Research Methodology

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Research

- Research is composed of two syllables, a prefix **re** and a verb **search**
- **Re** means again, a new, over again.
- **Search** means to examine closely and carefully, to test and try, to probe.
- The two words form a noun to describe *a careful and systematic study in some field of*

  knowledge, undertaken to establish facts or principles.
- *Research is an organized and systematic way of finding answers to questions*.

Research: Definition

- Research is a scientific inquiry aimed at learning new facts, testing ideas, etc.
- It is the systematic collection, analysis and interpretation of data to generate new knowledge and answer a certain question or solve a problem.

Characteristics of Research

- It demands a clear statement of the problem
- It requires a plan (it is not aimlessly “looking” for something in the hope that you will come across a solution)
- It builds on existing data, using both positive and negative findings
- New data should be collected as required and be organized in such a way that they answer the research question(s)

Quantitative Research

Quantitative research is a formal, objective, systematic process in which numerical data are used to obtain information about the world.

This research method is used:

- to describe variables;
- to examine relationships among variables;
- to determine cause-and-effect interactions between variables.

Quantitative & **Qualitative** researches

Qualitative research is concerned with finding the answers to questions which begin with:

Why? How? In what way?

Quantitative research, on the other hand, is more concerned with questions about: How much? How many? How often? To what extent? etc.

Steps in Research

1. Problem Identification
2. Identifying Research Topic
3. Literature Review
4. Research Objective identification
5. Identifying types of study
6. Identifying variables
7. Study Population, sampling
8. Data collection
9. Data analysis
10. Research Report preparation

Problem Identification

Whether a problem requires research depends on *three conditions:*

1. There should be a perceived difference or *discrepancy between what it is and what it should be;*
2. The reason(s) for this difference should be *unclear (so that it makes sense to* develop a research question); and
3. There should be more than one possible and plausible answer to the question (or solution to the problem).

Example of Conditions for Problem

Problem situation: In Union " Y " a report showed that in the first month there were 500 children under one year old who started immunization, but at the end of the year it was found out that there were only 25 children who completed their vaccination.

Discrepancy: All the 500 children at Union "Y "should have completed their vaccination but only 5% out of those who started vaccination have completed.

Problem (research) question: why only 5% of the children completed their vaccination?

Definite answer: Out of the 50 EPI outreach sessions, only 10 were functioning, the rest were closed due to vacancy of health assistants, difficult communication – crossing river to reach chars

In the above example, assuming that all the given facts are true, there is no need of undertaking a research, since definite answer is obtained to the problem situation.

Example of Problems

Problem situation: In upazila “Z” there are 50 satellite clinics and 150 EPI outreach sessions and all of them function smoothly. However, at the end of the year it was found that the EPI coverage was only 50%.

Discrepancy: Although upazila “Z” had 100% availability of health services and at least 80% of the children should have had full vaccinations the EPI coverage was only 50%

Problem question: What factors influence the low EPI coverage in upazila “Z”?

Possible answers:

- Mothers might have problems for not attending in the EPI sessions.
- Satellite clinics are not integrated with EPI outreach sessions; hence children might have missed opportunities in getting immunization.
- The follow up of defaulting children might not be effective and other reasons.

Thus, the above problem situation is researchable.

Criteria for selecting a research topic

1. **Relevance:** The topic you choose should be a priority problem:

   Questions to be asked include:

- *How large or widespread is the problem?*
- *Who is affected?*
- *How severe is the problem?*

2. **Avoidance of duplication*:*** Investigate whether the topic has been researched.

   If the topic has been researched, the results should be reviewed to explore whether major questions that deserve further investigation remain unanswered.

   If not, another topic should be chosen

Criteria for selecting a research topic

3. **Feasibility:** Consider the complexity of the problem and the resources you will require to carry out the study.

   Thought should be given first to personnel, time, equipment and money that are locally available. In situations where the local resources necessary to carry out the project are not sufficient, you might consider sources available at the national level.

4. **Political acceptability**: It is advisable to research a topic that has the interest and support of the authorities. This will facilitate the smooth conduct of the research and increases the chance that the results of the study will be implemented.

Criteria for selecting a research topic

5. **Applicability of possible results and recommendations**

   Is it likely that the recommendations from the study will be applied? This will depend not only on the blessing of the authorities but also on the availability of resources for implementing the recommendations**.**

6. Urgency of data needed

   How urgently are the results needed for making a decision? Which

   research should be done first and which can be done late?

7. **Ethical acceptability**

   We should always consider the possibility that we may inflict harm on others while carrying out research. Therefore, it will be useful to review the proposed study.

Exercise

In a certain upazila (population 250,000), sanitary conditions are very poor (only 20% of households have sanitary latrines) and diseases connected with poor sanitation, such as, diarrhoea and worms are very common. Government has initiated a sanitation project that aims at increasing the number of households with sanitary latrines by 20% each year. The project provides materials and the population should provide labour. Two years later, less than half of the target has been reached.

State the discrepancy, research question and the possible answers.

Is this problem situation researchable?

Research Topic

Clear statement of Research Topic is needed

- Is the foundation for the further development of the research proposal (research objectives, methodology, work plan, etc);
- Makes it easier to find information and reports of similar studies from which your own study design can benefit;
- Enables the researcher to systematically point out why the proposed research on the problem should be undertaken and what you hope to achieve with the study results.

Literature Review

- It prevents you from duplicating work that has been done before.
- It increases your knowledge on the problem you want to study and this may assist you in refining your "statement of the problem".
- It gives you confidence why your particular research project is needed.
- To be familiar with different research methods

Sources of Information in LR

- Books in libraries
- Organizations (institutions)
- Published information (books, journals, etc.)
- Unpublished documents (studies in related fields, reports, etc.)
- Computer based literature searches
- Opinions, beliefs of key persons

Research Objectives

Having decided what to study, and knowing why s/he wants to study it, the investigator can now formulate his/her study objectives. Objectives should be closely related to the statement of the problem. For example, if the problem identified is low utilization of health facilities in a upazila or union, the general objective of the study could be to assess the reasons for this low utilization. If we break down this general objective into smaller and logically connected parts, then we get specific objectives.

General Objective

Aim of the study in general terms

Example:

In a study on missed opportunities for EPI in Kurigram the general objective may be:

to assess missed opportunities for EPI in Kurigram.

Specific Objectives

Measurable statements on the specific questions to be answered.

Unlike the general objectives, the specific objectives are more specific and are related to the research *problem situation.*

They indicate the variable to be examined and measured.

Example of Specific Objectives

In the study of missed opportunity for EPI in Kurigram the specific objectives may be:

- To find out the magnitude of missed opportunities for children who attend different health facilities – UZHC, USC, UH&FWC, CC in Kurigram
- To examine the reasons for children not being immunized while attending the UZHC, USC, UH&FWC, CC services.

Types of Research Design

1. Prospective
2. Retrospective
3. Descriptive
4. Cross-sectional
5. Longitudinal
6. Case Control/Intervention Control
7. Cohort
8. Experimental
9. Quasi-experimental
10. Case Study

Prospective Research

The term *prospective* usually implies in which a group of subjects are selected in the present and followed into the future.

For example, the effect of exposure to a specific risk factor on the eventual development of a

particular disease can be studied. The group of the subjects are then followed over a period of time to determine the incidence rates of the outcomes being

studied as they relate to the original factors.

Prospective Research

The term *prospective* usually implies in which a group of subjects are selected in the present and followed into the future.

For example, the effect of exposure to a specific risk factor on the eventual development of a

particular disease can be studied. The group of the subjects are then followed over a period of time to determine the incidence rates of the outcomes being

studied as they relate to the original factors.

Retrospective Research

The Retrospective Research looks backward in time, usually using records and interviews with patients who already known to have a disease.

Descriptive Research

Descriptive research is used to describe characteristics of a population or phenomenon being studied. It does not answer questions about how/when/why the characteristics occurred. Rather it addresses the "what" question (what are the characteristics of the population or situation being studied?). The characteristics used to describe the situation or population are usually some kind of categorical scheme also known as descriptive categories.

Cross-sectional Research

In public health research and social science a cross-sectional study (also known as a cross-sectional analysis, transversal study, prevalence study) is a type of observational study that involves the analysis of data collected from a population, or a representative subset, *at one specific point in time*—that is, cross-sectional data.

Longitudinal Research

Longitudinal research is a correlational research/study that involves repeated observations of the same variables over long periods of time, often many decades. It is a type of observational study.

Case control/Intervention control

It is a type of observational study in which two existing groups differing in outcome are identified and compared on the basis of some supposed causal attribute. Case-control studies are often used to identify factors that may contribute to a medical condition by comparing subjects who have that condition/disease (the "cases") with patients who do not have the condition/disease but are otherwise similar (the "controls").

Cohort Research

A cohort study or panel study is a form of longitudinal study (a type of observational study). For instance in medicine, it is an analysis of risk factors and follows a group of people who do not have the disease, and uses correlations to determine the absolute risk of subject contraction. It is one type of clinical study design and should be compared with a cross-sectional study. Cohort studies are largely about the life histories of segments of populations, and the individual people who constitute these segments.

A cohort is a group of people who share a common characteristic or experience within a defined period (e.g., are born, are exposed to a drug or vaccine or pollutant, or undergo a certain medical procedure).

Experimental Research

An experiment is a procedure carried out to verify, refute, or validate a hypothesis. Experiments provide insight into cause-and-effect by demonstrating what outcome occurs when a particular factor is manipulated. Experiments vary greatly in goal and scale, but always rely on repeatable procedure and logical analysis of the results.

Quasi-experimental Research

Quasi-experimental research to study individuals within the same environment facing similar circumstances. Although circumstances or environments are the same, the groups or individuals have very different experiences based on a variety of factors. Quasi-experimental research studies these factors and the effects that they have on the outcome.

Case Study

Case studies are analyses of persons, events, decisions, periods, projects, policies, institutions, or other systems that are studied holistically by one or more method. The case that is the *subject* of the inquiry will be an instance of a class of phenomena that provides an analytical frame — an *object* — within which the study is conducted and which the case illuminates and explicates.

Research Questions

- **Descriptive Study**

✓ What is the nature/magnitude of the problem?

- **Cross-sectional/Longitudinal study**

✓ Who is affected?

✓ How do the affected people behave?

✓ What do they know, believe and think about the problem?

Research Questions contd.

- **Cross-sectional/Case-control/Cohort**

✓ What is(are) the cause(s) of the problem?

- **Intervention-control/Experimental/Quasi Experimental**

✓ Will the removal of a particular factor prevent or reduce the problem?

✓ What is the effect of a particular intervention/ strategy?

✓ Which of the two alternative strategies gives better results?

✓ Are the results in proportion to time/money spent?

Study Objectives

- Description of the magnitude of the problem

✓ Descriptive study
✓ Cross-sectional study
✓ Longitudinal study
✓ Case study

- Prediction of relation between cause and effect

✓ Cohort study
✓ Cross-sectional study
✓ Case-control study

Study Objectives contd.

- Determination of causes

✓ Experimental study

✓ Quasi Experimental

- Simple experimental study

✓ Case-control study

✓ Intervention control study

Variable

A variable is a characteristic of a person, object, or phenomenon that can take on different values.

A simple example of a variable is a person's age. The variable can take on different values, such as, 20 years old, 30 years old, and so on. Other examples of variables are:

a) weight in kilograms

b) height in feet and inches

c) monthly income in Taka

d) marital status (single, married, divorced and widowed)

e) job satisfaction index (1 to 5)

f) occupation (civil servant, farmer, student, etc.)

g) disease condition (presence or absence of a disease)

Variable

The first three variables (a to c) are **numerical variables** because they are expressed in numbers (metric data). Since the values of the remaining three variables (d to g) are expressed in categories, we call them **categorical variables.**

Because in the health research we often look for associations, it is important to make a distinction between **dependent and independent variables.** Both the dependent and independent variables together with their operational definitions (when necessary) should be stated.

Dependent/Independent Variables

The variable that is used to describe or measure the problem under study is called the dependent variable. The variables that are used to describe or measure the factors that are assumed to influence (or cause) the problem are called independent variables.

For example, in a study of relationship between smoking and lung cancer, "suffering from lung cancer" (with the values yes, no) would be the **dependent variable and "smoking" (with** the values no, less than a packet/day, 1 to 2 packets/day, more than 2 packets/day) would be the **independent variable.**

Background Variables

In almost every study involving human subjects, background variables, such as, age, sex, educational status, monthly family income, marital status and religion will be included. These background variables are often related to a number of independent variables, so that they influence the problem indirectly. Hence they are called background variables or background characteristics.

Variables

Confounding variable - A variable that is associated with the problem and with a possible cause of the problem is a potential confounding variable. This type of variable may either strengthen or weaken the apparent relationship between the problem and a possible cause.

Composite variable - A variable based on two or more other variables may be termed a composite variable. Incidence and prevalence rates, sex ratios, and other rates and ratios are composite variables, since they are based on separate numerator and denominator information.

Defining variables

To ensure that everyone (the researcher, data collectors, and eventually the reader of the research report) understands exactly what has been measured and to ensure that there will be consistency in the measurement, it is necessary to clearly define the variables.

For example, to define the indicator “waiting time” it is necessary to decide what will be considered the starting point of the “waiting period” e.g. Is it when the patient enters the front door, or when he has been registered and obtained his card?

Scales of Measurement of Variables

As part of the process of clarifying each of the variables to be studied, its scale of measurement should be specified. There are four types of scales of measurement: Nominal, Ordinal, Interval and Ratio.

1. **Nominal Scale:** This consists of two or more named categories (classes) which are qualitatively different from each other.

   E.g Sex: male (1); Female (2)

   Marital status: 1. Married 2. Single 3. Divorced 4. Widowed

Scales of Measurement

2. **Ordinal scale:** This has the additional quality that the categories are ranked and have implied order. However, the intervals between classes are not necessarily equal.

Example 1. Severity of a disease: Severe (grade III); moderate (grade II); mild (grade I); absent (grade 0).

Example 2. Educational status: 0; 1-6; 7-8; 9 -12; more than 12.

Scales of Measurement

3. **Interval scale:** This has the additional quality that the intervals between classes are equal.

   Example: Temperature (in Celsius)

   Equal differences between any pair of numbers in the scale indicate equal differences in the attribute being measured. The difference in temperature between 20… C and 25…C is the same as the difference between 30…C and 35…C. The ratio between numbers in the scale is not, however, necessarily the same as that between the amounts of the attribute. That is, a room at 30… C is not 'twice as hot' as one at 15…C. This is because *the zero on the scale does not indicate absence of the attribute.*

Scales of Measurement

4. Ratio scale: This has the additional quality that zero indicates absence of the

attribute. As a result, the ratio between numbers in the scale is the same as that

between the amounts of the attribute being measured.

Example: Weight measured in kilograms, height in cms., etc.

Study Population

At an early stage in the planning of any research decisions must be made concerning the study population. That is, concerning the population of individual units (whether they are persons, households, etc.) to be investigated. The population under consideration should be clearly and explicitly defined in terms of place, time, and other relevant criteria. If the study population comprises cases of a disease the procedures to be used for case identification should be stated. If controls are to be chosen their method of selection should be stated.

Often the investigator will have implicitly chosen his study population when he defined the topic of his investigation, by reason of his interest in a specific community or a specific health program.

Study Population

In other instances, particularly when an analytic survey or an experiment is being planned, the investigator may require purposively to select a study population. In so doing he must consider questions of appropriateness and practicability.

The appropriateness of the study population refers to its suitability for the attainment of the objectives of the study.

The selection of study population on the basis of suitability usually affects the validity of subsequent generalizations from the findings. This situation requires a close attention at the early stage of the given study. Two examples are given below.

Study Population

Volunteer populations: Persons who volunteer to enter a study may differ in many respects from those who do not so volunteer, and therefore the findings in a volunteer population do not necessarily apply to the population at large.

Hospital or clinic populations: Persons receiving medical care are obviously not representative of the general population from which they have come from. That is, persons treated in hospital for a certain disease may differ from those patients with the same disease but not receiving care for it.

Practical Questions for Study Population

- Is the proposed population the one that would give the required information?
- Will the population cooperate to participate in the study, or will it be a 'resistant' one?
- If it is proposed to study patients with a specific disease, will it be possible to identify enough cases to yield useful conclusions?
- If a long term 'follow up' study is planned, is the population so mobile that it may be difficult to maintain contact with the subjects?

Sampling

Sampling involves the selection of a number of study units from a defined study population. The population is too large for us to consider collecting information from all its members. Instead we select a sample of individuals hoping that the sample is representative of the population.

When taking a sample, we will be confronted with the following questions:

a) What is the group of people from which we want to draw a sample?

b) How many people do we need in our sample?

c) How will these people be selected?

Definitions in Sampling

Target population (reference population): Is that population about which an investigator wishes to draw a conclusion.

Study population (population sampled): Population from which the sample actually was drawn and about which a conclusion can be made. For Practical reasons the study population is often more limited than the target population. In some instances, the target population and the population sampled are identical.

Definitions in Sampling

Sampling unit: The unit of selection in the sampling process. For example, in a sample of districts, the sampling unit is a district; in a sample of persons, a person, etc.

Study unit: The unit on which the observations will be collected. For example, persons in a study of disease prevalence, or households, in a study of family size.

The sampling unit is not necessarily the same as the study unit.

Definitions in Sampling

Sample design: The scheme for selecting the sampling units from the study population.

Sampling frame: The list of units from which the sample is to be selected**.**

The existence of an adequate and up-to-date sampling frame often defines the study population.

Sampling Process

The sampling process comprises several stages:

1. Defining the population of concern
2. Specifying a sample frame, a set of items or events possible to measure
3. Specifying a sample method for selecting items or events from the frame
4. Determining the sample size
5. Implementing the sampling plan
6. Sampling and data collection
7. Data which can be selected

Sampling Methods

Two broad types of sampling methods are

1. Probability Sampling
2. Non-probability Sampling

Probability Sampling

Probability sample is a sample in which every unit in the population has a chance of being selected in the sample.

The combination of this trait makes it possible to produce unbiased estimates of population totals

Non-probability sampling

Non-probability sampling is any sampling method where some elements of the population have **no** chance of selection (these are sometimes referred to as out of coverage/ under covered) or where the probability of selection can't be accurately determined. It involves the selection of elements based on assumptions regarding the population of interest, which forms the criteria for selection. Hence, because the selection of elements is nonrandom, non-probability sampling does not allow the estimate of sampling errors. These conditions give rise to exclusion bias, placing limits on how much information a sample can provide about the population. Information about the relationship between sample and population is limited, making it difficult to extrapolate from the sample to the population.

Types of Probability Sampling

1. Simple Random Sampling
2. Systematic Random Sampling
3. Stratified Random Sampling
4. Cluster (Area) Random Sampling
5. Multi-stage Sampling

Simple Random Sampling

Simple random sampling is a type of probability sampling technique. With the simple random sample, there is an equal chance (probability) of selecting each unit from the population being studied when creating your sample.

Simple Random Sampling Explained

Imagine that a researcher wants to understand more about the career goals of students at a single university. Let's say that the university has roughly 10,000 students. These 10,000 students are our population (*N*). Each of the 10,000 students is known as a unit. In order to select a sample (*n*) of students from this population of 10,000 students, we could choose to use a simple random sample.

With simple random sampling, there would an equal chance (probability) that each of the 10,000 students could be selected for inclusion in our sample. If our desired sample size was around 200 students, each of these students would subsequently be sent a questionnaire to complete (imagining we choose to collect our data using a questionnaire).

Systematic Random Sampling

Systematic random sample is a variation on the simple random sample. Like simple random sampling, there is an equal chance (probability) that each of the 10,000 students could be selected for inclusion in our sample. Whilst you typically use random number tables to select the first unit for inclusion in your sample, the remaining units are selected in an ordered way (e.g., every 9th student).

Stratified Random Sampling

Stratified Random Sampling, also sometimes called *proportional* or *quota* random sampling, involves dividing the population into homogeneous subgroups and then taking a simple random sample in each subgroup.

Cluster (Area) Random Sampling

The problem with random sampling methods when we have to sample a population that's disbursed across a wide geographic region is that we will have to cover a lot of ground geographically in order to get to each of the units we sampled. Imagine taking a simple random sample of all the residents of Dhaka district in order to conduct personal interviews. By the luck of the draw we will wind up with respondents who come from all over the district. Our interviewers are going to have a lot of traveling to do. It is for precisely this problem that **cluster or area random sampling** was invented.

Mixed/Multi-stage Random Sampling

The four methods we've covered so far -- simple, systematic, stratified and cluster -- are the simplest random sampling strategies. In most real applied social research, we would use sampling methods that are considerably more complex than these simple variations. The most important principle here is that we can combine the simple methods described earlier in a variety of useful ways that help us address our sampling needs in the most efficient and effective manner possible. When we combine sampling methods, we call this **multi-stage sampling**.

Types of Non-probability sampling

1. Convenience sampling
2. Quota sampling
3. Purposive sampling
4. Snowball sampling

Non-probability Sampling

Convenience sampling: is a method in which for convenience sake the study units that happen to be available at the time of data collection are selected

Quota sampling: is a method that insures that a certain number of sample units from different categories with specific characteristics appear in the sample so that all these characteristics are represented. In this method the investigator interviews as many people in each category of study unit as s/he can find until s/he has filled the quota

Non-probability sampling

Purposive sampling: Typically used when focusing on a limited number of informants, whom select strategically so that their in-depth information will give optimal insight into an issue about which little is known. May also be used due to other limitations – time, money etc.

Snowball sampling: used for reaching inaccessible or otherwise hard to reach population. Approach is to identify a unit of interest from population and finding other units through the current unit and progressing such way with the new unit. Street-based/ home-based /hotel-based sex workers; children conflicted with law, drug users etc.

Data Collection

Approach/techniques depends on

1. Study objectives
2. Study design
3. Availability of time, personnel and money
4. Produce relatively precise quantitative findings
5. Produce qualitative descriptive information

Data Collection Techniques

1. Survey
2. Interview – KII (key informant interview), IDI (in-depth interview)

- Face to face
- Telephone
- ICT assisted – zoom, messenger, skype etc.

3. Written Questionnaire

- Face-to-face
- Mailed
- Electronically

4. Using available information – annual report, website, published/unpublished documents, newspaper reports etc.

5. Observation – participatory , surrogated role, mystery clients etc.

6. Focused Group Discussions

Survey

Quantitative method for collection of information from a pool of respondents by asking multiple survey questions. Data collected from surveys is then statistically analyzed to draw meaningful research conclusions. Three main survey research methods, divided based on the medium of conducting survey research: Online/Email, Phone, Face-to-face. Cross-sectional survey, Longitudinal survey. Decide survey questions (close-ended), finalize target audience, administer the survey. All four scales of measurement of variables may be used. Benefits of survey are minimum investment, reliable for respondents and versatile source for response collection

Interview

Involve questioning of respondents. Response can be recorded by writing down (either during the interview or immediately after the interview), by tape recording or by input into computer. May be through details questionnaire – close ended, open ended; using check-list or interview guidelines.

Written Questionnaires

Written questions are presented which are to be answered by the respondents in written form. May be self-administered or may be by interviewer administered (literacy compromised respondents). Questions may be close-ended or open ended.

- Should focus and saturate study objectives by content
- Arranged in logical sequence
- Mutually exclusive and exhaustive
- Self-explanatory and understandable
- Unambiguous and not conflicting
- Sensitive and specific
- Comfortable for respondents
- Consider sensitive/pr issue

Observation

Systematically selecting, watching and recording behaviour and characteristics of living beings, objects or phenomena. In-depth idea about behaviour, norms culture and practices can better be revealed through observation techniques. Usually a check-list is used. Avoid observation bias by allowing time. Researcher may be embedded with the observation community for sometimes – Jhograpur (quarrel village), reality check for health and education.

Focus Group Discussions (FGD)

The researcher brings together a small number of targeted subjects to discuss the topic of interest. The group is homogenous (age, sex, socio-economic background etc.) and size is kept deliberately small (10-12), so that its members do not feel intimidated but can express opinions freely. A FGD guidelines to aid discussions is usually prepared beforehand. The researcher usually moderate discussions to ensure broader participation as much as possible and to ensure that a range of aspects of topics are explored. The discussion is frequently recorded, then transcribed. A note taker may also be engaged.

Data Analysis

The plan for processing and analysis of data need to be prepared at the time of developing the methodology of the study. This should essentially take place before the data collection and questionnaire has to be developed accordingly. Data analysis plan depends on the

1. Objectives of the study
2. Type of the study: qualitative or quantitative
3. Type of variable, whether continuous or discrete
4. Availability of resources like money, computer etc.

Many sophisticated user-friendly data analyzing software are now available.

Data Analysis contd.

For quantitative data, the starting point in analysis is usually a description of the data for each variable for all the study units included in the sample. For qualitative data, it is more a matter of describing, summarizing and interpreting data obtained for each study unit. When making a plan for data processing and analysis, the issues like sorting data, performing quality-control check, data processing, analysis and interpretation need to be considered. It may be necessary to decide on the type of statistical tests need to be performed.

Writing Research Report: Cover Page

- Title

  The title could consist of a challenging statement or question, followed by an informative subtitle covering the content of the study and indicating the area where the study was implemented.

  Baird, S., C. McIntosh, and B. *Ö*zler, 2011. *Cash or Condition? Evidence from a Cash Transfer Experiment,* The Quarterly Journal of Economics, Oxford University Press, 126 (4): 1709-1753
- Names of the authors with their titles and positions, the institution that is publishing the report, (e.g., Ad-din Women's Medical College, Dhaka, Bangladesh)
- Month and year of publication.

Abstract/Summary

The summary should be brief and informative It should contain:

- a very brief description of the problem (WHY this study was needed)
- the main objectives (WHAT has been studied)
- the place of study (WHERE)
- the type of study and methods used (HOW)
- major findings and conclusions, followed by
- the major (or all) recommendations.

The summary will be the first (and for busy decision makers most likely the only) part of your study that will be read. Therefore, its writing demands thorough reflection and is time consuming..

A reader who has been attracted by the title will usually look at the summary to decide whether the report is worth reading. The summary should be written only *after the first or even the second draft of the report has been* completed.

Acknowledgements

It is good practice to thank those who supported technically or financially in the design and implementation of study. Also the employer who has allowed to invest time in the study and the respondents may be acknowledged. Acknowledgements are usually placed right after the title page or at the end of the report, before the references.

Contents

A contents is essential. It provides the reader a quick overview of the major sections of the report, with page references, so that reader can go through the report in a different order or skip certain sections.

List of tables, figures

If you have many tables or figures it is helpful to list these also, in a ‘contents’ type of format with page numbers.

List of abbreviations

If abbreviations or acronyms are used in the report, these should be stated in full in the text the first time they are mentioned. If there are many, they should be listed in alphabetical order as well. The list can be placed before the first chapter of the report.

1. Introduction

It may contain

- some relevant (environmental/ administrative/ economic/ social) background data about the country
- the health status of the population, and health service data which are related to the problem that has been studied
- the statement of the problem
- relevant literature
- what you hope(d) to achieve with the results of the study
- Global literature can be reviewed in the introduction to the statement of the problem if selected a problem of global interest. Otherwise, relevant literature may follow as a separate literature review after the statement of the problem.
- introduce theoretical concepts or models that you have used in the analysis of your data in a separate section after the statement of the problem.

2. Objective

The general and specific objectives should be included as stated in the proposal. If necessary, you can adjust them slightly for style and sequence. However, you should not change their basic nature. If you have not been able to meet some of the objectives this should be stated in the methodology section and in the discussion of the findings. The objectives form the HEART of your study. They determined the methodology you chose and will determine how you structure the reporting of your findings.

3. Methodology

The methodology you followed for the collection of your data should be described in detail. The methodology section should include a description of:

- the study type;
- major study themes or variables (a more detailed list of variables on which data were collected may be annexed);
- the study population(s), sampling method(s) and the size of the sample(s);
- data-collection techniques used for the different study populations;
- how the data were collected and by whom;
- procedures used for data analysis, including statistical tests (if applicable).

4. Results

- Findings should be presented
- Tables and graphs could be used (should be well titled and captioned)
- The tables should be well constructed, and without anomalies such as percentages which do not add up to 100 percent
- Avoid too many decimal places
- Graphs should clarify and not complicate, and care should be taken that they do not mislead
- If appropriate statistical tests are used, the results should be included. P-values alone are not very helpful. Confidence intervals and the type of tests used should be indicated.

5. Discussions

The findings can now be discussed by objective or by cluster of related variables or themes, which should lead to conclusions and possible recommendations. The author interprets the findings. Care should be taken not to introduce new findings, i.e., findings not mentioned in the result section. The discussion may include findings from other related studies that support or contradict your own. Limitation of the study and generalizability of the finding should also be mentioned.

6. Conclusions and Recommendations

The conclusions and recommendations should follow logically from the discussions of the findings. Conclusions can be short, as they have already been elaborately discussed in chapter 5. As the discussion will follow the sequence in which the findings have been presented (which in turn depends on your objectives) the conclusions should logically follow the same order. It makes easy reading for an outsider if the recommendations are again placed in roughly the same sequence as the conclusions.

6. Conclusions and Recommendations

However, the recommendations may at the same time be summarized according to the groups towards which they are directed, for example:

- policy-makers,
- health and health-related managers at district or lower level,
- health and health-related staff who could implement the activities,
- potential clients, and
- the community at large.

Remember that action-oriented groups are most interested in this section. In making recommendations, use not only the findings of your study, but also supportive information from other sources. The recommendations should take into consideration the local characteristics of the health system, constraints, feasibility and usefulness of the proposed solutions. They should be discussed with all concerned before they are finalized

7. References

The references in your text can be numbered in the sequence in which they appear in the report and then listed in this order in the list of references (Vancouver system). Another possibility is the Harvard system of listing in brackets the author's name(s) in the text followed by the date of the publication and page number, for example: (Shan 2000: 84). In the list of references, the publications are then arranged in alphabetical order by the principal author's last name. Y

ou can choose either system as long as you use it consistently throughout the report.

Harvard Reference

Last name, First initial. (Year published). *Title*. Edition. (Only include the edition if it is not the first edition) City published: Publisher, Page(s).

- ✓ Patterson, J. (2005). *Maximum ride*. New York: Little, Brown.
- ✓ Dahl, R. (2004). *Charlie and the chocolate factory*. 6th ed. New York: Knopf.
- ✓ Desikan, S. and Ramesh, G. (2006). *Software testing*. Bangalore, India: Dorling Kindersley, p.156.
- ✓ Vermaat, M., Sebok, S., Freund, S., Campbell, J. and Frydenberg, M. (2014). *Discovering computers*. Boston: Cengage Learning, pp.446-448.

Vancouver Reference

1. O'Campo P, Dunn JR, editors. Rethinking social epidemiology: towards a science of change. Dordrecht: Springer; 2012. 348 p.
2. Schiraldi GR. Post-traumatic stress disorder sourcebook: a guide to healing, recovery, and growth [Internet]. New York: McGraw-Hill; 2000 [cited 2019 Nov 6]. 446 p. Available from: http://books.mcgraw-hill.com/getbook.php?isbn=0071393722&template=#toc DOI: 10.1036/0737302658
3. Halpen-Felsher BL, Morrell HE. Preventing and reducing tobacco use. In: Berlan ED, Bravender T, editors. Adolescent medicine today: a guide to caring for the adolescent patient [Internet]. Singapore: World Scientific Publishing Co.; 2012 [cited 2019 Nov 3]. Chapter 18. Available from: https://doi.org/10.1142/9789814324496_0018

8. Annexes or appendices

The annexes should contain any additional information needed to enable professionals to follow your research procedures and data analysis. Information that would be useful to special categories of readers but is not of interest to the average reader can be included in annexes as well. Examples of information that can be presented in annexes are:

- tables referred to in the text but not included in order to keep the report short;
- lists of hospitals, districts, villages etc. that participated in the study;
- questionnaires or checklists used for data collection.