a hypothesis enhances objectivity in a study.

- A hypothesis may enable you to add to the formulation of theory. It enables you to conclude specifically what is true or what is false.

Errors in testing a hypothesis

Incorrect conclusions about the validity of a hypothesis may be drawn if:

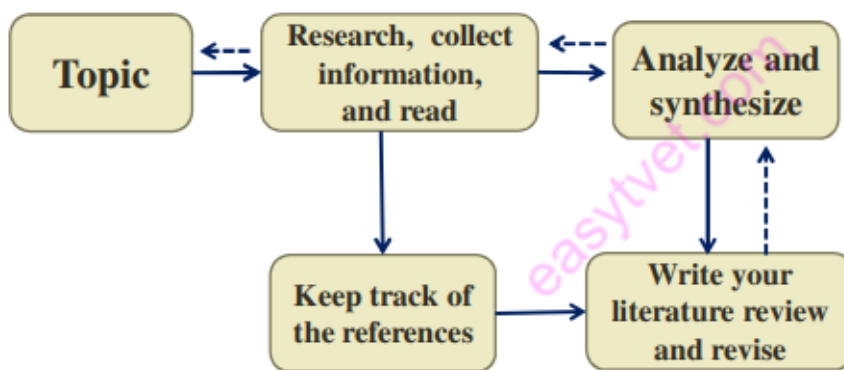- the study design selected is faulty;

- the sampling procedure adopted is faulty;

- the method of data collection is inaccurate;

- the analysis is wrong;

- the statistical procedures applied are inappropriate; or

- the conclusions drawn are incorrect

Literature review

This refers to the systematic identification, location and analysis of documents containing information related to your research topic/problem

What do we already known/ what has already been done…What type of research has been done in the area? What has been found in previous studies? Place your research in a logical or theoretical framework Provide the rationale for your research; where your study will be situated? Give possible directions what needs to be done; what suggestions do other researchers make for further study? What has not been investigated?

The literature review process should be organised as follows;

Step 1: Identify a list of key words

Step 2: Search for primary and secondary sources that are relevant to your research topic

Step 3: Screen and evaluate the sources

Step 4: Analyze and organize the sources

Step 5: Write the literature review

The researcher should search for relevant documents (books, journals, articles, reports, thesis etc). The kind of information one expects to get is as follows;

- Primary sources: firsthand information (an original research, study report by the person who conducted it)

- Secondary sources: second-hand information (a review, description of a study conducted by someone else).

Once all the information has been gathered, an outline should be made as follows;

- Definitions

- Introduction of the main theory or theories that may support your research

- Overview of previous research in this field or related field, organize and summarize in a meaningful way; avoid too broad and irrelevant info

- Similarities and differences identified in previous studies (does it support or justify your planned research? Does it point to certain directions of research)?

How to write literature review

Once a clear outline has been laid out, writing should begin. One should quote or provide a source when using arguments/opinions or presenting findings from other studies.

Content should be organized logically, explaining each concept and relevant/potential relationships. Being precise and consistent is of great essence when using terms.

Remember….

- Avoid too long, irrelevant information

- Avoid big words, or being too general

- Avoid repetition, summarize them

- Be focused, well-organized

- It is important to develop a logical framework for your study

- Bear in mind that what is important is not just what has been done, but why do you conduct this research

Conceptualizing a research design

Through a research design you decide for yourself and communicate to others your decisions regarding what study design you propose to use, how you are going to collect information from your respondents, how you are going to select your respondents, how the information you are going to collect is to be analysed and how you are going to communicate your findings.

Research design has two main functions whereby the first relates to the identification and/or development of procedures and logistical arrangements required to undertake a study, and the second emphasises the importance of quality in these procedures to ensure their validity, objectivity and accuracy.

A research design, therefore, should do the following:

- Name the study design per se – that is, 'cross-sectional', 'before-and-after', 'comparative', 'control experiment' or 'random control'.

- Provide detailed information about the following aspects of the study:

- Who will constitute the study population?

- How will the study population be identified?

- Will a sample or the whole population be selected?

- If a sample is selected, how will it be contacted?

- How will consent be sought?

- What method of data collection will be used and why?

- In the case of a questionnaire, where will the responses be returned?

- How should respondents contact you if they have queries?

- In the case of interviews, where will they be conducted?

- How will ethical issues be taken care of?

7.3.3.3 Self-Assessment

1. _____ outlines the process from beginning to end and may be used to request financing for the project, certification for performing certain parts of research of the experiment, or as a required task before beginning the research project.

    A. Research design

    B. Research topic

    C. Research proposal

    D. Research methodology

2. Historical records, books, journals, scientific papers, magazines and governemet reprts are collectively known as;

    A. Sources of research ideas

    B. Research report

    C. Research data sources

    D. Literature review

3. _____ helps to guide on the information listed by acquainting the researcher with the available literature in the area of study and providing information on the methods and procedures other researchers have used in past situations.

    A. Introduction

    B. Literature review

    C. Table of content

    D. Background information

4. Briefly discuss four sources of research topics.

5. Outline the steps in identifying a suitable research topic.

6. Describe factors that will help you to differentiate between a scholarly and a non-scholarly article.

7. Describe the components of a research proposal

8. What are the two main functions of a research design?

9. Describe how you formulate a problem statement in research

7.3.3.4 Tools, Resources, and Materials

Research methods textbooks

Sample proposal document

LCD projector

Stationery

Videos

7.3.3.5 References

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7.3.4 Learning outcome 3: Conduct data collection

7.3.4.1 Learning Activities

Learning Activity	Specific instructions
Collect data • Follow the guideline provided by the proposal developed • Perform pre-testing of data collection tools • Carry out sampling of the respondents • Perform data management and data quality checks	Study through the proposal and understand what the study requires Follow the "how to" guideline provided in the proposal Show ability to collect the data captured in the proposal using the proposed data collection tools

7.3.4.2 Information Sheet

Definitions

Data: any observation collected in respect of any characteristic or event

Data collection: process of collecting information from all the relevant sources to find answers to the research problem, test the hypothesis and evaluate the outcomes.

Sampling: is the use of a subset of the entire population.

Research data management: a term that describes the organization, storage, preservation, and sharing of data collected and used in a research project. It involves the everyday management of research data during the lifetime of a research project.

Data collection

Data collection is a term used to describe a process of Systematic gathering of data for a particular purpose from various sources that has been systematically observed, recorded, organized.

Purpose of data collection

- To obtain information
- To keep on record
- To make decisions about important issues,
- To pass information on to others
- For research study

Factors to be considered before collection of data

- Nature , scope & Objective of the enquiry
- Sources of information
- Availability of fund
- Techniques of data collection
- Availability of trained persons

Types of data

Qualitative data	Quantitative data
Deals with descriptions.	Deals with numbers
Data can be observed	Data can be measured
Data cannot be measured	
Example: feather colour in poultry	Example: height, weight, length, weight

Sources of data

These are mainly divided into external and internal sources of data

Internal sources of data	External sources of data
Many institutions and departments have information about their regular functions , for their own internal purposes When those information are used in any survey is called internal sources of data. Eg…social welfare societies.	When information is collected from outside agencies is called external sources of data. Such types of data are either primary or secondary. This type of information can be collected by census or sampling method by conducting survey.

Primary data is the data that has been collected from first-hand experience. Primary data has not been published yet and is more reliable, authentic and objective. Primary data has not been changed or altered by human beings, therefore its validity is greater than secondary data.

Secondary data is a type of data that has already been published in books, newspapers, magazines, journals, online portals etc. There is an abundance of data available in these sources about your research area. Therefore, application of appropriate set of criteria to select secondary data to be used in the study plays an important role in terms of increasing the levels of research validity and reliability.

Quantitative data collection methods are based in mathematical calculations in various formats. Methods of quantitative data collection and analysis include questionnaires with closed-ended questions, methods of correlation and regression, mean, mode and median and others.

Quantitative methods are cheaper to apply and they can be applied within shorter duration of time compared to qualitative methods. Moreover, due to a high level of standardisation of quantitative methods, it is easy to make comparisons of findings.

Qualitative research methods, on the contrary, do not involve numbers or mathematical calculations. Qualitative research is closely associated with words, sounds, feeling, emotions, colours and other elements that are non-quantifiable. Qualitative studies aim to ensure greater level of depth of understanding and qualitative data collection methods include interviews, questionnaires with open-ended questions, focus groups, observation, game or role-playing, case studies etc.

Your choice between quantitative or qualitative methods of data collection depends on the area of your research and the nature of research aims and objectives.

Factors affecting method of data collection

- Type of research subject
- Purpose of research study
- Size of study sample
- Distribution of target population
- Time frame of the study
- Literacy level of subjects

Data collection tools

There are three main types of interviews;

Structured interviews: involve the use of questionnaires based on a predetermined and identical set of questions. The questions are usually read out by a researcher in a neutral tone of voice to avoid influencing or prompting a particular response from a participant.

Semi structured interviews: The interviewer will have a list of themes and areas to be covered and there may be some standardised questions, but the interviewer may omit or add to some of these questions or areas, depending on the situation and the flow of the conversation.

Unstructured interviews: These are informal discussions where the interviewer wants to explore in-depth a particular topic with another person in a spontaneous way. However, even in unstructured interviews it is likely that the researcher would have a pre-decided range of topics to cover in the discussion.

Focus Groups

Focus groups are used to gather data, usually in the forms of opinions, from a selected group of people on a particular and pre-determined topic, e.g. consumer topic; political topic etc. The researcher creates a relaxed atmosphere and records in some way what is being said (e.g. by use of a tape-recorder, video, note-taker etc). The purpose of the discussion is introduced and discussion ground-rules agreed. The researcher encourages free discussion, but is ready to intervene if necessary to resolve group problems. Focus groups can be a useful way of finding out what the main issues and concerns of any group are. This can help in questionnaire design or to develop a future interview strategy. They can be a useful way too, of bringing to the surface issues that might not otherwise have been discovered: the dynamics of a group can often make people bolder in advancing their opinions.

Participant Observation

As discussed earlier, participant observation is when a researcher attempts to observe in some way in the group being researched and to share in the experiences being recorded and analysed. It can be used in association with other research approaches or as the primary way of gathering data. It can be a good way of getting below the surface of any situation and to help reveal or unravel complex causal

Questionnaires

Main points to remember when designing and using questionnaires;

1. Questionnaires facilitate the collection of data by asking all, or a sample of people, to respond to the same questions. They can be in both printed and electronic forms.

2. There are five types of questionnaire approaches:

    *   On-line (electronic)

    *   Postal (printed)

    *   Delivery & collection (printed)

    *   Telephone (electronic/printed)

    *   Interview face to face/group (electronic or printed)

3. You need to absolutely clear before you design a questionnaire what it is you want to learn and what data you need to obtain to enlighten you in this search. You also need to think ahead about how you are going to collate the information you gather. There is no point in designing a questionnaire that produces a range of information you find very difficult to collate in any meaningful quantitative or qualitative way.

4. The validity (the extent to which the data accurately measures what they were intended to measure) and reliability (the extent to which the data collection method will yield consistent findings if replicated by others) of the data you collect depend on the design of the questionnaire and the words that you use.

5. Questions can be open or closed: Open questions: a question is posed, but space is left for the respondent's own answer (the questions posed to you in this workbook have all been open questions) e.g. Please tell me which brand you prefer, and why in the space that follows Closed: where a limited number of alternative responses to the set question are provided. These can be in list, category, ranking, scale/rating, grid or other quantitative form. They can be pre- coded on a questionnaire to facilitate analysis. e.g. Please tick the box shown below with the brand you prefer

6. The order and flow of questions should be logical to the respondent.

7. There can be a low rate of return with questionnaires, so they need to be introduced carefully and courteously to potential respondents.

8. All questionnaires should be piloted, if possible, with a small group before the main research to assess their value, validity and reliability.

Guidelines for designing questionnaires

1. Explain the purpose of the questionnaire to all participants

2. Keep your questions as simple as possible

3. Do not use jargon or specialist language (unless the recipients really prefer and understand it)

4. Phrase each question so that only one meaning is possible

5. Avoid vague, descriptive words, such as 'large' and 'small'

6. Avoid asking negative questions as these are easy to misinterpret

7. Only ask one question at a time

8. Include relevant questions only

9. Include, if possible, questions which serve as cross-checks on the answers to other questions

10. Avoid questions which require participants to perform calculations

11. Avoid leading or value-laden questions which imply what them required answer might be

12. Avoid offensive questions or insensitive questions which could cause embarrassment

13. Avoid asking 'difficult' questions, e.g. where the respondent may struggle to answer (people hate to look stupid by not knowing the 'answer').

14. Keep your questionnaire as short as possible, but include all the questions you need to cover your purposes.

Pre-testing of data collection tools

Pre-testing is the administration of the data collection instrument with a small set of respondents from the population for the full scale survey. If problems occur in the pre-test, it is likely that similar problems will arise in full-scale administration. The purpose of pre-testing is to identify problems with the data collection instrument and find possible solutions.

It is not possible to anticipate all of the problems that will be encountered during data collection. Terminology used in questionnaires or interviews may not be understood by respondents and information to be retrieved from documents may not be readily available. Reducing error to acceptable levels requires the pre-testing of data collection instruments.

Because standardized procedures are essential for ensuring that general statements can be made, it is advisable to make as few adjustments as possible to data collection instruments once data collection has actually started. In the case of mailed questionnaires, adjustments are impossible once the data collection instruments have been distributed. Pre-testing mail questionnaires or other data collection instruments allows adjustments to be made before full scale administration of the instrument, helping to ensure that standardized procedures are applied during data collection.

Principles for pre-testing

Pre-testing should be conducted in circumstances that are as similar as possible to actual data collection and on population members as similar as possible to those that will be sampled.

Careful notes should be taken on the problems encountered and possible solutions should be identified.

Pre-testing questionnaires

One important objective of pre-testing questionnaires is to get at the thinking behind the answers so that the auditor can accurately assess whether the questionnaire is being filled out properly, whether the questions are actually understood by respondents, and whether the questions ask what the auditor thinks they are asking. Pre-testing also helps assess whether respondents are able and willing to provide the needed information.

In pre-testing, the respondents should actually fill out the questionnaire, giving their views along the way or afterward. One approach is to give the questionnaire as an interview, asking for clarification of answers and clarifying questions along the way. The respondents' views can also be obtained during a post-questionnaire interview or in a focus group. Another common approach is to have respondents think out loud as they answer.

Sampling/ identification of respondents

Sample design and sample size

Sampling is usually done as it is not possible to study the entire population as this would be tedious, expensive and time consuming.

There are many types of sampling procedures which are determined by factors such as:

- The objectives of the study

- The nature of the research(qualitative or quantitative)

- Experience of the researcher

- The research questions

- Where detailed analysis of the sample is required

During the process of sampling there may be bias in sampling. These are the data errors that may occur hence resulting to false finding. Bias in sampling can be due to;

- Faulty research instruments(e.g. rulers, measuring tapes, weighing scales)

- Non responses

- Late return of questionnaires

- False information from the respondents

- Biasness of the interviewer concerning a certain culture or political differences

Sampling techniques

There are two main types sampling techniques that are used in research;

- Probability sampling

- Non probability sampling

A. Probability Sampling:

Where the researcher has a significant measure of control over who is selected and on the selection methods for choosing them. Sampling methods allow for representative cross-sections, or particular groups to be identified or targeted.

Main Methods:

i. Simple Random Sampling: (selection at random by the researchers from a choice of subjects).

Each item in the population has the same probability of being selected as part of the sample as any other item. This is usually achieved by the use of computers that will generate the table of random numbers. The lottery method can also be used. In this method, names of the subject or objects, in the population frame are written on pieces of paper and put in a container .The pieces of paper are then thoroughly mixed so as each item has an equal chance of being selected. Random sampling can be done with or without replacement. If done without replacement, an item is not returned in the population after being selected and thus can only occur once in the sample.

ii. Systematic Sampling: (selecting by the researchers at numbered intervals, e.g. every one person in five in the target group).

Every nth element from the list is selected as the sample is, starting with a sample element n randomly selected from the first k elements. For example if a population has 1000 elements and a sample size of 100 is needed, then k would be 1000/100=10. If number 5 is randomly selected from the first ten elements on the list, the sample would continue down the list selecting the 5th element from each group of ten elements

iii. Stratified Sampling:

This is sampling within particular sections of the target groups, e.g. you target a specific number of people based on the percentage of the total group that share the same characteristics. So, for example, in a study of an organisation that had 50 supervisors & 800 labourers, a 10% representative sample of this population would target 5 supervisors & 80 labourers to interview.

The population is first divided into subgroups known as the strata based on mutually exclusive criteria. Random or systematic samples are then taken from each of the subgroup (stratum). The sampling fraction for each of the subgroup may be taken in the same proportion as the subgroup has in the population. For example, if 40 students are to be selected,5%are first years,25%are second years,60%are third years and 10% are fourth years, then 2 first years,10 second years 24 third years and 4 fourth years will be selected randomly so as to be part of the sample population of 40.Statified sampling can also sample an equal number of items from each subgroup.

Advantages over other sampling methods include;

- Improves the accuracy/efficiency of estimation

- Permits greater balancing of statistical power of tests of differences between strata by sampling equal numbers from strata varying widely in size.

- Allows use of different sampling techniques for different subpopulations.

- Focuses on important subpopulations and ignores irrelevant ones.

  Disadvantages

- Requires selection of relevant stratification variables which can be difficult.

- Is not useful when there are no homogeneous subgroups.

- Can be expensive to implement.

iv. Cluster Sampling: (surveying a particular cluster of the subject group)

Also known as block sampling. In cluster sampling, the population that is being selected is divided into groups known as clusters. Instead of these groups being homogenous based on a certain criteria, a cluster is as heterogeneous as possible to match the population. For example all the clusters in the population are listed (e.g. Hospitals, markets, restaurants, and colleges).Subjects are then selected from each cluster ensuring that the selected subjects are a representative of the entire population.

v. Multistage sampling

This is a complex form of cluster sampling. Two or more levels of the units are imbedded one into the other. For example geographic areas (primary units), factories (secondary units), employees (tertiary units).At each stage, a sample of the corresponding unit is selected. At first, a sample of primary units is selected, then, in each of those selected, a sample of secondary units is selected, and so on. All ultimate units (individuals, for instance) selected at the last step of this procedure are then surveyed. The reasons for adopting such a design may be reducing costs, for example, when interviewers are assigned to persons located in a restricted area, or reducing the sample error. Multi-stage sampling is sometimes used when no general sample frame exists. In this case, a first step is to select, at random, a sample of areas, collective units, or villages from a list where they are all registered (primary units). Then, for each selected primary unit, a comprehensive enumeration of all units of lower rank is made, thus obtaining a local sample frame among which a sample of secondary units will be selected.

B. Non-Probability Sampling:

Where the researcher has little initial control over the choice of who is presented for selection, or where controlled selection of participants is not a critical factor.

Main Methods include:

i.   *Convenience Sampling:* (sampling those most convenient; those immediately available)

ii. *Voluntary Sampling:* (the sample is self-selecting; they come forward voluntarily in response to an appeal)

iii *Purposive Sampling:* (enables you to use your judgement to choose people that are presented or are available that best meet your objectives or your target groups).

Subjects are selected because of some characteristic. Purposive sampling targets a particular group of people. When sampling the desired population for the study is rare or very difficult to locate and recruit for a study, purposive sampling may be the only option. For example, you are interested in studying cognitive processing speed of young adults who have suffered closed head brain injuries in automobile accidents. This would be a difficult population to find.

iv. 'Snowball' Sampling: (building up a sample through informants. You start with one person – who then suggests another & so on).

This sampling method is used if the sample for the study is very rare or is limited to a very small subgroup of the population. This type of sampling technique works like chain referral. After observing the initial subject, the researcher asks for assistance from the subject to help identify people with a similar trait of interest.

The process is much like asking your subjects to nominate another person with the same trait as your next subject. The researcher then observes the nominated subjects and continues in the same way until the obtaining sufficient number of subjects.

For example, if obtaining subjects for a study that wants to observe a rare disease, the researcher may opt to use snowball sampling since it will be difficult to obtain subjects. It is also possible

that the patients with the same disease have a support group; being able to observe one of the members as your initial subject will then lead you to more subjects for the study. The process is cheap and cost efficient and needs little planning. The disadvantages of this method are that the researcher has little control over this method and the representative of the sample is not guaranteed.

v. Event Sampling (using the opportunity presented by a particular event, e.g. a conference, to make contacts)

vi. Time Sampling (recognising that different times or days of the week or year may be significant and sampling at these times or days.

Administering questionnaires and other data collection tools

The methods used in data collection include;

- Questionnaire

- Interviewing

- Observation

Data-collection techniques allow us to systematically collect information about our objects of study (people, objects, phenomena) and about the settings in which they occur.

In the collection of data we have to be systematic. If data are collected haphazardly, it will be difficult to answer our research questions in a conclusive way.

Example:

Various data collection techniques can be used such as:

- Using available information

- Observing

- Interviewing (face-to-face)

- Administering written questionnaires

- Focus group discussions

- Projective techniques, mapping, scaling

Using available information

Usually there is a large amount of data that has already been collected by others, although it may not necessarily have been analyzed or published. Locating these sources and retrieving the information is a good starting point in any data collection effort.

For example, analysis of the information routinely collected by health facilities can be very useful for identifying problems in certain interventions or in flows of drug supply, or for identifying increases in the incidence of certain diseases.

Analysis of health information system data, census data, unpublished reports and publications in archives and libraries or in offices at the various levels of health and health-related services, may be a study in itself. Usually, however, it forms part of a study in which other data collection techniques are also used.

Interviews

In interviews, information is obtained through inquiry and recorded by enumerators. Structured interviews are performed by using survey forms, whereas open interviews are notes taken while talking with the respondent. The notes later interpreted for further analysis.

Types of interviews

Face to face interview

An interview is used to obtain information from one person about particular situations, problems or topics. This kind of interview involves a direct meeting between interviewer and interviewee. The interview can be structured or semi-structured.

The structured interview is designed to elicit specific responses to specific questions. Responses to a structured interview will normally be easier to quantify and interpret since uniform questions tend to yield a narrower range of responses. The semi-structured interview uses open-ended questions to explore broad issues in a non-directive, non-threatening manner.

Advantages

1. The main advantage of face-to-face or direct interviews is that the researcher can adapt the questions as necessary, clarify doubt and ensure that the responses are properly understood, by repeating or rephrasing the questions.

2. The researcher can also pick up nonverbal cues from the respondent. Any discomfort, stress and problems that the respondent experiences can be detected through frowns, nervous taping and other body language, unconsciously exhibited by any person.

Disadvantages

1. The main disadvantages of face-to-face interviews are the geographically limitations they may impose on the surveys and the vast resources needed if such surveys need to be done nationally or internationally.

2. The costs of training interviewers to minimize interviewer's biases for example differences in questioning methods, interpretation of response are also high.

3. Respondents might feel uneasy about the anonymity of their responses when they interact during face to face interviews.

Telephone interviews

This is a prescheduled interview that takes place between the interviewer and the interviewee. Unlike the face to face interview, there is no meeting with the parties involved

Advantages

1. Telephone interview enable a researcher to gather information rapidly.

2. Wide geographical access. People from all over the globe can be accessed.

3. The people are likely to cooperate due to the confidentiality involved.

4. Access to dangerous or politically sensitive areas.

Disadvantages

1. Some people may not have telephones

2. People often dislike the intrusion of a call to their home.

3. Telephone interviews need to be relatively short otherwise the people will feel imposed upon.

4. Many people do not have publicly listed telephone numbers

5. The interviewer has no view on the situation in which the interviewee is situated. Because of this the interviewer has lesser possibilities to create a good interview ambience.

E-Mailed interviews.

Advantages

• There is extended access to participants.

• The questionnaire may be handed to the respondents or mailed to them, but in all cases they are returned to the researcher via mail.

• Cost is very low, since bulk postage is cheap in most countries.

• Respondents can answer at their own convenience.

• No interviewer bias introduced

• Large amount of information can be obtained: some mail surveys are as long as 50 pages

Disadvantages

• Long time delays, often several months, before the surveys are returned and statistical analysis can begin

• Not suitable for issues that may require clarification

Questionnaires

A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents.

Advantages

- The responses are gathered in a standardized way, so questionnaires are more objective unlike interviews.

- Generally it is relatively quick to collect information a questionnaire. However in some situations they can take a longtime not only to design but also to apply and analyze.

- Questionnaires are very cost effective when compared to face-to-face interviews especially for studies involving large sample sizes and large geographic areas. Written questionnaires become even more cost effective as the number of research questions increases.

- They are easy to analyze. Data entry and tabulation for nearly all surveys can be easily done with many computer software packages.

- Questionnaires are familiar to most people. Nearly everyone has had some experience completing questionnaires and they generally do not make people apprehensive.

- Questionnaires reduce bias. There is uniform question presentation and no middle-man bias. The researcher's own opinions will not influence the respondent to answer questions in a certain manner. There are no verbal or visual clues to influence the respondent.

- Questionnaires are less intrusive than telephone or face-to-face surveys. When a respondent receives a questionnaire in the mail, he is free to complete the questionnaire on his own time-table. Unlike other research methods, the respondent is not interrupted by the research instrument.

Disadvantages

- Questionnaires, like many evaluation methods occur after the event, so participants may forget important issues.

- Questionnaires are standardized so it is not possible to explain any points in the questions that participants might misinterpret. This could be partially solved by piloting the questions on a small group of students or at least friends and colleagues. It is advisable to do this anyway.

- Open-ended questions can generate large amounts of data that can take a long time to process and analyze. One way of limiting this would be to limit the space available to students so their responses are concise or to sample the students and survey only a portion of them.

- Respondents may answer superficially especially if the questionnaire takes a long time to complete. The common mistake of asking too many questions should be avoided.

- Students may not be willing to answer the questions. They might not wish to reveal the information or they might think that they will not benefit from responding perhaps even be penalized by giving their real opinion. Students should be told why the information is being collected and how the results will be beneficial. They should be asked to reply honestly and told that if their response is negative this is just as useful as a more positive opinion. If possible the questionnaire should be anonymous

1. Open ended or unstructured (qualitative)

The interviewee is at liberty to answer the questions without any limitation. Examples

- Tell me about yourself.

- Why do you indulge in alcohol

- What is your opinion on traditional birth attendants?

2. Semi- structured

Semi-structured interviews are conducted with a fairly open framework which allow for focused, conversational, two-way communication. They can be used both to give and receive information. A semi-structured interview is flexible, allowing new questions to be brought up during the interview as a result of what the interviewee says. The interviewer in a semi-structured interview generally has a framework of themes to be explored.

3. Structured questionnaires

The aim of this approach is to ensure that each interview is presented with exactly the same questions in the same order. This ensures that answers can be reliably aggregated and that comparisons can be made with confidence between sample subgroups or between different survey periods. The answers are answered in on way (e.g. yes or no)

4. Focus group discussion

This is a form of qualitative research method where people from similar backgrounds or experiences (e.g., mothers, HIV/AIDS patients, students) are brought together to discuss a specific topic of interest to the investigator(s). Homogeneous samples are preferred because mixing age/ gender groups may inhibit some people, especially women, from expressing their views. Questions are asked in an interactive group setting where participants are free to talk with other group members. The main characteristic of a focus group is the interaction between the moderator and group, as well as the interaction between members. The objective is to give the researcher an understanding of the participants' perspective on the topic in the discussion. Focus groups are rapidly gaining popularity in health and medical research.

Advantages of focus groups include:

- Quick, cheap and relatively easy to assemble

- Good for getting rich data in participants' own words and developing deeper insights

- People are able to build on one another's responses and come up with ideas they might not have thought of in a 1-on-1 interview

- Good for obtaining data from children and/or people with low levels of literacy

- Provides an opportunity to involve people in data analysis (e.g. "Out of the issues we have talked about, which ones are most important to you?")

- Participants can act as checks and balances on one another - identifying factual errors or extreme views

Limitations of focus groups include:

- The responses of each participant are not independent

- A few dominant focus group members can skew the session

- Focus groups require a skilled and experienced moderator

- The data which results from a focus group requires skill and experience to analyze

Observation

Observational research techniques solely involve the researcher or researchers making observations.

To develop an observation tool, you want first to establish the indicators for the observation. Indicators are based on what you expect to find in the environment, product or process as a result of your program. The second thing you want to do is consider each of the indicators and measure them for their presence or absence, and then, their quality. The observed resorts may be recorded by methods such as video taping, taking notes or counting occurrences

Advantages

- In terms of validity, observation findings are considered strong as compared to other methods because the researcher is able to collect a depth of information about a particular behaviour.

Disadvantages

- There are problems with reliability. Reliability refers the extent that observations can be replicated. Seeing behaviours occur over and over again may be a time consuming task.

- There is a possibility of the researcher being bias. Often; it is assumed that the researcher may see what they want to see.

- Data management and data quality checks

- Research Data Management is part of the research process, and aims to make the research process as efficient as possible, and meet expectations and requirements of the university, research funders, and legislation. It concerns how data is created and plan for its use, how data is organized and how it is kept.

Research data management concerns the organization of data, from its entry to the research cycle through to the dissemination and archiving of valuable results. It aims to ensure reliable verification of results, and permits new and innovative research built on existing information.

Data quality relies on a chain of events: what is asked for and how, how it is entered, what is edited and when, and finally how data is reviewed, stored, and used. Since data quality is affected by virtually every part of the business process, data quality is an integral part of what must be a Total Quality Management concept.

Clean data is the result of some combination of two efforts: making sure that data entered into the system are clean, and cleaning up problems once the data has been accepted. The first part is best interactive and immediate, although it may include some "close of business day" review and rework processes. The second type of effort is, fundamentally, a batch data cleanup exercise.

Clean data is also the result of a shared sense of responsibility and never-ceasing vigilance. Every time data is entered to the system, the person doing the entry should feel responsibility for and pride in the quality of the data and success of the mission. Managers responsible for a business area must be aware of their responsibilities for the data around which their work is structured. Business and technical experts must realize that anytime the business changes, the data might change. Responsibility is typically defined as a combination of data stewardship and ownership.

Characteristics of good quality data

Accuracy: degree to which data value meets the source assumed to be correct. This means that the data is free of error

Completeness: degree to which values are present in the attributes that require them

Consistency: data maintained in such a way that they are free from variation or contradiction

Timeliness: extent to which a data item is provided at the specified time

Uniqueness

Validity: satisfies the acceptance requirements

7.3.4.3 Self-Assessment

1. Define the following terms as used in research studies

    A. Sample

    B. Sampling

2. Data collection methods can be divided into two main categories;

    A. Qualitative and quantitative data collection methods

    B. Questionnaire and interviews data collection method

    C. Primary and secondary data collection methods

    D. Focus groups and participant observation data collection methods

3. The following are disadvantages of stratified sampling except?

    A. Requires selection of relevant stratification variables which can be difficult.

    B. Does not allow efficiency of estimation

    C. Is not useful when there are no homogeneous subgroups.

    D. Can be expensive to implement.

4. Convenience sampling, voluntary sampling and purposive sampling are the main methods of ;

    A. Non-probability sampling

    B. Multi stage sampling

    C. Systematic sampling

    D. Stratified sampling

5. Giving relevant examples, differentiate between probability and non-probability sampling?

6. Discuss the advantages and disadvantages of using focused group discussions during data collection

7. Describe any two data collection tools citing the advantages of each

8. Bias in sampling can result to data errors that may occur hence resulting to false finding. Explain.

9. Explain the characteristics of good quality data

1.0. Explain the characteristics of good quality data

7.3.4.4 Materials and resources

Sample data collection tools

Research methods textbooks

LCD projector

Stationery

Videos

Research proposal

7.3.4.5 References

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7.3.5 Learning outcome 4: Conduct data analysis and presentation

7.3.5.1 Learning Activities

Learning Activity	Specific instructions
Analyse data • Identify an appropriate data analysis software • Identify the variables in research	Demonstrate the ability to classify the data Perform data cleaning Perform data coding Differentiate dependent and independent variables Run the data through the software for analysis Use the analyzed data to write the research report
Present research findings • Identify and describe the methods of presenting the analysed data	Identify the appropriate data presentation method for the different data sets

7.3.5.2 Information Sheet

Definitions

Variable is any measured characteristic or attribute that differs for different subjects

Data analysis: the process of bringing order, structure and meaning to the mass of collected data.

Introduction to data analysis

Data analysis is a messy, ambiguous, time-consuming, creative, and fascinating process. It does not proceed in a linear fashion; it is not neat. Qualitative data analysis is a search for general statements about relationships among categories of data.

The 'raw' research data needs to be edited, tabulated and analyzed to find the results and to interpret them.

– The method used may be manual or computer based.

– The analysis plan follows from the research objective of the study.

– Association and relationships of variables are identified and discussed in the light of the specific marketing problem.

The analysis process is the most important process in the research as the results are generated on the basis of data preparation. After the data collecting stage the collected data is;

– edited

– Coded

– transcribed

– corrected if required and

– validated.

Uni/multivariate techniques are used for analyzing data when there is a single/multiple measurement of each element or unit in the sample data.

The purpose of analysing data is to obtain usable and useful information. The analysis, irrespective of whether the data is qualitative or quantitative, may:

• Describe and summarise the data

• Identify relationships between variables

• Compare variables

• Identify the difference between variables

Variables in research

There are two main types of variables in research;

1. Independent variable

The independent variable is the variable that is representing the value being manipulated or changed. It is what the experimenter changes so as to carry out an experiment.

This is what the experimenter changes or enacts in order to carry out the experiment

For instance: if you are measuring the growth rate of bacteria under aerobic conditions for 12 hours a day versus bacteria that is only exposed to aerobic conditions for 6 hours, the amount of time per day that the bacteria is exposed to aerobic conditions per day is the independent variable-the value that you control. The growth rate of the bacteria would be a dependent variable.

2. Dependent variable

The dependent variable is what changes when the independent variable changes (the dependent variable depends on the outcome of the independent variable). Example: You are interested in how stress affects heart rate in humans. Your independent variable would be the stress and the dependent variable would be the heart rate. You can directly manipulate stress levels in your human subjects and measure how those stress levels change heart rate.

Extraneous and Confounding Variables

The independent and dependent variables are not the only variables present in many experiments. In some cases, extraneous variables may also play a role. This type of variable is one that may have an impact on the relationship between the independent and dependent variables.

For example, in our previous description of an experiment on the effects of sleep deprivation on test performance, other factors such as age, gender and academic background may have an impact on the results. In such cases, the experimenter will note the values of these extraneous variables so this impact on the results can be controlled for.

There are two basic types of extraneous variables:

Participant Variables: These extraneous variables are related to individual characteristics of each participant that may impact how he or she responds. These factors can include background differences, mood, anxiety, intelligence, awareness and other characteristics that are unique to each person.

Situational Variables: These extraneous variables are related to things in the environment that may impact how each participant responds. For example, if a participant is taking a test in a chilly room, the temperature would be considered an extraneous variable. Some participants may not be affected by the cold, but others might be distracted or annoyed by the temperature of the room.

In many cases, extraneous variables are controlled for by the experimenter. In the case of participant variables, the experiment might select participants that are the same in background and temperament to ensure that these factors do not interfere with the results. If, however, a variable cannot be controlled for, it becomes what is known as a confounding variable. This type of variable can have an impact on the dependent variable, which can make it difficult to determine if the results are due to the influence of the independent variable, the confounding variable or an interaction of the two.
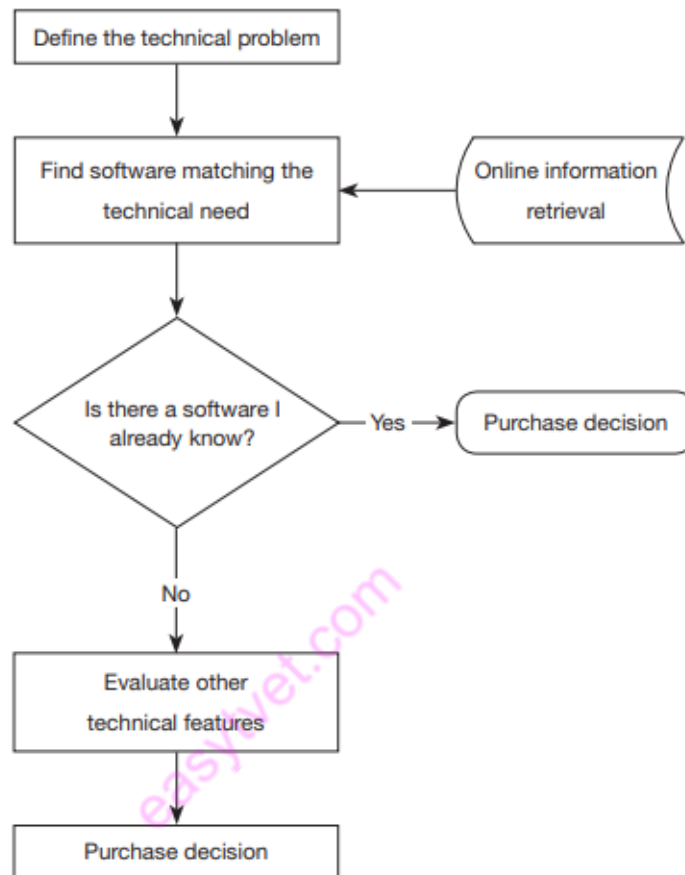
Tools to support data analysis

- Spreadsheet – simple to use, basic graphs

- Statistical packages e.g SPSS

- Qualitatitive data analysis tools

  o Categorization and theme-based analysis

  o Quantitative analysis of text-based data

- Nvivo and Atlas.ti support qualitative data analysis

Organizing the data for analysis

- Organize all forms/questionnaires in one place

- Check the completeness and accuracy

- Remove those that are incomplete or do not make sense; keep a record or your ecisions

- Assign a unique identifier of each form/questionnaire

Identification of data analysis software's

Use of statistical/data analysis software is very critical in the current research era. Choosing the right software tool is a strategic move for any research department. The success of a software selection is determined by several factors such as software usability, technical support, training materials/courses, and community of users. It is important for the buyer to consider the technical problem being addressed and then follow the steps suggested in Figure below.

Purchase decision model for software

Various types of data analysis softwares are available in the market today. Examples include;

- Stats software
- Statistical package for the social sciences (SPSS)
- SAS
- MAXQDA
- Quirkos
- Qualtrics
- Raven's Eye e.t.c

Interpretation of data

Interpretation is the process of attaching meaning to the data. It demands fair and careful judgements. Often the same data can be interpreted in different ways

Data presentation

Research data can be presented either in tabular (simple and complex tables) or graphical method. In graphical method, quantitative data is presented using histogram, frequency polygon, frequency curve, line chart, normal distribution curve, cumulative distribution curve and scatter diagram. For qualitative data, bar charts, pictograms, pie charts and map diagram are used in the graphical method of data presentation

Principles of data presentation

(a) To arrange the data in such a way that it should create interest in the reader's mind at the first sight.

(b) To present the information in a compact and concise form without losing important details.

(c) To present the data in a simple form so as to draw the conclusion directly by viewing at the data.

(d) To present it in such a way that it can help in further statistical analysis.

Various methods are used to present that analysed data for easy interpretation. Some of the commonly used methods include;

1. Tabulation

Tables are the devices that are used to present the data in a simple form. It is probably the first step before the data is used for analysis or interpretation.

General principles of designing tables

1. The tables should be numbered e.g. table 1, table 2 etc.

2. A title must be given to each table, which should be brief and self-explanatory.

3. The headings of columns or rows should be clear and concise.

4. The data must be presented according to size or importance chronologically, alphabetically, or geographically.

5. If percentages or averages are to be compared, they should be placed as close as possible.

6. No table should be too large

7. Most of the people find a vertical arrangement better than a horizontal one because, it is easier to scan the data from top to bottom than from left to right

8. Foot notes may be given, where necessary, providing explanatory notes or additional information.

Types of tables

i. Simple tables :Measurements of single set are presented

ii. Complex tables :Measurements of multiple sets are presented

Frequency distribution table

-   In the frequency distribution table, the data is first split up into convenient groups (class interval) and the number of items (frequency) which occur in each group is shown in adjacent columns.

-   Hence it is a table showing the frequency with which the values are distributed in different groups or classes with some defined characteristics.

Rules for construction of frequency table

i.   The class interval should not be too large or too small

ii. The number of classes to be formed more than 8 and less than 15

iii. The class interval should be equal and uniform throughout the classification.

iv. After construction of table, proper and clear heading should be given to it

v.   The base or source of data should be mentioned with the pattern of analysis in footnote at the end of table
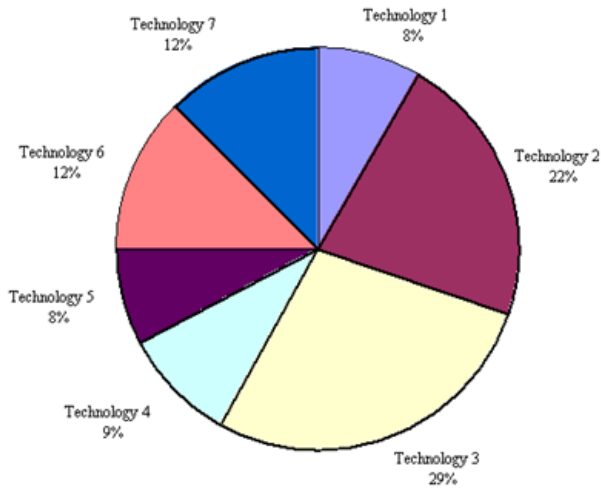
2. Charts and diagrams

Charts and diagrams are useful methods of presenting simple data. They have powerful impact on imagination of people. Gives information at a glance. Diagrams are better retained in memory than statistical table. However graphs cannot be substituted for statistical table, because the graphs cannot have mathematical treatment whereas tables can be treated mathematically. Whenever graphs are compared, the difference in the scale should be noted. It should be remembered that a lot of details and accuracy of original data is lost in charts and diagrams, and if we want the real study, we have to go back to the original data.

Common diagrams

-   Pie chart
-   Simple bar diagram

-   Multiple bar diagram
-   Component bar diagram or subdivided bar diagram

-   Histogram
-   Frequency polygon

-   Frequency curve
-   O give curve

-   Scatter diagram
-   Line diagram
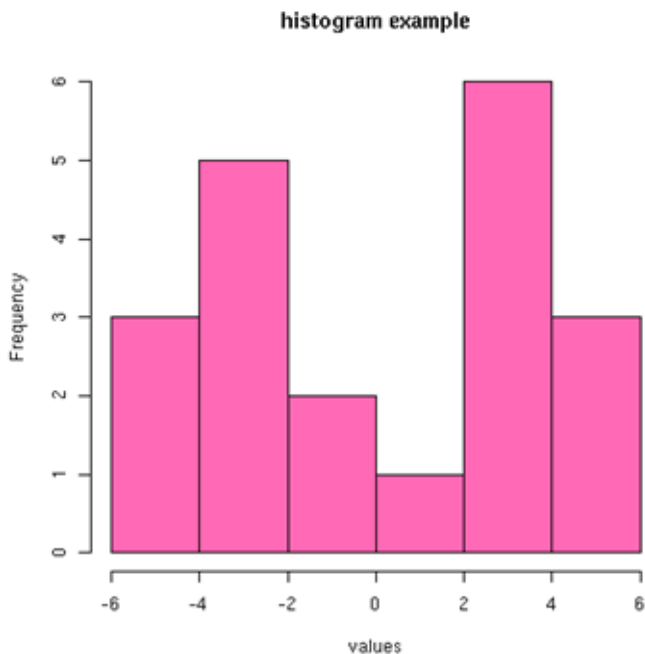
-   Pictogram
-   Statistical maps

3. Pie charts

A pie chart (or a circle graph) is a circular chart that is divided into sectors, illustrating proportion. In a pie chart, the arc length of each sector (and consequently its central angle and area), is proportional to the quantity it represents. Pie charts can be an effective way of displaying information in some cases, in particular if the intent is to compare the size of a slice with the whole pie, rather than comparing the slices among them. Below is an example of a pie chart

4. Histogram

The histogram provides a graphical summary of the shape of the data's distribution. It often is used in combination with other statistical summaries such as the boxplot, which conveys the median, quartiles, and range of the data. Below is an example of a histogram.
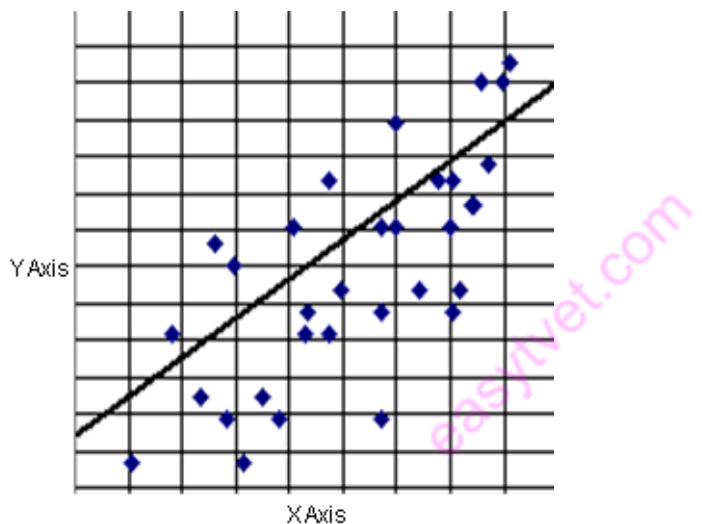
5. Scatter plots

Scatter plots show the relationship between two variables by displaying data points on a two-dimensional graph. The variable that might be considered an explanatory variable is plotted on the x axis, and the response variable is plotted on the y axis.

Scatter plots are especially useful when there is a large number of a data point. They provide the following information about the relationship between two variables:

- Strength

- Shape - linear, curved, etc.

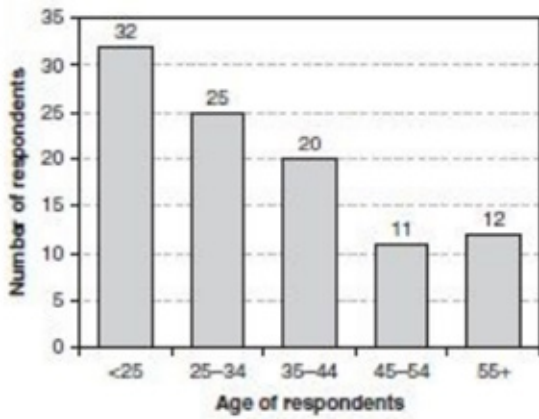- Direction - positive or negative

- Presence of outliers

A correlation between the variables results in the clustering of data points along a line. The following is an example of a scatter plot suggestive of a positive linear relationship.
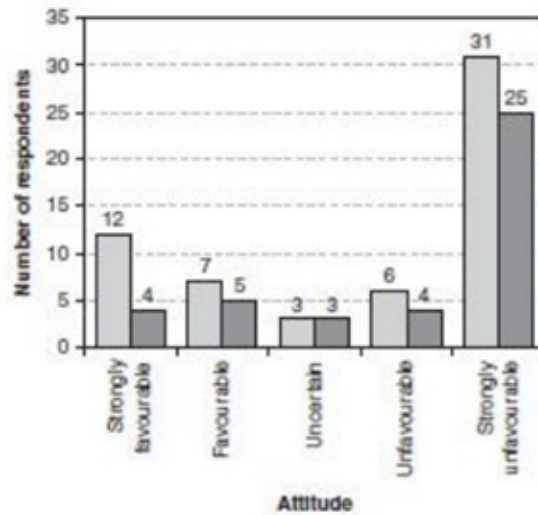

6. Bar chart

The bar chart or diagram is used for displaying categorical data (See the followingFigure). A bar chart is identical to a histogram, except that in a bar chart the rectangles representing the various frequencies are spaced, thus indicating that the data is categorical. The bar chart is used for variables measured on nominal or ordinal scales. The discrete categories are usually displayed along the x-axis and the number or percentage of respondents on the y-axis. However, as illustrated, it is possible to display the discrete categories along the y- axis. The bar chart is an effective way of visually displaying the magnitude of each subcategory of a variable.
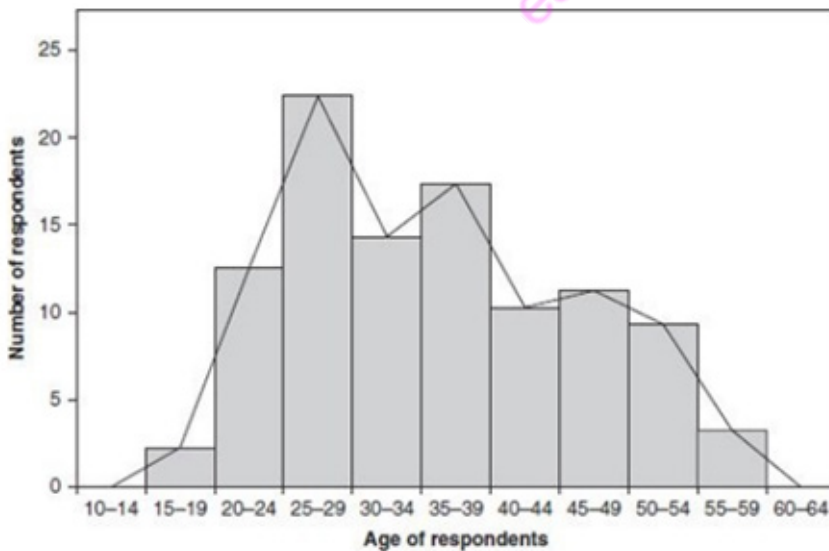
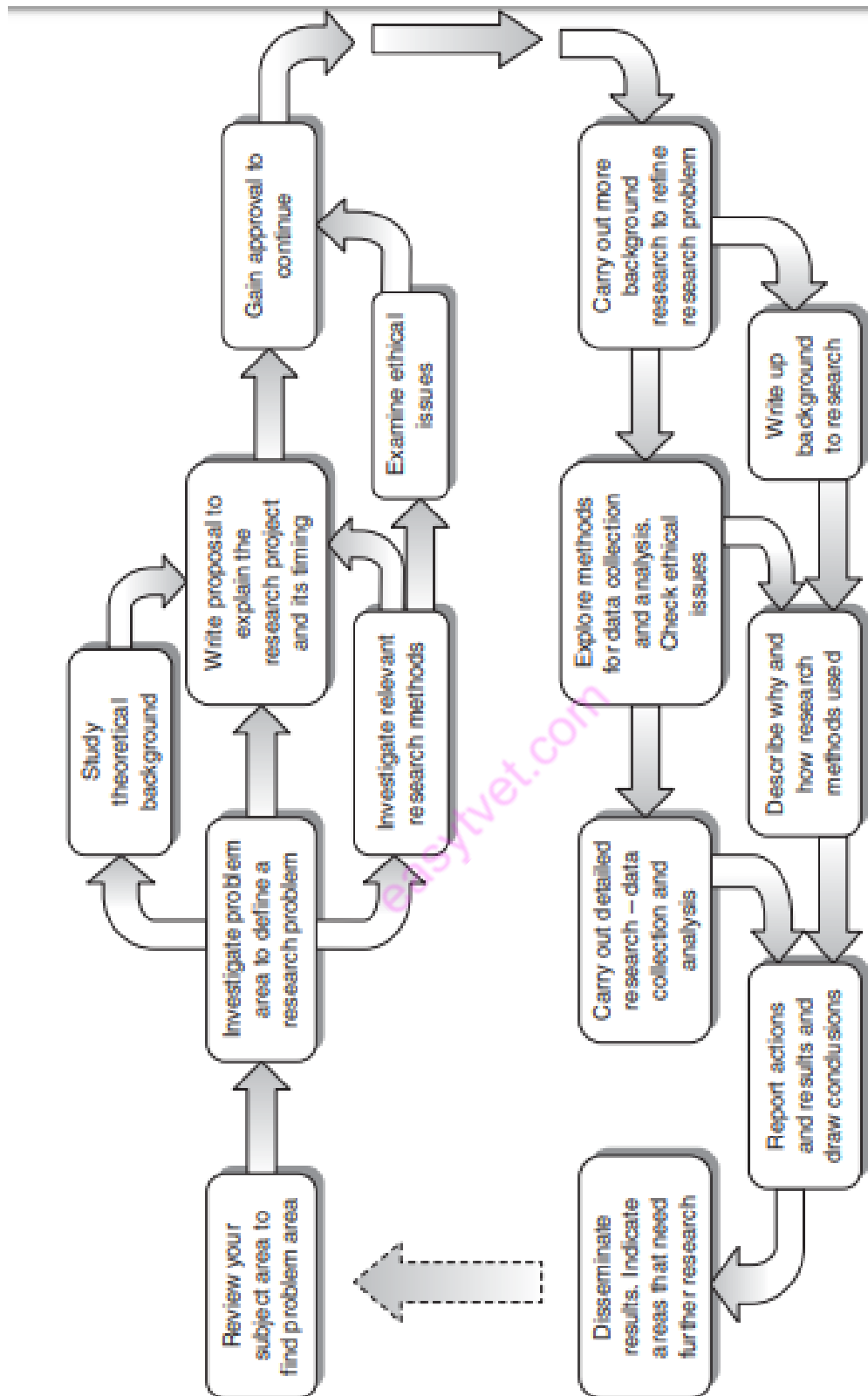a: one variable (2D)   b: two variables (2D)

7. Frequency polygon

The frequency polygon is very similar to a histogram. A frequency polygon is drawn by joining the midpoint of each rectangle at a height commensurate with the frequency of that interval (Figure below). One problem in constructing a frequency polygon is what to do with the two categories at either extreme. To bring the polygon line back to the x-axis, imagine that the two extreme categories have an interval similar to the rest and assume the frequency in these categories to be zero. From the midpoint of these intervals, you extend the polygon line to meet the x-axis at both ends. A frequency polygon can be drawn using either absolute or proportionate frequencies.

Frequency polygon

In summary…..

Flow of a typical research process

7.3.5.3 Self-Assessment

1. Define a variable in reference to research

2. _____ is the variable that is representing the value being manipulated or changed.

   A. Independent variable

   B. Extraneous variable

   C. Dependent variable

   D. Confounding variable

3. In graphical method of data presentation the following tools are used (),Indicate true or false)

   A. Frequency distribution table

   B. Frequency polygon

   C. Frequency curve

   D. Histogram

4. The following are tools used to support data analysis

   A. Spreadsheet

   B. Statistical packages

   C. Qualitative data analysis tools

   D. MS Word

5. State the differences between an independent and a dependent variable

6. State three ways of data presentation

7. Define data analysis

8. Identify the steps through which raw data should be taken through before it is analyzed

9. Describe the factors that will lead to a research choosing one statistical software over others

10. Give a summary of conducting research methodology

7.3.4.4 Equipment, Materials and Resources

- Computer/laptop
- Research methods textbooks
- Stationery
- Data analysis software
- LCD projector
- Videos

7.3.5.5 References

Clarke, S. (2014). Introduction to research. An Introduction to Theory and Reasoning in Nursing: Fourth Edition, 226–259. https://doi.org/10.5005/jp/books/12430_2

Macdonald, S., & Headlam, N. (2011). Introductory guide to research methods for social research. Retrieved from www.cles.org.uk

Neville, C. (2007). Effective Learning Service: Introduction to Research and Research Methods. Bradford University School of Management, 1–44.

Cavaliere, R. (2015). How to choose the right statistical software? - A method increasing the post-purchase satisfaction. Journal of Thoracic Disease, 7(12), E585–E598. https://doi.org/10.3978/j.issn.2072-1439.2015.11.57

Mugenda & Mugenda (2003). Research Methods Quantitative and Qualitative Approaches. Nairobi: ACTS Press.

Walliman, N. (2010). Research Methods: The Basics. Research Methods: The Basics. https://doi.org/10.4324/9780203836071

7.3.6 Learning outcome 5: Preparation of reports and dissemination

7.3.6.1 Learning Activities

Learning Activity	Specific instructions
i) Do scientific writing of research document • Demonstrate ability to cite authors in research • Identify the areas of scientific dishonesty • Identify the report format • Prepare research report as per set standards • Observe ethics in research • Insert in text citations correctly	Present findings of the research Change the tense used in the proposal into past tense Determine and present research findings Use different formats of quoting research references Write a research project report
i) Do power point presentations • Conduct peer review of the research and publications	Prepare a power point presentation Ensure all the text is readable Avoid having text in less than 25 point font Avoid using more than two typefaces Limit the use of animations and other special effects Avoid using more than six lines per slide Use six words per line Use a light background with dark text Perform a power point presentation of research project

7.3.6.2 Information Sheet

Definitions

Ethics: These are the moral principle governing research.

Informed consent: Participants have adequate information regarding the research, are capable of comprehending the information and have the power of the free choice, enabling them to consent or to decline participation voluntarily.

Scientific research

Scientific research therefore relies on the application of the scientific methods for the purpose of satisfying curiosity or to correct previous knowledge as well as to come up with a solution concerning a particular problem within a topic of interest. Scientific research is funded by public authorities, by charitable organizations and by private groups, including many companies.

Citing authors in research

To avoid plagiarism in research projects, a researcher is required to acknowledge the sources of words, facts or ideas borrowed from other scholars. Most academic disciplines or professional bodies require special documentation formats or styles in research projects reports. Consequently; the style should be consistent with the requirements of each discipline.

In-text citations

The method of citing authors within the text varies with the format and the number of authors being cited.

Work by two authors:

Name both authors in the signal phrase or in the parentheses each time you cite the work. Use the word "and" between the authors' names.E.g (Gerald & Beatrice, 2010).

Work by Three to Five Authors:

All the authors in the signal phrase should be listed in the signal phrase or in the parentheses the first time you site the .E.g (Osteen, Myles, Jakes, Benny, & Copeland, 1993)

In subsequent citations, only use the first author's last name followed by "et al." in the signal phrase or in parentheses.E.g (Osteen et al., 1993).

Six or More Authors:

Use the first author's name followed by et al. in the signal phrase or in parentheses.

David et al. (2001) argued that malaria is common……………….

(David et al., 2001).

Two or More Works in the Same Parentheses:

When your parenthetical citation includes two or more works, order them the same way they appear in the reference list, separated by a semi-colon.

(David , 2002; Faith, 1983)

Authors with the Same Last Name:

To avoid confusion, use first initials with the last names.

(E.Joel, 2001; L. Robert, 1998).

American Psychological Association (APA) format.

This is the most commonly used to cite sources within the field of social sciences, psychology and education.

In-Text Citations in APA Format

When citing references in the text of a paper, the author's name should be used followed by the date of publication. E.g. (Eriksson, 2000)

Reference Page in APA Format

* All references should begin on a new page that will be titled "References" and center the title text at the top of the page.

* All entries should be in alphabetical order

* The first line of a reference should be flush with the left margin. Each additional line should be indented (usually accomplished by using the TAB key.)

* Each reference should be single-spaced, though double spacing should be used between the references.

* All sources cited should appear both in-text and on the reference page. Any reference that appears in the text of your report or article must be cited on the references page, and any item appearing on your reference page must be also included somewhere in the body of your text.

* Titles of books, journals, magazines, and newspapers should appear in italics. Below is an example of a reference page using the APA format:

References

[1] Bremen, J. (2001). The ears of hippopotamus: manifestation, determinants, and estimates of malaria burden. Am. J. Trop. Med. Hyg. 64 (1, 2) S, 1-11

[2] Charlwood, J. D. Kihonda, J. Sama, S. Billingsley, P.F., Hadji, H. Verhave, J.P. Lyimo, E. Luttikhuizen, P.C. Smith, T. (1995). The rise and fall of Anopheles arabiensis (Diptera: Culicidae) in a Tanzanian village. Bulletin of Entomological Research, 85:37-44.

[3] Detinova, T.S. (1962) Age-grouping methods in Diptera of medical importance with special reference to some vectors of malaria. WHO monograph series 47, Geneva?

[4] Frevert, U. (1993). Malaria circumsporozoites protein binds to heparin sulphate

proteoglycans associated with the surface membrane hepatocytes. J. Exp. Med. 177: 1287-1298.

MLA (Modern Language Association) format

MLA citation style refers to the rules that were established by the Modern Language Association for acknowledging the sources used in a research paper. MLA citation style uses a simple two-part parenthetical documentation system for citing sources: In-text citations of a paper are used to point to an alphabetical works cited list that appears at the end of the paper. Together, these references identify and credit the sources used in the paper and allow others to access and retrieve this material. The general rules of the MLA format include:

- Leave one inch margins all around the text of the paper (left side, right side, top and bottom) except for page numbers.

  -The research paper should be double spaced.

- The research paper does not need a title page. At the top of the first page, at the left-hand margin, type your name, your instructor's name, the course name and number, and the date all on separate, double-spaced lines.

- Number your pages consecutively throughout the manuscript (including the first page) in the upper right-hand corner of each page, one-half inch from the top. Type your last name before the page number.

- Tables should be labeled "Table," given an Arabic numeral, and captioned (with those words flush to the left-hand margin). Other material such as photographs, images, charts, and line-drawings should be labeled "Figure" and be properly numbered and captioned.

Areas of scientific dishonesty

1. Plagiarism

Plagiarism is defined in dictionaries as "the wrongful appropriation, close imitation, or purloining and publication, of another author's language, thoughts, ideas, or expressions, and the representation of them as one's own original work. Understanding plagiarism helps us to know how to go about sharing information and writing scientific paper since knowledge is generated from knowledge. The problem of plagiarism is on the increase especially in learning institutions. The consequences may vary depending on the nature of the offence and the number of time one commits the offence. In learning institute The problem of plagiarism is on the increase especially in learning institutions. The consequences may include disqualification of the entire work, getting a lower grade, loss of reputation, academic probation and even expulsion from the learning institution. As a student is expelled from one institution, they may find it hard to get admission into another institution. To avoid plagiarism the person making the statement, presenting their view etc. in the book or publication must be referenced next to the extract from the book, or in a footnote at the bottom of the page on which the extract exists.

Paraphrasing: Involves putting a passage from source material into your own words. A paraphrase must also be attributed to the original source. Paraphrased material is usually shorter than the original passage, taking a somewhat broader segment of the source and condensing it slightly.

Quotations: Must be identical to the original, using a narrow segment of the source. They must match the source document word for word and must be attributed to the original author.

Summarizing: Involves putting the main idea(s) into your own words, including only the main point(s). Once again, it is necessary to attribute summarized ideas to the original source. Summaries are significantly shorter than the original and take a broad overview of the source material.

2. Fabrication

This is the publication of intentional (deliberate) or misleading research for one purpose or the other. It is subdivided into three:

Obfuscation: This refers to the use of jargon (difficult words or terms) so as to make something difficult to understand. Doctors may use obfuscation to conceal some information from patients. Obfuscation is also used to prevent work from being duplicated (e.g. soft wares).

Base rate fallacy: Using weak evidence to make a probability judgment without taking into account known empirical statistics about the probability.

Falsifications: This refers to the act of making a false statement concerning a particular thing or mispresentation of results.

3. Poor data storage and retention

Data collected during the process of research need to be kept safely and with due regards to issues of confidentiality and anonymity. Information on video tapes, auto tapes, Cds, DVDs should be stored in fireproof lockable cabinets. Data kept electronically should be password protected. It should also be protected from any computer virus or Trojan.

4. Non publication of data

This involves not including data in your research paper because it does not support your hypothesis. Researchers may be tempted to do this especially if there is funding involved. Non publication of data is also referred to as suppression. Examples include failure to publish information if the information states that the disease being researched is no longer a threat in the community or the drug the researcher intends to use is harmful.

5. Faulty data gathering.

This can Faulty data gathering in research will automatically result to bias in the research findings are as a result of collecting data from subjects (participants) who are not meeting the objectives of the research. It can also result from the malfunctioning of the instruments being

used to collect data e.g. rulers, weighing scale, tape measure e.t.c.Others include inappropriate treatment of the research subjects and recording data incorrectly.

6. Misleading authorship.

Authorship credit is determined by the contributions of the researchers towards the research paper. Meaning the person who comes up with the research idea automatically becomes the first author. This has to be decided before the research is started. Authorship should include only those who directly contributed to the research. This means that technicians who may have helped in data collection or anyone else should not be included as an author

Research involving human subjects

Ethical considerations have to be put in mind especially if the research is involving human subjects. There are several ethical issues that must be considered when designing research that will utilize participants who are human beings.

- The investigator should be primarily concerned with the safety of the subject (participant). Meaning; the interest of the researcher should not outweigh the wellbeing of the subject. This can be achieved by carefully considering the risk/benefit ratio. The investigator must therefore do a through research concerning what he intends to study.

- The investigator must obtain informed consent from each person participating in the research. This should be obtained in writing but at times oral consents are sometimes acceptable. After the participant has had the opportunity to carefully consider the risks and benefits and to ask any questions. Informed consent should be seen as an ongoing process. It is the duty of the investigator to first inform the subject on what the research is all about before they (participants) give the consent.

- The investigator must consider the privacy and confidentiality concerns will be approached. Researchers must be sensitive to know only how information is protected from unauthorized observation, but also if and how participants are to be notified of any unforeseen findings from the research that they may or may not want to know.

- The investigator must consider how adverse events will be handled; they must ensure that there is a qualified person who will provide care incase there are adverse effects (e.g. injuries or reaction to the treatment) on the research subjects. In addition, before enrolling participants in an experimental trial, the investigator should be in a state of "equipoise," that is, if a new intervention is being tested against the currently accepted treatment, the investigator should be genuinely uncertain which approach is superior. In other words, a true null hypothesis should exist at the onset regarding the outcome of the trial.

Principles of research in human subjects.

1. The principle of autonomy.

Autonomy refers to the ability of a person to self determine what they want. The subject should be at free will to decide if they want to be part of the research or not. They are also at free

will to withdraw from the research if they so wish. A researcher should therefore respect the principle of autonomy.

2. The principle of beneficence.

The principle of beneficence stands for the proposition that it is the physician's duty to do good for his patient. This is certainly a foundational principle of medical practice finding its roots in Hippocrates. For centuries, beneficence was actualized through the process of the patient presenting himself to the physician for examination and inquiry and then following the advice of the physician. In recent decades, societal needs for self determination have sometimes brought this principle into conflict with autonomy.

3. The principle of non- maleficence.

Non-maleficence means to "do no harm." Physicians must refrain from providing ineffective treatments or acting with malice toward patients. This principle means that harm to the patient should not be done in the first place, hence prevention is better than cure.

4. The principle of justice

Study participants have a right to fair and equal treatment before, during and after their participation in the study.

Scientific writing of research document;

- All the content in proposal should be changed to past tense

- Chapter Four; and Five should be included containing research findings and discussions, conclusions and recommendations respectively

- It is the report which communicates properly and result to changes

REPORT WRITING

Report writing is an essential skill for professionals in almost every field. A report aims to inform, authority within the stipulated period. Report helps to know what has been done , why it was done how it was done , what result was obtained & what conclusion.

Features of a report

- It should be accurate & written in simple language

- It is Complete and Self-explanatory

- It is Comprehensive but Compact

- It has a Proper Date and Signature

- A good report should be able to sustain reader's interest

PROJECT PROPOSAL AND REPORT GUIDELINES

General considerations.

Length spacing and font size

One and a half line spacing and a standard font size of 12 should be used for the text and front matter materials except for the title page where different lien spacing and fonts may be used. Times New Roman font should be used.

Pagination.

The preliminary pages of a research project should be paginated appropriately with small roman numbers at the bottom center of the page i.e. i, ii, iii, IV

Format

COVER PAGE/TITLE PAGE (contain information related to title, name of the student, year, month of submission &afiliation)

The cover page should appear as below.

Title

Name of the student…………………….Reg No…………………………………………

Signature……………………………..Date…………………………………………………

Name of the supervisor…………………………………………………………………………

Signature……………………………..Date…………………………………………………

A project proposal/report submitted in partial fulfillment for the award of a diploma/certificate in…………..(state your course) of Thika School of Medical and Health Sciences in the department of…………

Year………..

Declaration

This page contains the students' declaration of the originality of the work and approved by the supervisor.

This project/report is my original work and has not been presented previously for the award

of any academic qualification in another institution.

Name of the student……………………Reg No………………………………………..

Signature………………………………..Date……………………………………………

Name of the supervisor…………………………………………………………………

Signature………………………………..Date……………………………………………..

ABSTRACT

This is a brief summary of the entire proposal/project

ACRONYMS AND ABBREVIATIONS

Acknowledgement (it indicate the name of person, institutions & organisations who have sanctioned & help in various in conduct of research & preparation of report in various ways)

Dedication

TABLE OF CONTENTS

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background information

1.2 Problem statement.

1.3 Justification.

1.4 Research questions/hypothesis.

1.5 Objectives.

1.6 Significance.

1.7 Limitations and delimitations.

CHAPTER TWO

2.0 Literature review

CHAPTER THREE

3.0 METHODOLOGY

Preparation of Power point presentations and peer reviewed publications

The presentations should be no more than 10 minutes long. Plan on needing about 1 minute per slide. The trick to giving good presentations is distilling your information down into a few bulleted lists, diagrams, tables and graphs.

- Title slide (1 slide). Title of the research project, candidate's name and number.

- Introduction (typically 3-4 slides). Explain why your work is interesting. Place the study in context – how does it relate to / follow from the scientific literature on this subject. If it relates to any applied issues (e.g., environmental problems), mention this here. Use some pretty visuals (photographs, drawings, etc.) to get the audience excited about the issue and questions you are addressing. Clearly state your hypotheses.

- Materials and Methods (typically 2-3 slides). Clearly summarize the design. Show any pictures you may have taken during the research work. Mention what parameters you measured but do not go into detail on exact procedures used. Do state what statistical tests you used to analyze your data.

- Results (typically 2-4 slides). First show a photograph (or sketch) that shows an interesting qualitative results and state that result. Then display the results in graphical form, reminding the audience of your hypothesis and stating whether it was supported as you do so.

- Use simple, clean, clearly labeled graphs with proper axis.Do not use light colors (yellow, light green, or pink) in your figures, they do not show up well when projected. Indicate the results of the statistical tests on the slides by including p-values (or asterisks/letters that indicate the significance level) on the same slides with the graphs.If you have multiple results, state them in a logical order.

- Implications and Conclusions (typically 2-3 slides). Correctly interpret your results. Constructively address sources of error and methodological difficulties. Place your results in context and draw implications from them.

- Acknowledgments (1 slide). Thank anyone who provided advice or assistance. Verbally thank your audience for their attention and tell them you would be happy to answer any questions.

Tips for presenting data in power point

- All text should be readable

Presentation design

- Don't overload your slides with too much text or data.

- FOCUS. In general, using a few powerful slides is key.

- Give slides a title.

- Proofread everything.

- Keep similar topics together

- Keep slides simple

Visual elements

- 28 to 34 bold font (Arial is easiest)

- Use clear, simple visuals. Don't confuse the audience.

- Use contrast: light on dark or dark on light.

- Graphics should make a key concept clearer.

- Place your graphics in a similar location within each screen.

Charts

- Charts need to be clearly labeled.

- Numbers in tables are both hard to see and to understand. Be creative!

How to do a good power point presentation

Practice your presentation. It will be obvious if you don't.

Don't attempt to memorize your text; your words will probably be different each time you practice. Use index cards as supplements.

Think about the ideas, and your words will follow naturally.

Data dissemination

Effective dissemination should create informed users (the center block in the decision framework), who can then make informed decisions that ultimately lead to improved health.

The goal of dissemination is to provide accurate and up-to-date information for evidence-based decision-making. Evidence-based decisions lead to better programs and, ideally, better health outcomes.

Purpose of Dissemination

Disseminating data can help potential users by providing them with information to;

- Understand current health status
- reach decisions based on quality data
- make changes to existing health programs and policies
- take other actions to improve health outcomes.

Planning for dissemination

Print materials are the most common way to disseminate results. If funding permits, however, it is helpful to use other kinds of materials in addition. For example, some projects prepare PowerPoint presentations of findings and makes those presentations available in the country. The more ways in which information is made available, the more likely that information is to reach a wide audience and be used.

Videos are an effective way to disseminate survey findings because they can include visuals of the country and interviews with women and men. This helps give survey data a human face and makes the information more compelling. However, video production can be expensive and time-consuming.

Dissemination materials are most useful if they draw conclusions, summarize major points, and highlight key ideas. This lets the materials do most of the work for the user. It may also be better to leave out some of the results in order to make sure that the major points stand out. This is better than flooding people with so much information that they feel overwhelmed and cannot absorb it.

A good way to present information is to categorize it by characteristics, such as wealth, education, province, and region.

Maps are particularly persuasive and easy to understand. They are more compelling than words because they present geographic differences so clearly.

Other graphics—including bar graphs, line graphs, and pie charts—allow the eye to grasp large amounts of information and to see trends more easily than in written text or tables.

Dissemination plan

Developing a dissemination plan is a key part of the collaborative research planning process. Although the decision makers and researchers working together won't know the results of the research until it's completed, working through an initial dissemination plan can help your team focus the project and identify key audiences. When the research results come in, you'll be ready to flesh out key messages, review and finalize the plan, and then implement it.

Components of a dissemination plan

The following is a list of some of the key elements that should be included in a dissemination plan. While this is not a detailed guide to developing a dissemination plan, it provides a good overview of some of the most critical things that should be considered.

1.Project overview

Describe the current environment or context that provides the impetus for the research being

Undertaken — what is your research aiming to clarify or change? Who is or should be interested in the results?

Briefly sketch out the research project and its objectives. How will it address the context or challenges you have identified?

2.Dissemination goals

What are you hoping to achieve by disseminating this research? You may have a single long-term goal, such as a change in a policy, practice, or even culture, but make sure to also include any supporting or shorter-term goals.

3.Target audiences

These are the groups you want to reach with your research results — and who you will target in your dissemination activities. Be as specific as you can — who are the people who can use this research?

You may want to divide your list into primary audiences (more important) and secondary audiences (less important) and allocate dissemination efforts according to audience importance.

4.Key messages

In your first stab at a dissemination plan, you won't be able to develop specific key messages because you won't know the results of your research project. However, you can plan broadly around what you anticipate the content will be.

Effective messages explain what your research results mean, why they are important, and what action should be taken as a result. They are not simply a summary of the results. Note the wider context if applicable — how the results fit with the body of related research on the topic.

Make messages clear, simple, and action-oriented. The style and content should be tailored for each audience. Messages should be based on what that audience wants to know, rather than on what you think it should hear.

5.Sources/messengers

Since using influential spokespersons to spread your messages can help ensure uptake of your research results, identify the people or organizations that are viewed as credible with each of your target audiences.

Then think about how you can get those people and organizations "on board" — maybe you can partner with them in a workshop, or ask them to include an article about your research results on their web site or in their newsletter.

6.Dissemination activities, tools, timing, and responsibilities

This is the meat of your dissemination plan. Here you describe the activities (such as briefings or presentations) you will undertake to reach each target audience, and the tools (such as printed materials or web sites) that will support these activities. You also set out timing (what you will do first and when you will do it) and assign responsibilities to team members.

Successful dissemination activities go beyond traditional vehicles such as publication in scholarly journals — look for activities that promote a two-way dialogue, not a one-way flow of information.

Face-to-face meetings or briefings are a very effective way to reach decision makers.

Make each member of your collaborative research team responsible for carrying out at least one dissemination activity, and schedule meetings to report back and ensure commitments are being met.

A good dissemination plan will have activities that reach each of your target audiences, taking into account their attitudes, habits, and preferences.

7.Budget

Time and budget requirements for dissemination are frequently underestimated. Effective dissemination involves resources and planning — think about travel, layout and printing, translation, equipment, and space rental costs when allocating a budget for dissemination activities. Don't forget to include resources the individual(s) will need to do the future planning and co-ordination of the activities you have identified!

8.Evaluation

Evaluation is most effective when it is built in from the start. Decide how you will evaluate the success of your team's dissemination efforts, selecting measurable criteria for each dissemination activity. Focus less on efforts (how much you did) and more on outcomes (what was the result).

7.3.6.3 Self-Assessment

1. The following are the categories of citing authors within the text based on the number of authors being cited (write true/false for each answer)

    A. In-text citations

    B. Work by two authors

    C. Work by six or more authors

    D. Work by three to five authors

2. Plagiarism in research writing can be avoided through the following ways except?

    A. Fabrication

    B. Quotations

    C. Summarizing

    D. Paraphrasing

3. _____ refers to the use of jargon (difficult words or terms) so as to make something difficult to understand.

    A. Base Rate Fallacy

    B. Falsification

    C. Fabrication

    D. Obfuscation

4. Explain qualities of a good power point presentation

5. Describe how to go about proper publication in research

6. Explain the contents of the informed consent form

7. Discuss the consequences of plagiarism in research writing

8. Explain the different areas of dishonesty in research

9. Discuss the components of a dissemination plan

7.3.6.4 Tools, Equipment, Supplies and Materials

- Research methods textbooks

- LCD projector

- Stationery

- Videos

- Computer/laptops

- Sample research project report

7.3.6.5 References

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