MINISTRY of HEALTH
REPUBLIC OF BOTSWANA

GOVERNMENT OF BOTSWANA

MINISTRY OF LOCAL GOVERNMENT

Self-Directed Learning Workbook

District Level M & E Training and Reference Material for Primary Health Care Programmes

Workbook 3

Doing the "E" of M & E

I-TECH International Training & Education Center for Health

UNIVERSITY of WASHINGTON

UCSF University of California San Francisco

BOTUSA PROJECT

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Foreword

Monitoring and evaluation (M&E) is an important process for collecting and analyzing data on health programmes that can be used for evidence-based planning and decision making. The information garnered from M&E increases capacity to improve health service delivery and the health of the population.

This set of three self directed learning workbooks is designed to provide information and guidance to you in carrying out M&E of health programmes in your district. The workbooks can be used as training documents as well as reference material for district-level M&E officers. They can also be used by other programme officers in the district who are involved in M&E.

The first workbook, entitled ***An Orientation to District-Level Monitoring & Evaluation*** is focuses on tasks and information necessary for newly recruited M&E officers who are beginning work in the field. It provides an orientation including: an overview of HIV and AIDS, the national health programmes in Botswana, job description, core activities of district M&E officers, an introduction to M&E, and an introduction to e-reporting of district health data.

The second workbook, entitled ***Doing the "M" in M&E*** focuses on monitoring activities. This workbook provides information on basic M&E processes. It also provides a practical overview of data collection, data management, data quality, basic data analysis, as well as a guide on presentation skills.

The third workbook, entitled ***Doing the "E" in M&E*** focuses on evaluation activities. This workbook provides information on designing evaluation studies, collecting and analyzing evaluation data, and writing reports.

Together these workbooks create a comprehensive view of the role that M&E officers are expected to play in their districts and provide you with the necessary guidance and tools necessary for you to fulfil this role. By actively reading the workbooks and completing the associated exercises, M&E officers will be prepared to carry out M&E activities for HIV and AIDS and other health programmes in their districts.

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M & E Officers evaluating data at a workshop

Chapter 1:
Evaluation Basics

Estimated time needed for completion: 3 hours

Chapter Overview

As a district-level Monitoring & Evaluation (M&E) officer, you are in a unique position to see and understand which programmes are in need of evaluation. You have learned, in previous workbooks, about general M&E, how to create M&E plans, and conduct basic programme evaluation. In this workbook you will learn about outcome evaluations, including study designs, data collection, and data analysis.

This chapter will help you add to routine programme data through designing an evaluation with supplemental data collection procedures. Evaluation of programmes will allow decision-makers to make necessary changes or address specific problems. Your evaluation activities will inform the following decisions:

- how to utilize funds for planned activities,
- determine health programme priorities, and
- identify research areas specifically related to the health needs of the district.

Evaluation activities encouraged from district level M&E officers vary from district to district and can include, providing an evidence base to stakeholders to make decisions on evaluations, providing reports and feedback to District Multi-sectoral AIDS Committee (DMSAC), assisting national programme evaluations, implementing evaluation plans at the district level, guiding evaluation tool development, and/or maintaining appropriate databases.

In order to effectively implement evaluations at the district level and provide the DMSAC with information about possible programmatic changes, it is important to understand all aspects of evaluation, from asking specific and measurable questions to analyzing the data. This chapter is intended to help you determine what information you might like to know from your district, what information you can get, and how to design a plan in order to get that information.

Learning Objectives

At the end of this chapter, you will be able to:

- describe the evaluation cycle;
- detail the benefits of outcome/ formative evaluations;
- describe the important components in priority setting and evaluation standards;
- prepare clear and precise evaluation questions;
- develop a clear and precise designs for answering an evaluation question; and
- describe the importance of ethics in proposal review, data management and analysis, and dissemination of findings.

1.1 Defining Outcome Evaluation

In Workbook 2 you learned about four types of evaluation including process evaluation. Process evaluation (or summative evaluation) is used to determine if you have achieved programme goals related to implementation, or district and health facility goals related to targets. Usually after process evaluation, or formative evaluation, of the implementation of the programme the next step is to conduct an evaluation of the outcome. This is called an outcome or process evaluation and is sometimes is referred to as *operations research*.

Often when confronted with the word *evaluation* people become intimidated with visions of complex statistical calculations and invasive patient procedures. Evaluations do not have to be intimidating. Evaluation is a way to find information about the programmes in your district and whether they are achieving their goals and objectives. Evaluation can be used routinely to improve services in your health facilities or to determine appropriate interventions in your community. Evaluation questions and evaluation designs do not have to come from outside the country or outside your district. In fact, many evaluations are based on facility and district priorities and lead to local decision-making.

Outcome evaluation refers to the systematic evaluation of the outcomes of a particular programme or project in a particular place. Evaluation looks for information that will help make decisions about that programme.

For example, providing HIV prophylactic drugs to HIV positive women in labour is a programme that already exists. Tracking this programme is usually done through routine data collection. If routine data shows that there are problems with this programme only in one district then an evaluation of the programme could be conducted in order to determine where improvements could be made. The routine data shows that only 50% of women who should receive prophylaxis are receiving it. An evaluation could be conducted to determine where this programme could benefit from improvements. You could conduct an observation at the labour ward to see determine the possible barriers to providing prophylaxis to HIV positive women in labour.

The focus of this chapter is on outcome evaluations. However, it is important to distinguish outcome evaluation from research. Outcome evaluations are about specific programmes or processes. Research, on the other hand refers to the systematic gathering of information for a general problem or programme expansion to many areas. A research study looks for information that would be important for decision-making in other contexts or other countries. Research is more rigorous and usually involves the comparison of one group or programme to another group or programme. For example, it is known that providing HIV prophylactic drugs reduces the transmission of HIV from mother to child. However, it is not known if this drug should be only given at the health clinic or whether it should be given to women to take it home with them in case of home delivery. A research study would then seek to find out if there are differences in the transmission rates between two groups: women who took prophylaxis at home and women who took it at the clinic. This information could be useful for any district or country that is giving women prophylaxis.

Even though programme evaluation and research studies have different goals, they use the same general methodology. The distinction is one of scale, and the ability to generalize findings to different contexts in other districts or countries. As district M&E officers your work will be to ensure that programmes at the district or facility level respond to local needs. You will be asked to help determine why results were not achieved or had unexpected results or how the activities led to the results.

Outcome Evaluation: evaluating particular aspects of a specific situation for local use.

Research Study: evaluating aspects of a situation that can be generalized to other places or populations

1.2 Approaches to Evaluation

Evaluations have different approaches depending on the necessity for independence and concerns over bias. In general these fall into three categories: external, independent, and participatory.

External: external evaluations are evaluations conducted by people that are outside government or outside the larger government body that implemented the programme. Often consultancy groups are contacted to perform these evaluations. They are often expensive but provide the best protection against bias in the evaluation because evaluators have no stake in whether the programme has achieved its objectives.

Independent: independent evaluations are conducted by people within the government or an organization but who are not directly responsible for implementation. Often these evaluations are conducted by a designated evaluation body within the institution.

Participatory: participatory evaluations are conducted with and by the stakeholders involved in the process and programmes. Care has to be taken with participatory evaluations because, as their title implies, stakeholders have a stake in the process and would likely want to see that the programme achieved its objectives. Negative results could be problematic. To avoid this it is important to inform all stakeholders that the purpose is not to criticize the programme but rather to determine how it can be strengthened or modified for future implementation.

1.3 Priority Setting and Evaluation Standards

As previously stated, evaluations are intended to provide information for decision-making to improve health programmes. There are likely many identified needs and many evaluation questions can be generated in each district. However, evaluations have to be prioritized when there are limited resources, as is most often the case. The selection and analysis of the problem for evaluation should involve those who are responsible for the health status of the community. These are called the stakeholders and include managers in the health and health-related services, health care workers, community leaders, as well as researchers.

There are several factors that should you should consider when determining your evaluation priorities: availability of resources, timing, and existing information. Often a needs assessment and participatory evaluations can be conducted to help define these priorities and narrow evaluation questions. Needs assessments and participatory evaluations are designed to get a broad understanding of a context before an intervention or programme is implemented. A needs assessment is a type of descriptive evaluation.

1.3.1 Needs Assessments:

Needs assessment can be used to improve your district. A needs assessment is designed to inform programme and implementation plans and can be used to influence district annual plans and determine where time and monetary resources should be spent.

Often needs assessments act as a baseline for further study. The baseline is the first measurement in an evaluation and occurs before an intervention or programme in order to determine what was happening before any change occurs. Alternatively, if it is unclear what type of intervention or programme to implement, needs assessments can give be used to provide direction. Needs assessments should also include a desk review where other literature and past evaluations are reviewed for information.

Needs assessments are important when there are decisions that have to be made about allocation of limited resources or when there is limited information on the context for implementation of new programmes. Given that needs assessments are directed toward gathering information to influence policy and programmes it is important that all people or entities involved in determining priorities or who will be affected by the priorities be included in designing the needs assessment.

1.3.2 Participatory Evaluations:

Participatory evaluations gather information from all stakeholders. Stakeholders include any person or group of people that have a stake, or an interest, in the programme or project. Participatory evaluations are used to determine priorities for an intervention or understand the range of needs. In addition they can be used to assess the uptake of the intervention. These evaluations often include data gathering from the government, from care providers, and from the affected population.

Stakeholders are important in determining priorities through an assessment of: resources, timing and existing information, political acceptability in decision-making, applicability, and adherence to principles of evaluation.

Specific stakeholders include:

- Funding agencies

The funding agency may be the Government of Botswana (GOB) or an outside donor. In order to influence programmes or policies you need to be sure to include information that these groups will find useful and relevant

- Government

Even if the GOB does not fund the work, the sites of study are under their supervision and control. It is important that needs assessments address their concerns and their priorities.

- Communities or specific groups affected

It is essential to consider the needs and desires of the community targeted for the intervention. Community leaders, activists, and representatives from specific groups should also have an opportunity to present their concerns and give their permission. The best designed programme can often do little to effect change without community and participant support.

- Facilities or programme implementers

It is important to take into account the buy-in from the facilities in which the evaluation will take place. Without the support of facility staff the evaluation could run into logistical challenges and any post evaluation implementation changes could be met with resistance.



1.3.3 Resources

There are different types of resources that should be considered when developing evaluation questions. These include:

- human resources: who will actually gather and analyze the data,
- time: when do you need this information and how long will it take to collect, and
- financial resources: how much money can you spend on this and whose money is it.

The processes involved in data collection provide a nice example of how human resources can affect your evaluation plan. Data collection can often be a time-consuming task and may require many researchers and/or consume many months.

For example: in your original evaluation question, you decided, to conduct a national survey on attitudes towards TB, you will have to consider who will administer the survey, collect and store the surveys, enter the survey data, and analyze the results. After determining the degree of human resources needed to conduct the survey on a national level, you may decide it is more feasible to conduct a local survey and then use those results to encourage the MLG or an outside funder to conduct the survey on a national level.

Consider the complexity of the problem and the resources you will require to carry out your evaluation. Thought should be given first to manpower, 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 resources available at the national level; such as evaluation units, research councils, or tertiary institutions.

1.3.4 Timing

All data collection should be based on a specified need. Data should not be collected just for the sake of evaluation without a specific purpose or plan to implement the results. Therefore you need to determine when the results of the evaluation must be available in order to have the greatest impact on policy decisions or facility interventions. Will answering the question take more time than you have to make the decision? Does a decision need to be made before anything else happens?

If a facility is considering changing an intervention in one month, an extensive survey design of new patients for that intervention would not be ideal. Developing protocols, tools, and analyzing the data would have to be performed in only three to four weeks.

1.3.5 Existing Information

One way to adjust your questions to fit limited resources is to examine closely the data that already exists. Patient records, routinely collected programme information, and national census records are often a good place to start. While some of the analysis of this information is routinely conducted, looking at specific issues of patient care on patient records, for instance, could lead to some new insights.

Before you decide to carry out an evaluation, it is important that you find out whether the suggested topic has been investigated before, either within the proposed evaluation area or in another area with similar conditions. Who else is trying to solve it? If the topic has been previously evaluated, the results should be reviewed to explore whether major questions that deserve further investigation remain unanswered. If not, another topic should be chosen.

1.3.6 Political Acceptability in Decision-making

Is the evaluation topic of interest to the local/national authorities? Would you be able to gain their support? Knowing the answer to these questions can increase the chance that the results of the evaluation will be implemented. Under certain circumstances, however, you may feel that an evaluation is required to show that the government's policy needs adjustment. If so, you should make an extra effort to involve the policy-makers concerned at an early stage, in order to limit the chances for confrontation later. Involvement and inclusion of decision-makers will ensure that the evaluation-based recommendations have the best chance of being implemented.

1.3.7 Applicability

Data needs to be collected, analyzed, and presented in "real time" and in a usable format for programme managers and administrators in order for it to be applicable. You can ask yourself if it likely that the recommendations from the evaluation will be applied? This will depend not only on the management capability within the team and the blessing of the authorities, but also on the availability of resources for implementing the recommendations. The opinion of the potential clients and of responsible staff will influence the implementation of recommendations. What would the impact of the results be? Everyone should be clear before the evaluation begins what the intended uses of the evaluation should be. If all stakeholders are aware of the implications of the evaluation than it will be more likely to be able to implement recommendations.

1.3.8 Evaluation Standards

There are many organizations that provide ethical guidelines of quality principles for ethical evaluation. These organizations were established to ensure that all evaluations adhere to international standards of ethics and data use. An organization that is important to evaluations in Botswana is the African Evaluation Association (AfrEA).

AfrEA's Main Principles of Evaluation

Utility:
The utility guidelines are intended to ensure that an evaluation will serve the information needs of intended users and be owned by stakeholders.

Feasibility principle:
The feasibility principle is designed to ensure that evaluation is useful, participative, realistic and efficient.

Precision and Quality:
Precision: this principle aims to ensure that evaluation has resulted in technically relevant data, demonstrating efficiency of project, programme and policies to be evaluated.

Quality: the principle of quality requires that data collection and analysis methods in evaluation determine relevance, validity and reliability of information resulting from an evaluation.

Principle of respect and ethics: These principles safeguard the respect of legal and ethical rules as well as the well being of stakeholders involved in the evaluation or affected by its findings.

(Source: http://www.pnud.ne/rense/AfrEA%202007/AfrEA_2007_Conclusions/AEG_2007_EN.pdf)

1.4 Identifying Evaluation Questions

1.4.1 Identifying a Need

The first step in conducting an evaluation is to identify the need or problem. Some examples of what you may find include:

- High infant mortality rate in Distinct 'X'.
- District 'X' has fewer men visit health facilities regularly than District 'Y'.
- Facility 'A' is able to get complete data to you in a timely manner while Facility 'B' always struggles.

You can also identify needs by determining where gaps in knowledge exist. Gaps in knowledge might include understanding why certain trends or patterns in data occur. For example, you may *know* that women are more adherent to their anti-retroviral (ARV) regimen than men, but you *do not know* why.

If you start to write down every need, problem, or gap you observe in your district you will soon see that there are lots of things that can be answered through evaluation procedures.

1.4.2 Outcome Evaluation Questions

Outcome evaluation seeks to answer questions about specific interventions or programmes that are being implemented in your district. Identifying evaluation questions in this area is achieved by reviewing the objectives of the programme or intervention. You can find objectives for many of the national programmes in Workbook 1 Chapter 2. Framing your objectives or problems as a question can be a good start for defining evaluation questions but often they will need much more refinement before you begin to conduct your evaluation. For example, did the programme aim to increase coverage of a certain procedure? Did it aim to educate the community about a specific service? Keep in mind that you may need to narrow down your focus in order to get well-defined questions.

Example: in Kgalagadi South district the Ministry of Local Government (MLG) determined that there was a cholera outbreak particularly along the border with South Africa, although specific data was hard to come by. An education intervention was quickly implemented in these areas. The objective of the intervention was to stop the outbreak of cholera by educating mothers and girls about water treatment and making chlorine tablets available at health centres. .

Two weeks after the intervention was initiated, the M&E officer in the district was asked if the intervention worked. The evaluation question that the M&E officer needed to answer was whether educating the mothers and girls and providing chlorine tables had ended the cholera outbreak. Since data regarding the number of new cases of cholera was poor, the officer decided that determining if the outbreak had stopped would be difficult. Instead, the officer narrowed the evaluation question to: Did women in the area report behaviour change and knowledge acquisition following the intervention? By narrowing the question, the M&E officer would be able to give an indirect indication about whether in fact, mothers were educated and water was treated with the chlorine tablets in that region

1.5 Formulating Evaluation Questions

Once needs have been identified, you can begin the process of formulating an evaluation question that can be answered. This may seem like a simple task; however, simple clear questions often take some effort to formulate.

Evaluation questions, when well defined, should address all of the following:

What: What will be studied - an intervention, a process, a disease incidence?

Who: Who will be the target of the study: -women, health care workers, community leaders?

When: From "when to when" will this study take place - a month, a year, three years?

Where: Where will the focus of this study be - a facility, a district, or the nation?

Consider the following example regarding how to reduce infant mortality.

In Chobe district, based on M&E data, the MLG and Ministry of Health (MOH) determined that infant mortality was very high and the number of facility births was low.

What: The first thing we determine is what we need to study. To determine this, we have to know the background. What has been studied before? What kind of evidence we have. What kind of evidence are we lacking?

In the example presented here, let us assume we find that there is substantial evidence in the literature to say that facility-based births do reduce infant mortality. We also know that a specific incentive programme, consisting of a post-partum kit, has seemingly increased facility-based births in other districts.

Therefore, we want to know if:

Incentives of post-partum kits lead to more facility births

Who: We know now *what* we need to study but we still need to determine what population, or *who*, will be participating in this evaluation. Are we just interested in collecting data from women at facilities? Would we want to collect information from women who gave birth at home or with a traditional birth attendant? Would we want information from nurses at the facility, community leaders, and members of the MLG and MOH? Are there specific populations that need special focus, for example women whose husbands are miners or truckers and therefore absent from the home for significant periods of time?

When: Once we know *what* we want to evaluate and *who* to evaluate we need to determine *when* this evaluation will take place. In determining when, it is important to have a realistic sense of how long data collection will take. Often the determination of when the evaluation will take place is revised after decisions about how to conduct the study occur. Things to consider in determining when the evaluation would take place include the timeline of the intervention, when the MLG and MOH need a report on the evaluation; the logistics of data collection during holidays, rainy season etc., who will be involved in data collection; and what the size of your data collection team will be.

Where: Finally, we will need to determine *where* the evaluation will take place. Are we just interested in Chobe district? Would we want to include other districts with high infant mortality? Would we want to include other districts with low infant mortality in order to compare results? Would we want to include districts without incentives or with different incentives? Are there specific populations or specific facilities within Chobe district that we need to focus on?

Learning Activity 1.5.a

Formulating an Evaluation Question

Directions: Read the case study below and Answer the following questions to help narrow the evaluation question.

In Chobe district, based on M&E data, the MLG and MOH determined that infant mortality was very high. According to GOB, infant mortality should not exceed 20 per 100,000 live births. However, in Chobe district, infant mortality is 70 per 100,000 live births. An intervention was designed to get more mothers to give birth in facilities by offering them a post-partum kit that included a baby jumper, soap and a blanket. We want to know if incentives lead to more facility births.

1. What will be studied?

   _____
   _____
   _____

2. Who will be the target of the study?

   _____
   _____

3. When will the study take place?

   _____
   _____

4. Where will the study take place?

   _____
   _____

Discussion 1.5.a

Formulating an Evaluation Question

Using the information gathered above we can then formulate an evaluation question that is focused, specific, and answerable. Your answers may not be exactly like the ones below depending on some of the assumptions you make. The important thing is that you know why you made these decisions and can defend them.

1. What will be studied?

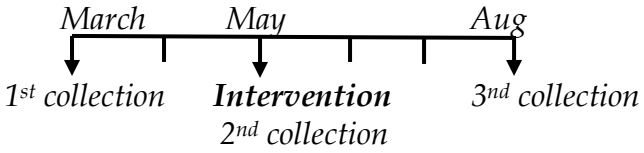
This evaluation will look at the intervention which was designed to get more mothers to give birth in facilities by offering them a post-partum kit that included a baby jumper, soap and a blanket.

2. Who will be the target?

The target in this case would be mothers who give birth in the facility, mothers who give birth in the community and pregnant women. Each type of participant can relay specific things about the intervention.

3. When will the study take place?

Assuming that the intervention was rolled out by the MLG and MOH before the evaluation, it would be important to evaluate the intervention as soon as possible and over a period of at least 6-months to be able to see a change in facility birth rates. Conducting the evaluation at multiple time points will provide rich data on the impact of the intervention and may allow for suggestions on how the intervention can be improved while it is still being implemented. For example if the intervention has been occurring for 2 months and evaluation could be conducted at month 4, month 6 and month 10 to get a broad range of responses. However, if it is likely that there will be variation in facility births due to other factors, such as the rainy season, it would be a good idea to conduct the evaluation before, during, and after the rainy season. Here is a diagram of a possible study timeline:



4. Where will the study take place?

This study will take place in Chobe district but specific facilities should cover a range of social or cultural areas and may target facilities serving specific populations like the truck drivers.

Putting this all together ,the question then changes from:

"Do incentives lead to more facility births?"

To:

"Did the intervention of giving the post-partum kit to new mothers delivering in facilities in Chobe district work to increase the proportion of pregnant women giving birth in the facility instead of home?"

At this time we are not collecting data on infant mortality because it would take too long to collect and would only show up over a longer period. In addition, it would be a costly process, and we have already have evidence that facility births reduce the number of deaths.

Writing evaluation questions according to the SMART principles is an easy way to check if your evaluation questions contain all the critical components. You may recall from previous chapters that SMART evaluation questions stand for Specific, Measurable, Achievable, Relevant, and Time-bound. CREAM is another acronym that is commonly used to formulate questions. The acronym stands for: Clear, Relevant, Economic, Achievable, and Monitorable. Let us review the question identified in Learning Activity 1.5 and determine if it is SMART. The table below lists the SMART principles with the best corresponding CREAM principles in brackets.

Specific (clear) Does the question focus on a specific programme/problem in a specific location with a specific target group?	Yes our question is specific, because it is asking about a specific intervention (i.e. providing post-partum kits), provided to a specific target group (new mothers), at a specific location (at health facilities within Chobe district)
Measurable (monitorable) Can we answer the question with the type of information we have gathered?	Yes, using routinely collected facility data we can answer whether there was an increase in the number of facility births.
Achievable (adequate) Can the question be answered with the resources available (funding, expertise) and within the designated timeframe?	This is an important part of developing a good research questions and depends greatly upon the local context but in this instance, with MLG support and routine data it should be achievable.
Relevant (relevant) Is the question related to the identified need?	Yes it is relevant. The literature supports the assumption that giving birth in facilities reduces infant mortality. It will also give the MLG and other similar programmes important information about whether incentives work for this purpose.
Time-bound (economic) Is there a start and end date?	While the question does not define the time it is time-bound in that we are looking at a time period directly after an intervention. This time period according to our graph is 5 months.

Exercise 1.5.b

Formulating an Evaluation Question

*Directions: Below is a list of evaluation questions that are not SMART. For each question, identify whether it is **S**pecific, **M**easurable, **A**chievable, **R**elevant and **T**ime-bound. If the evaluation question meets the criteria for each letter, place an "X" in each column under that letter.*

Question	S	M	A	R	T
1. Do health care workers use counsellors more when they want a patient to eat more nutritious food?					
2. In Botswana would a 50% pay raise for some M&E officers increase their retention over M&E officers who did not receive the raise, one month, six months and 12 months after implementation?					
3. What are all the reasons that women in Botswana give birth at home rather than at the facility?					
4. If a new data system is introduced in Ngamiland will reporting get better?					

Discussion 1.5.b

Formulating an Evaluation Question

Question	S	M	A	R	T
1. Do health care workers use counsellors more when they want a patient to eat more nutritious food? *This question is Relevant. This question may be very relevant depending on what the use of counsellors in being compared too. But this question needs a lot of clarification before it can be called Specific, Measurable, Achievable or Time-bound. It is not specific; we do not know who "people" are or what kind of patients they are referencing. While it is clear that the measurement would be the use of counsellors it is unclear what "more" means. Is this more food or different food? It is also unclear what diet this will be compared too. Whether or not answering the question is achievable is unknown without the missing information. This question is not time-bound. We do not have a sense of when this evaluation would begin or end.*				X	
2. In Botswana would a 50% pay raise for some M&E officers increase their retention over M&E officers who did not receive the raise, one month, six months and 12 months after implementation? *This question is specific; we know who, where, when and why. This question is measurable and time-bound. However it is not clear whether this question would be relevant or achievable. Is giving M&E officers such a big raise really sustainable for the MLG and MOH? Is this ethical? Is it achievable or will there be strikes or attrition from those not receiving the raise above and beyond the background rate? If it was possible to give a raise, the better approach might be to look at retention in the past year, offer a 25% raise to all M&E officers, and then look at retention in the coming year. There should be a clear indication that the results are useful. Will the MLG and MOH be able to use this information?*	X	X			X
3. What are all the reasons that women in Botswana give birth at home rather than at the facility? *This question is measurable; the measurement is the variety of opinions from women on giving birth at home. This question is relevant given the benefits to facility births that the MLG has noted. However, this questions is not specific or time-bound therefore it is hard to determine if it achievable. Getting this information for all of Botswana might be difficult, specifying where would help focus the question. It is also unclear when this would be conducted. Is there a specific time period for gathering this information or is this something that could be gathered slowly over a few years?*		X		X	

4. If a new data system is introduced in Ngamiland will reporting get better? *This question is interesting and very relevant. However, it is not specific in its measurement. "Better" is too ambiguous. Does this refer to better than before the new system? Or better than other districts without the new system? This question is measurable but, as mentioned for "s" it is not specified what the measurement will be, Ngamiland before and after the intervention or Ngamiland compared to another district? This question, when more specific and measurable should be easily achievable. Given the importance of reporting this question is most likely very relevant to the MLG. This question is not time-bound. When will the intervention occur? Will measurements be taken before the intervention? Once these questions have been answered this could become a very SMART question.*			**X**	**X**		

1.6 Evaluation Designs

An evaluation design is a way to organize data collection so that you can study the relationship between an intervention or programme and a given outcome while minimizing the possibility of interference. This means that you want to make sure that you have answered the questions:

- What is being changed? (Independent variables)
- What do I want to observe? (Dependent variables)
- What else might cause what I want to observe? (Intervening variables)

Evaluation designs will help you organize these questions by determining when you can conduct the evaluation, how many groups you can evaluate, how they are compared, and how to make sure that any changes that you see are really a product of the independent variables and not because of intervening variables.

When planning your evaluation it is important to consider how and when you will collect your data. You will also need to consider how you will analyze and compare your data. Evaluation designs organize what data to collect and how to collect it so that your analysis will answer your evaluation question. Whether using already existing data or collecting new data, creating specific and focused evaluation questions and choosing an evaluation design that will best support data collection for that question is critical. Often questions are once again, modified at this stage in developing the evaluation due to the limitations of the evaluation design. An overview and specific strengths and drawbacks of many common designs will be discussed in this section. In discussing these designs we will again use the example of a post-partum intervention programme in Chobe district designed to increase women's facility births.

1.6.1 Evaluation Variables

In designing an evaluation it is important to determine the different variables that make up an evaluation. Determining your variables will help you decide what you need to measure and what can get in the way of your measurement. Refer back to Workbook 2 Chapter 4 for a discussion of categorical (such as red, blue, green) and numerical variables (such as less, more, most). In addition, you need to decide what kinds of data can be manipulated (independent variables) and what cannot be manipulated (dependent and intervening variables).

First begin by defining independent and dependent variables. *Independent variables* are variables that can be controlled by the evaluator. For example, receiving or not receiving an intervention is an independent variable. In Chobe district receiving or not receiving the post-partum kit could be the independent variable. The independent variable will depend on the type of outcome that you would like to achieve. The independent variable is the variable to be manipulated to achieve a

given outcome. For instance, if you are interested in women's opinions of facility and community birth you may choose to look at different communities or different points in time.

Dependent variables are often called outcome variables; they are the result that will be measured by an evaluation. In the Chobe district example the dependent variable would be the number of women giving birth at facilities. This is a variable that the evaluator cannot control and it is *dependent* upon the intervention. If you are looking at women's opinions over different areas or different time periods your independent variable would be their opinions. The evaluator does not control the opinions of women at one point in time or in specific communities.

Intervening variables are variables that are not changed by the evaluator and are not the variables under study. Often these depend on context in which the evaluation occurred including location, language, facility size, seasonal variation, cultural norms, etc. These variables should be noted and every precaution should be made to lessen their effect on the intervention.

For example, if the rainy season often means that women are less likely to visit the clinic, measurements should be taken before, during, and after to make sure that any change in use is not the normal result of the weather. If one measurement was taken before the rainy season, the intervention was implemented, and the second measurement was taken during the rainy season, you may see a drop in facility births. This drop would not be due to the intervention but would rather be due to the weather. In this case time or season would be an intervening variable.

In the case of women's opinions of facility births, an intervening variable may be an education campaign that was rolled out in some communities but not others. This may shape women's opinions more than social or cultural values and therefore should be considered in either the research design (by choosing communities with and without the intervention) or in the analysis (by either separating the analysis based on exposure to the intervention or describing the possible effects of the intervention on women's opinions).

Figure 1.6.1 reviews the different types of variables using the Chobe birth example.

Figure 1.6.1. Variable Type Example

Variable Type	Chobe Example
Independent	facilities receiving the intervention
Dependent	number of women giving birth at a facility
Intervening	other educational programmes, seasonal changes, staffing changes etc.

When planning your evaluation it is important to consider how and when you will collect your data. Will you collect it before a programme or intervention or afterward? You will also need to consider how you will analyze and compare your data. Will you compare different groups or only the group that received the intervention? These questions should be addressed through your choice of evaluation design. Evaluation designs help you organize what data to collect and how to collect it so that your analysis will answer your evaluation question. An overview of specific strengths and drawbacks of many common designs will be discussed in this section. In discussing these designs we will continue using the example of a post-partum intervention programme in Chobe district designed to increase women's facility births.

Often questions are once again modified at this stage in developing the evaluation due to the limitations of the evaluation design.

1.6.2 Evaluation Design Notation

When discussing evaluation designs we will use the designations below. The arrow represents passage of time so we can see how many measurements will be conducted over a certain time period. It is important to note whether the arrow is pointing forward or backward. An arrow pointing forward means an evaluation going forward in time. You will study your independent variables from now to into a certain point in the future to analyze your dependent variables, this is a *prospective evaluation*. An arrow pointing backward means that you will study from today backward from your dependent variables to find the presence of independent variables in the past, this is a *retrospective evaluation*.

An 'X' represents a programme intervention (your independent variable) and 'O' represents a study observation point; or a point at which you will take a measurement to determine your dependent variable. O_1, O_2, O_3... are representations of the number and order of observations; so O_1 is the first observation, O_2 the second, and so on. With many evaluation designs you will form

two groups, those who will receive the intervention, and those who will receive it at a later date or not receive it at all. These are called "arms" of your study and each arm will be represented on a separate line. Therefore, if you see an X over an O than you know that in Arm 1 there was an intervention (X) and in Arm 2, there was an observation (O).

Figure 1.6.2 Evaluation Design Notation

⟶	**Passage of Time**
X	**A Programme Intervention**
O	**An Evaluation Observation Point**
O_1, O_2, O_3, O_4....	**Observations 1, 2, 3, 4....**
X **O**	**Different rows mean different arms of evaluation participants**

Evaluation designs fall into a few broad categories; non-experimental, quasi-experimental, and experimental. Each evaluation design has its strengths and limitations. The choice of design is based on several considerations. Those considerations include how much control over the environment, or intervening variable, you have, your budget and, how critical it is for the evaluation or evaluation plan to PROVE cause and effect of an intervention or programme.

1.7 Descriptive Evaluations

Descriptive evaluations, also called *non-experimental evaluations*, are not meant to prove that something is happening or not, rather they are meant to describe the context and explain the data. Descriptive evaluations describe what is occurring and characterize the problem. A descriptive evaluation signifies that there is no control group and no random assignment. This means that participants are not assigned to arms in the evaluation by chance. Due to limited resources (mostly time and money) many evaluation projects will fall into this category. Descriptive evaluations tend to take less time and require fewer resources.

These evaluations often focus on cases or a series of cases that can be explored to determine characteristics of a problem. They can be as simple as collecting a little extra data to better understand the trends and patterns in the data you collect regularly. For example, in Chobe district, a few interviews with women in the district on their opinions about facility births would be a descriptive evaluation. It would describe the context and help explain that data. The results could also be useful for modifying the intervention.

Below are some examples of how descriptive evaluations can be used to answer our evaluation question, these data sources will be described in more detail in Chapters 2 and 3:

- Interviews are used for collecting qualitative information. They can be used with facility staff to ask how they feel the intervention has impacted facility births.
- Surveys are used for collecting quantitative information. They can be used with women giving birth in the facility to determine the important factors in their decision to give birth at the facility.
- Interviews and surveys in the communities around the facilities in Chobe district can be used to determine if people have heard of the intervention, if this influences decision-making around facility births, and what some of the barriers might still be to facility births.

There are several different types of descriptive evaluations. Needs assessments and participatory evaluations were discussed earlier in the chapter and are types of descriptive evaluation. These assessments are designed to get a broad understanding of a context before an intervention or programme is implemented. A needs assessment is one of the most useful descriptive evaluations you can use to improve your district. We will discuss three additional types of descriptive evaluations; cross-sectional, case-study and rapid assessments.

Figure 1.7 Descriptive Evaluations Design Notation

Figure 1.7 shows the general notation of a descriptive evaluation. Note that there is no comparison group (no additional arm) and no comparison measurements (the same group is not measured before and after). An intervention takes place and then observations are made in order to describe that intervention and possible outcomes. For needs assessments and participatory evaluations the X and the O would be reversed. First observations would be made and then an intervention would be implemented based on the information gathered.

1.7.1 Cross-sectional evaluation:

A cross-sectional evaluation includes observation and data gathering for the population under study at a single point in time. Cross-sectional evaluations are a snapshot of the whole population. For instance, if you want to determine the outcome of a malaria education campaign in Palapye, you would gather information from all different groups within Palapye, including men, women, leaders, and children. This would give you a broad understanding of anti-malaria practices after the campaign and would give you a description of the outcomes of the programme.

1.7.2 Case-study evaluation:

A case study evaluation is used to describe the context for people with a certain health outcome. For example, in Palapye, after a malaria education campaign, you could go to the hospital and find patients that were diagnosed with malaria. You would then gather information from them on their habits, knowledge of the education campaign, etc. With this information you could describe the possible changes that would need to be made in future malaria campaigns.

1.7.3 Rapid Assessments:

Rapid assessments are similar to cross-sectional studies but are used to quickly gather data over a large area for use in decision making. Rapid assessments are characterized by multiple data gatherers working simultaneously to collect large amounts of data, often from many communities, in a small amount of time. For example, if the malaria campaign in Palapye was also conducted in Tsabong, Ghanzi, and Francistown, evaluators could join in conducting a rapid assessment of the outcome of this campaign. Due to the fact that multiple evaluators work simultaneously in this evaluation design it is important to have a rigorous training plan for all evaluators so that all the data gathered is comparable and consistent.

1.7.4 Strengths and Limitations in Descriptive Evaluations

Descriptive evaluations are often cheaper and faster because the evaluator does not have to manipulate the environment or wait for certain interventions to occur. It is best used when fast information is needed to guide policy, to give context to routine data, or to gather information through a needs assessment.

You should remember that descriptive evaluation, because they are looking solely at one point in time, cannot establish cause and effect and are subject to more evaluator bias than quasi-experimental or experimental designs. Evaluator bias is systematic error in either data collection or data analysis. This could be due to the evaluators own assumptions.

For example if you chose to use a descriptive design to conduct an evaluation of women's opinions of facility births in two different communities you may not think that differences between these communities such as cultural norms, distance of maternities, and existence of other educational campaigns are important. If specific questions were not introduced to understand the influence of these variables you might assume that women in one community are more culturally open to use the facility, when in fact they may just be closer to a facility. Bias could be introduced into your analysis by not addressing potential pre-existing differences.

Figure 1.7.4 Strengths and Limitations of Descriptive Evaluations

Strengths	Limitations
• Often cheaper and faster • Requires little manipulation of the environment	• Ineffective for establishing cause and effect

1.8 Quasi-Experimental Evaluations

Quasi-experimental evaluations, sometimes called *normative evaluations*, systematically study the relationship between the exposure, or intervention/programme, and the outcomes of that intervention/programme. Quasi-experimental designs offer a way of demonstrating a relationship between the outcome and intervention/programme. There are many common quasi-experimental evaluation designs; here we will review cohort and case-control.

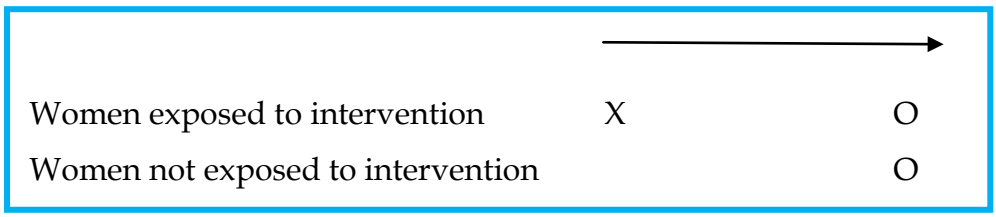
1.8.1 Cohort:

The most common quasi-experimental evaluation and one that you will probably use the most often is the *cohort evaluation.* In this evaluation design you compare the outcomes of those exposed and not exposed to intervention outcomes. This design is generally chosen when there is no possibility of participants being randomized to the intervention because of ethics or logistics. *Randomization* means that people are randomly assigned to one group or the other.

For example, you cannot assign women to either live in Chobe district or in another district, or live near one health facility and not another. Instead those who live in areas with the intervention are considered one cohort while those who do not are considered the comparison group.

Another simple method to conduct an evaluation is to use the just one group but measure key aspects before and after the intervention. The women giving birth in Chobe district before the intervention become the *control* and the women giving birth after the intervention become the cohort.

Figure 1.8.1.a Cohort Evaluation Design Notation



There are various ways to set up the measurement times in cohort designs, below are a few of the most common designs; static group comparison, pre-test post-test, pre-test post-test non-equivalent comparison group, and time-series.

Static Group Comparison

This evaluation design is also referred to as a post-group only comparison design and it often used if there is no possibility of measurement before the intervention is

implemented. The intervention 'X' is implemented for the intervention group and then a comparison is made of this intervention group versus a comparison group that didn't receive the intervention.

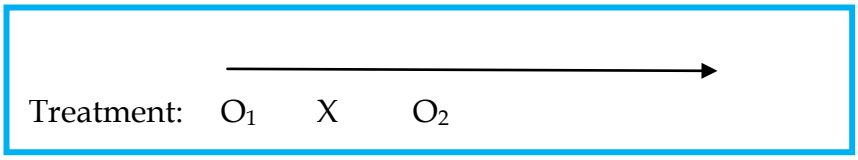
Figure 1.8.1.b Static Group Comparison Study Design Notation

Using the example of giving incentives to increase the number of facility births in Chobe district, this design would be a good option if the MLG had already implemented this intervention in five facilities and wanted information on whether it worked before it would implement the intervention in the other facilities. In this case, percentage of births in facilities with and without the intervention would be the dependent variable to be compared.

Pre-test, Post-test

This evaluation design is used when there is no access to or no logical comparison group. In this design you measure the group that will be exposed to the intervention, then the intervention is implemented and you measure the same group again. The group before the intervention is then compared to the group after the intervention.

Figure 1.8.1.c Pre-test, Post-test Evaluation Design Notation



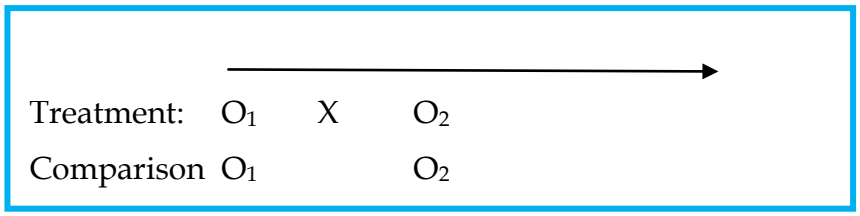
You would use this evaluation design for the Chobe district intervention if, for example, the MLG and MOH planned to implement the intervention in all the facilities in the district at the same time. You would not have the ability to look at a group that had not been exposed to the intervention; therefore you would look at the facilities with the intervention before and after the intervention was implemented and use each facility, before intervention, serve as its own control group.

Pre-test, Post-test, Non-Equivalent Comparison Group

This evaluation design is similar to the pre-post test design but enables a comparison group. The comparison group will strengthen an argument for the effect of the intervention if the comparison group measurements stay the same while the intervention group measurements rise. This design is also strengthened because you

can see what has happened before and after the intervention in both groups. This will ensure that the effect you see in the post-intervention measurement is not just due to differences already present between the two groups. This is the strongest of the cohort designs.

Figure 1.8.1.d Pre-test, post test, Non-Equivalent Comparison Group Evaluation Design Notation

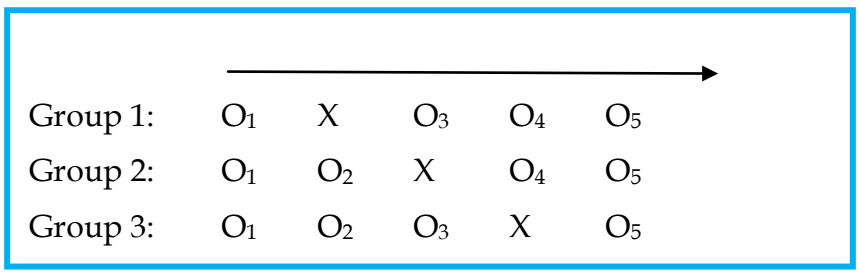


For example, in the Chobe intervention, you may suspect that the facilities that the MLG chose to offer the intervention already had higher rates of facility births because they were closer to population centers. In this design you would look at the rate of facility births before the intervention in both those facilities that would receive and not receive the intervention. Once the intervention has taken place you would take another measurement of these two groups and compare the old and the new values.

Time series

Time series evaluations are used when there is staggered implementation of an intervention. For instance, each group could represent a different facility in which a PMTCT counselling intervention is implemented. In this case the first facility receives the intervention (X) and the other facilities are used for comparison. Then the next facility receives the intervention and group 1 and 2 are used for comparison. This continues until all groups, or facilities, receive the intervention and a final observation is made. This is a very strong design because you are able to conduct multiple measurements over time.

Figure 1.8.1.e Time Series Evaluation Design Notation



1.8.2 Case Control Evaluations:

Case control evaluations are different from cohort studies because they compare groups with the outcome (cases) to groups without the outcome (controls). You will notice that in the evaluation design notation the arrow for this evaluation design is

pointing backward. This means that you separate out the outcomes in the dependent variable into case, with the outcome, and controls, without the outcome. You then look backward in time to determine what independent variables might have been present in each group. In the Chobe example, you would compare those that gave birth in facilities (cases) and those that did not (controls). Then you would compare how many of the cases and how many of the controls were "exposed" (i.e. were aware of the incentive programme) to the post-partum kit incentive.

Figure 1.8.2 Case Control Study Evaluation Notation

←		
(X?)	O	Women who gave birth in a facility
(X?)	O	Women who gave birth in the community

Figure 1.8.2 shows that there was an intervention "X" at one point in time. The arrow pointing to the left show that past data will be gathered from evaluation point "O" to some point in the past "X?" For example "X?" could be from six months back when an intervention was implemented. This evaluation design could be used to see if there were any differences between women who gave birth in the facility or the community.

In this example we are testing the hypothesis that the intervention of the post-partum kit incentive increases the number of pregnant women who give birth in facilities. If our hypothesis is correct, in this evaluation design we would expect to find that the number of cases who were aware of the incentive programme would be greater than the number of controls.

Examples of ways you could use the case-control evaluation design for the Chobe district intervention would be:

- Surveys and interviews with women in Chobe district who did and did not give birth in facilities to determine their relationship to the exposure. Unlike the descriptive study you would need to conduct a systematic sample of these women.
- Compare facilities with high and low rates of facility births and determine their exposure to the post-partum intervention.
- Compare districts with high and low rates of facility births and determine their exposure to the intervention.

These studies are most useful when there are varying rates of implementation of a programme or exposure to an intervention, or if there is more than one exposure or intervention that is taking place.

1.8.3 Bias in Quasi-Experimental Evaluations

Bias is anything that influences the outcomes of the evaluation in one way or another or can lead the researcher to make false conclusions about the potential causes of difference between intervention and non-intervention conditions. Bias in quasi experimental evaluations is unavoidable, but can be minimized through consideration of the evaluation design and the context. Each evaluation design above presented potential bias. If an evaluation takes place after the intervention there could be natural effects of time or location that account for the change in facility births. The researcher would not be able to quantitatively distinguish between natural time effects and intervention effects. However, careful consideration and planning could include qualitative tools that would allow the researcher to ask women, community members, or nurses about the effect of the intervention and the rates of facility births before and after the intervention. This would not eliminate quantitative bias but would give context and explanation to the difference seen.

1.9 Experimental Evaluations

Experimental evaluations refer to evaluations where relationship to the intervention or exposure can be randomized. These evaluations are often referred to as Randomized Control Trials (RCT's) and are considered the "gold standard" or best possible design to determine if an intervention worked. Randomization means that participants are chosen to either receive the intervention or not receive the intervention based entirely upon chance. For example, if you are interested in assigning patients to extra counselling in a randomized manner you could assign every 3rd patient to receive the intervention.

The benefit of randomization is that all other factors besides your intervention, such as older participants, women with husbands who are truckers, members of certain tribal groups, should be equally likely to receive and not receive the intervention and therefore should minimize bias in your analysis. However, for there to be randomization with confidence there should be a minimum number of participants in these designs (the sample size). In further chapters we will discuss sample size and how to estimate the size of the sample you will need.

Randomization should be done when possible. It is a method to ensure that the two groups do not differ in significant ways. Randomization can be achieved by listing all the potential participants and assigning them random numbers. In Excel you can create a random number column with the function "=RAND()*1000". This column can then be sorted and the first names assigned to the intervention and subsequent names to the control group.

Another option, if you do not know the identities of the participants ahead of time is to decide make a choice of how many participants you need and then choose every 3rd person or 4th person.

Experimental evaluations often require a lot of resources and can be logistically difficult in real-life situations. Experimental evaluations can also pose ethical challenges if randomization is difficult. In the Chobe district example, it could cause ethical and community problems if some women received post-partum kits in the maternity ward while others did not.

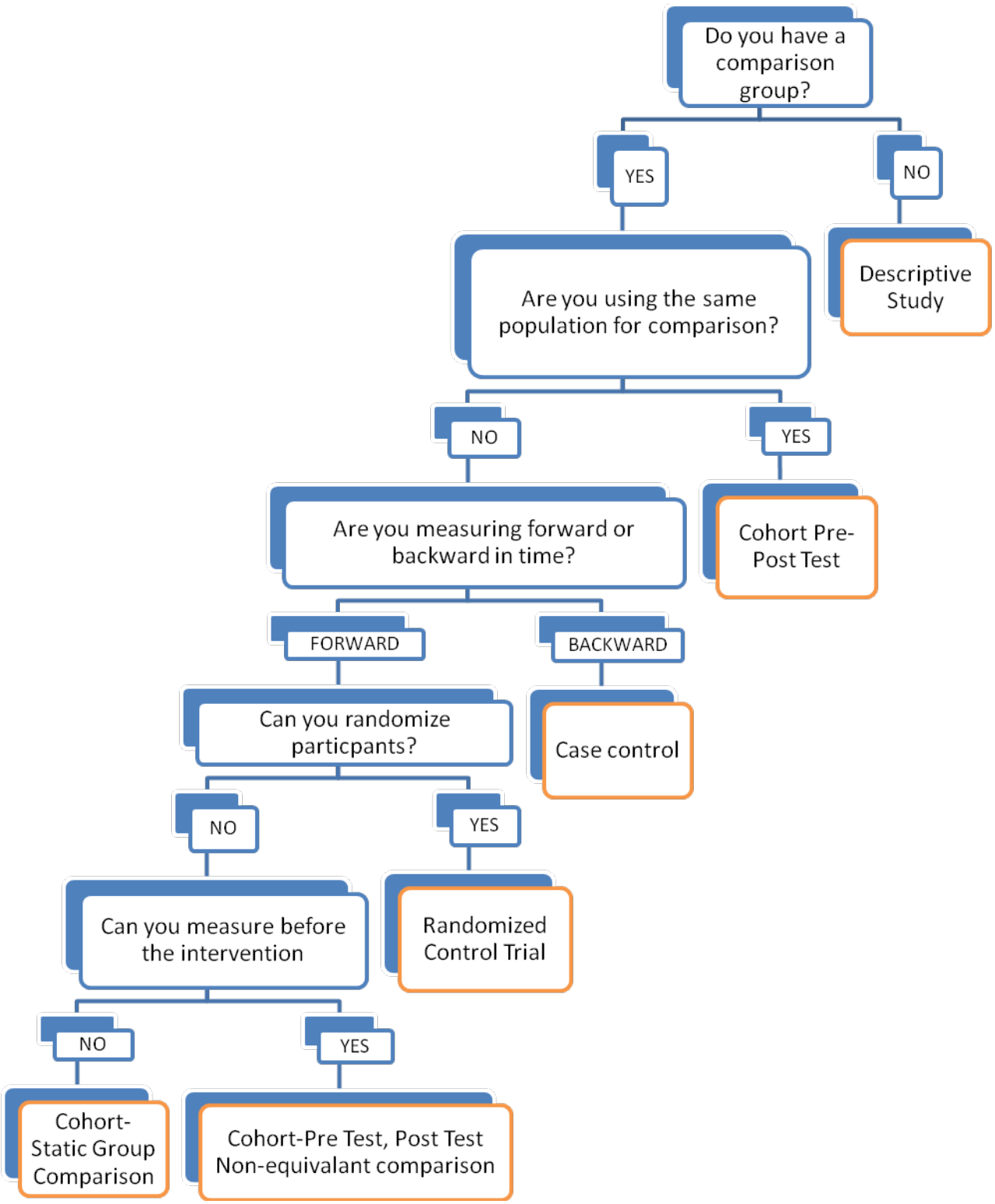
1.9.1 Review of Study Designs

Figure 1.9.1 lists a brief synopsis of the strengths and limitations of the three major categories of study designs.

Figure 1.9.1 Review of Evaluation Design Strengths and Limitations

Evaluation Designs	Strengths	Limitations
Descriptive	• Often cheaper and faster • Requires little manipulation of the environment • Good for describing environmental/exploratory studies	• Ineffective for establishing cause and effect
Quasi-experimental	• Good for establishing cause and effect when environment cannot be fully controlled	• More controlled than non-experimental • Not as strong as experimental design
Experimental	• Gold standard for proving effectiveness of interventions/establishing cause and effect	• Can be expensive • Requires highly controlled environment

Choosing between an evaluation design you should take into account all of these strengths and limitation. However, study designs are often decided upon by practical limitation, such as the inability to determine a comparison group, or not being able to randomize participants. The flow chart on the next page shows how to choose evaluation designs based on these practical decisions.


Do you have a comparison group?
YES
NO
Descriptive Study
Are you using the same population for comparison?
NO
YES
Cohort Pre-Post Test
Are you measuring forward or backward in time?
FORWARD
BACKWARD
Case control
Can you randomize particpants?
NO
YES
Randomized Control Trial
Can you measure before the intervention
NO
YES
Cohort-Static Group Comparison
Cohort-Pre Test, Post Test Non-equivalant comparison

1.10 Types of Data Collection Methods

The next two sections will present an overview of the types of data collection for evaluations. These are methods that are used for any special evaluations that needed to be conducted. There are two types of data that can be collected; qualitative and quantitative data

1.10.1 Qualitative Data

Qualitative data provides rich, in-depth information about human experiences. The data can answer questions like, "Why?" "How?" and "What does it feel like?" Responses are not given to the participant to choose from; instead the respondent can answer in multiple ways. These types of questions are important when the range of responses is unknown. The data gathered using qualitative methods is often very rich but is also time-consuming to collect and analyze, therefore qualitative data is often collected with fewer respondents than quantitative data.

1.10.2 Quantitative Data

Quantitative data answers questions like, "How many?" and, "How much?" Responses are fixed and respondents answer according to specific guidelines. This type of data is important when obtaining countable or statistically significant information is necessary. These methods do not allow as much depth of response but allow for more breadth of respondents and allow for the calculation of percentages, distributions and statistical tests.

1.10.3 Mixed Methods

There some problems that require mixed methods, or a combination of both qualitative and quantitative information.

If you determine that a mixed method is the best approach, it is important to consider the order in which you employ each of these methods.

Qualitative then Quantitative

Using a qualitative and then quantitative design can be used when you want quantitative information on a problem but are unsure of the categories that can be used to collect quantitative information.

For example, if you want to know who influences a woman's decision to give birth at home; you may be unsure of whom these potential people are. First, you would begin by employing qualitative methods, either observation, interviews or focus groups, and then you would use these answers to make quantitative questions. You could determine that mothers-in-law, religious leaders, and husbands are considered important influences on women's decision or ability to give birth at a facility and then create a survey asking about the relative importance of each of the influence of these people for women who did and did not give birth at a clinic.

Quantitative then Qualitative

A quantitative then qualitative design is best used when you want to know why the problem occurs but are unsure exactly of the extent of the problem. You could develop a broad survey about whether women gave birth at home and ask about their first, second, and subsequent children, and then use this information to conduct interviews and focus groups based on the data that you gather. For example, if you notice that women give birth more often at a facility with their first child but not with subsequent children, you could explore these relationships with qualitative methods.

Qualitative and Quantitative Methods

This mixed method design is used when you know something about the extent of the problem and the reasons for the problem but you want to get systematic information as well as in-depth information.

For example, you can administer a survey to women about facility births, giving categories that are already understood and then follow-up the survey with focus groups or interviews that allow the women to give more information or more depth to their answers.

This type of methodology is often used in rapid assessments where in-depth information is needed to influence programme or intervention design or policy but there is little time to collect and analyze the data.

Learning Activity 1.10.3

Choosing Tool Types

Directions: Below are various questions that could be asked in the Chobe district intervention. Please note which ones could be answered with quantitative methods (QUAN) or qualitative methods (QUAL) or mixed methods (MIX).

A._____How many women chose to give birth at the facility because of the intervention?

B._____Why did the women who chose to give birth at the facility because of the intervention feel that the intervention was so important?

C._____How do midwives in the community feel about the intervention?

D._____What percentage of women feel that mothers-in-law were an important part of their decision to give birth at in the community?

E._____What are the most important factors in giving birth at a facility and how do women who give birth at a facility rate the importance of these factors on a scale of 5.

Discussion 1.10.3

Choosing Tool Types

A. *Answer: QUAN.* *Is this question you are looking at "how many" and only need numbers of women. This should be able to be estimated from facility data.*

B. *Answer: QUAL.* *In this question you are analyzing "why" and therefore can take a sample of women who have given birth and ask them qualitative questions.*

C. *Answer: QUAL/QUAN or MIX.* *In this question you are interested in opinions of midwives. This question could be answered with a quanitative survey of midwives if you feel that you know what the answers might be and want an understanding of the weight of each potential answer. It could also be answered with qualtitative interviews with midwives, especially if there is very little understanding of how they might feel. MIX is also a valid option because you could use both qualitative and quantitative methods to get an answer to your question.*

D. *Answer: QUAN.* *This question looks at percentages therefore a quantitative approach would be indicated. A short survey detailing things that women could possibly find important could be developed and administered to a sample of mother-in-law.*

E. *Answer: MIX.* *It is clear that the factors that would be important in giving birth at a facility are unknown. Therefore you would have to perform qualitative work to gather a range of factors. Once that is completed you can list the range of factors with scales and then give this quanitative survey to women.*

1.11 Ethics and Data Sources

Once the evaluation question has been determined and prioritized, it is essential to ensure that the evaluation can be conducted in an ethical manner. Often the questions change as you start to develop your methodology and consider the ethical implications of your evaluation. There are many other factors to consider when deciding upon an evaluation question. Returning to your evaluation questions and modifying them should happen at each stage of evaluation design.

1.11.1 The Role of Confidentiality in Evaluation

During an evaluation you are likely to ask many people, including patients, health care workers (HCWs), and programme staff, questions that may be on sensitive topics, such as how happy are patients with the quality of care they are receiving, how well are data collection processes going at facilities, or how supervision of programmes could be improved. For example, imagine a situation in which you ask a patient how happy they are with the HIV services they receive at their facility. If the patient reports he is very unhappy with the services and the matron overhears, what might happen when that patient visits the facility in the future? What if another patient overhears and learns that this patient has HIV?

If the participants do not trust that their information will be kept confidential they will be less likely to be forthcoming with information that could be critical to your evaluation. While we might hope there would be no negative consequences arising from the information shared by participants, using the previous example of patient satisfaction related to HIV services, it is possible that the matron could inform other staff and they might treat the patient poorly in the future because that patient has been identified as a "complainer. It is also possible that if the patients' HIV status is revealed, other patients could tell others in the community might openly share that information. In both of these situations, a simple set of questions could have very real consequences for the patient that we interviewed.

Ensuring the confidentiality of data collected during an evaluation means that only those directly responsible for data collection and data analysis should be able to link a specific person to specific information collected. As evaluators you solicit a lot of information from participants and therefore can feel a strong need to "give" similar information in return. People also enjoy talking about what they hear and learn – and evaluators are no different. It may be tempting to pass along seemingly inconsequential information from one participant to another – for example, a funny statement or some news that appears to be common knowledge. Do not do it. As evaluators we have made a commitment to keep confidential all information gathered during the research process.

1.11.2 Practices to Ensure Confidentiality

Strategies should be put into place in order to protect a participant's confidentiality. However, no single practice will ensure confidentiality. Each data collection method and evaluation plan will require unique strategies. The ways in which confidentiality might be breached should be carefully considered before data collection begins and explicit strategies should be put in place to protect participants involved in your evaluation. There are some general steps however, to ensure confidentiality: confidentiality training and statements; consent forms; participant coding; and obtaining certification from an ethics review board.

Confidentiality Training & Statements

All individuals involved in administering the study should be trained on how to protect confidentiality. In addition, they should sign statements promising to keep all information confidential and use information solely for data gathering and analysis.

Consent Forms

These forms are for the evaluation participants which detail what type of information participants are being asked to provide, why they are being asked to provide it, what potential risks they face participating in the study, how their information will be stored to ensure confidentiality after it has been collected and how the information will be used to benefit them or others. This form should provide the participants with enough information to make an informed choice about whether they wish to participate and how much or the nature of the information they want to share. The form should include a summary statement at the bottom that says something similar to "I agree/ do not agree to participate in this evaluation." Participants should be asked to check or circle whether or not they agree to participate in the evaluation. After this statement, there should also be an area for the participant's signature at the bottom (signed by the evaluator if the participant is illiterate).

Codes and Data Management

A Consent Form Should Identify:

- What type of information participants are being asked to provide
- Why they are being asked to provide it
- What potential risks they face participating in the study
- How their information will be stored to ensure confidentiality after it has been collected
- How the information will be used to benefit them or others

In addition participant codes and data management procedures for the consent forms and other data should be planned before any data collection occurs.

Participant codes: these are codes that are developed by the evaluation team so that they can make sure that only the study team can link an individual's name to the information they provide. The paper or electronic file that links these codes to individuals should be available in only one location and access should be managed by the evaluation coordinator.

Data management procedures: data management is very important not only to ensure that data is not lost or mislabelled but also to ensure that people outside the evaluation team do not gain access to sensitive information. Data management procedures should include:

- Who codes the data gathering tools?
- Who distributes and collects the tools?
- How is this information filled?
- Who is responsible for storing the information?
- How will it be stored to guarantee safety both in the field and in the office?
- How are computer files stored? Is the computer password protected?

Making Participant Codes

Participant codes are a series of letters and numbers that hide individual names from people other than the study team. Participant codes are also numbered in a way that allows the evaluators to quickly determine the type of participant that provided the information. The identifiers can include information such as the type of facility or community location, the type of data (interview, focus group, survey, etc.), the category of the participant (pregnant mother, new mother, father, nurse, programme staff), a number for each participant and information about who gathered the data. Each type of category would be assigned a number or letter.

For example, for the post-partum kit evaluation in Chobe district we could choose to work within 3 communities and 4 facilities, interview MLG staff, nurses, pregnant women and new mothers, and conduct interviews and surveys. Figure 1.11.2 shows how we would use this information to build our coding structure.

Figure 1.11.2 Sample Participant Coding Structure

Facility Type	Community Location	Type of Participant
T1: hospital T2: clinic T3: health post T4: no facility	A: Ihaha B: Kayanga C: Impalila D: Chobe	M: new mother P: pregnant woman G: GOB programme staff N: nurse
Type of Data	**Participant number**	**Evaluators**
6: Interview 7: Focus group 8: Survey	0001, 0002, 0003....	82: John 76: Mina 45: Patience 33: Precious

Each code category above has its own box and number should be filled in accordingly. For example, Dikeledi Melesi, a pregnant mother who was the eighth participant was interviewed in her home in Ihaha by Patience would receive the code:

T4	A	P	6	0008	45

You will need to keep the code and the person that they correspond to on a list. When making a list linking the participant to the code the list would contain:

Dikeledi Melesi—T4AP6000845

This code would allow the evaluation team members to quickly identify the type of participant, where they were located and by whom they were interviewed. The code structure also keeps Dikeledi's participation confidential since only the evaluation team would have access to the list with her name; the code would not mean anything to anyone outside of the study team.

Learning Activity 1.11.2

Participant Coding

Directions: Directions: Below are descriptions that need coding and codes that need decoding. Using the participant coding system described in Figure 1.11.2 above, please write the relevant codes into the boxes provided and fill in a description for the codes provided

1. Mosegi Maphane was the 12th person to fill out a survey from the MLG in Chobe district. Precious was the person who administered the survey.

2. John ran a focus group with pregnant women in Kayanga at a health post. He had 6 participants. Kasigo Dilebo was the 4th participant in a focus group.

3. Patience interviewed 10 nurses in a clinic in Impilila. Baraedi Ramasedi was the 8th participant in the interview.

4. This is a code for Tau Phewa. Please provide a description.

T1	D	N	6	0011	76

5. This is a code for Goitsemedi Motsieloa. Please provide a description.

T2	B	M	8	0003	45

6. This code is for Setete Batshu. Please provide a description.

T4	A	P	7	0031	33

Discussion 1.11.2

Participant Coding

1. *Mosegi Maphane*

T4	*D*	*G*	*8*	*0012*	*33*

2. *Kasigo Dilebo*

T3	*B*	*P*	*7*	*0004*	*82*

3. *Baraedi Ramasedi*

T2	*C*	*N*	*6*	*0008*	*45*

4. *Tau Phewa is nurse at the hospital in Chobe. She was the 11th nurse to be interviewed and was interviewed by Mina.*
5. *Goitsemedi Motsieloa is a new mother. Patience administered a survey to her at a clinic in Kayanga clinic. She was the 3rd mother to fill out a survey.*
6. *Tirelo Batshu is a pregnant woman in Ihaha. She was the 33 person in one of the focus groups that Precious ran in the community (no facility).*

1.11.3 Obtaining Research Ethics Training and Certification

If you intend to conduct a study or conduct research, you should undergo ethics training and obtain ethics certification before fieldwork begins. In addition to data collectors, this includes anyone who will have direct contact with participants – such as drivers and receptionists – or with the data – such as typists, transcribers, translators, and data managers.

Different data sources can have different procedures to ensure ethical evaluation. Using information that is publically available often does not require review by an ethics board, however, using patient information, even if it is already collected, coded and not linked to individuals, usually at least requires a cursory review by an ethics board. Any data collected directly from individuals, particularly information that is sensitive in nature and could result in embarrassment or risk for the participants is likely to need a thorough ethics review to ensure that all the procedures mentioned above, including confidentiality agreements, consent forms, codes, and data management procedures are sufficient to guarantee participant privacy and safety.

Botswana's **Health Research and Development Department (HRDD)** is responsible for guaranteeing the safety of human subjects. This department is part of the **Health Research Unit (HRU)** in the Ministry of Health. Human subjects include any human being who is a participant in an evaluation. In addition the **Drug Regulatory Unit** (DRU) is responsible for ensuring drag safety, efficacy, and quality and should be contacted if there are any non-regulated drugs to be used in an evaluation.

The HRDD's guidelines for proposal review and guide to consent form, as well as HRDC application form, are included in this workbook (Appendices 1, 2 and 3) and can also be found under 'forms' on the Ministry of Health website.

Many times programme evaluations do not require a full human subjects review but they should be submitted to the HRDD for a determination of the review requirements.

1.11.4 Ethical Considerations in Reporting Evaluation Findings

It is not just in data collection and management that ethics are important. It is also important to proceed ethically in the dissemination of evaluation analyses and reports.

Deciding on findings before the evaluation: this introduced bias into the evaluation and could possible influence the actual results.

Removal of questions that may have negative outcomes: your evaluation should be comprehensive and include questions that could measure possible negative effects as well as positive ones.

Modification of findings: findings should never be modified; this is a serious breach of ethics.

Suppression or ignoring of findings: often stakeholders have invested greatly in a programme or intervention and feel embarrassed or angry by negative findings. It should be emphasized that negative findings are an opportunity to make a programme or intervention better.

Misuse of findings: finding should never be used for anything other than the programme they were intended to inform. Using findings for political, economic, or other gain is unethical.

Presenting findings that violate confidentiality: it is very important, as we have seen above, to project confidentiality of all participants in the evaluation. Not only will you be legally liable for violating confidentiality but any violation could have serious repercussions for participants and for any confidence from government bodies or possible participants in future studies.

1.11.5 Proposal Development

After identifying a need, formulating your evaluation question, and determining your data collection methods, you can begin to write your evaluation proposal. An evaluation proposal describes exactly why and how you will collect your data. It details study designs, data collection tools and specifies data management and data

analysis. A proposal is important so that you can make sure that you have thought through exactly how to conduct a study and it also give detailed information to anyone who has to approve the study or the ethical procedures in the study. Often you will not be the person writing the proposal but you should be familiar with its parts and request to see the full proposal when participating in an evaluation. An evaluation proposal should follow this outline:

Background and literature review

The background and literature review is intended to provide the person(s) reading your proposal a brief history of the subject matter. Using published literature, you should describe what is already known about the topic you are wishing to investigate or evaluate. Critically appraise that literature. Describe the weaknesses, controversies, inconsistencies, or gaps in knowledge in previous studies. It is also important to strengthen the background section with any current local data on the topic. And lastly, explain why further evaluation is required, thus justifying your investigation.

Statement of the problem

As mentioned earlier, your problem statement, or evaluation question, should be SMART. It should be possible for this question to be answered by your chosen study design. For example, a study that looks only at infant mortality rates will not be able to readily answer the question about whether the post-partum kit incentive worked in Chobe district. Instead you need a design in which the outcomes of the design directly address the problem.

Aim and objectives of the study

This section should describe the aim and objectives of your evaluation. The aim of your evaluation is the broadest statement of what you hope to achieve through your evaluation. The objectives are the small steps you must take in order to achieve your aim.

Significance of the study

When describing the significance of your evaluation, explain why the knowledge gained from your results are important. This may be very specific to the needs of the MLG, MOH or agencies that are funding their projects. For example, using the Chobe case study, explain to the prevention of mother-to-child transmission (PMTCT) programme officer that by determining whether post-partum incentives increase the number of facility births, they may have a way to encourage HIV positive women to come to a facility to give birth and thus, an opportunity to provide Nevarpine and prevent MTCT.

Evaluation Subjects

Describe who will be the focus of the evaluation. Will it be pregnant and post-partum women in Chobe? If there is to be more than a single category of

participants, include all categories. Identify how many participants will be in each group.

Materials and Methods

Evaluation Design

Describe the evaluation design chosen. Make sure it is clearly the best design given your evaluation question. Describe the advantages and strengths of using the study design you have chosen.

Evaluation Sample

Identify the reference population (the population to which you expect to be able to generalize your results), the source population (the population from which you draw your study sample) and lastly, your study sample. How to calculate sample size for your evaluation will be discussed in Chapter 3.

Using the Chobe example, the reference population might be pregnant women living near a health facility. The source population would be the population living in and around Chobe and the sample population is the pregnant women who gave birth at a health facility within the given period of your study.

It is important to list the inclusion and exclusion criteria for the sample population. For example, would you exclude women who gave birth at a health facility prior to a specific date? Describe how your sampling method may have introduced a sampling bias. And lastly, describe the descriptive data you will collect. Make sure to attach any data collection tools you plan to use.

Sample Size

Describe calculations for the sample size, including the size of the effect to be detected, the prevalence of the condition (if applicable), the power of the study, and the level of significance for the results. All of these topics will be addressed in Chapter 3 of this Workbook.

Evaluation Sites

Identify where you will conduct the study.

Ethical Considerations

Ethical considerations should include information about seeking HRDC approval, and how voluntary consent will be obtained. Include copies of informed consent forms (if applicable) in appendix.

Confidentiality

Cleary describe all measures that will be put into place to protect the privacy and confidentiality of the participants and their information.

Statistical Analysis

Describe the statistical analyses you intend on using. Make certain that it is the most appropriate method for the study design and evaluation question.

Protection of Human Subjects

Clearly identify any potential benefits and/or risks to the participants.

Budget

Present a realistic description of all the costs associated with the evaluation, including the staff time, transportation, and materials that will be needed to conduct the evaluation. Do your best to present a realistic budget.

Dissemination

State how you intend to share with the findings. Will there be a final report and/or a presentation? Who are the findings shared with? Will they be published widely? Or will the results remain within the organisation?

References

Include a comprehensive list of references. This list you should include all sources used to inform your proposal.

Chapter Summary

Determining information gaps, developing strong evaluation questions, and designing evaluations that answer these questions are important duties for an M&E officer. This chapter was intended to help you begin to identify questions and evaluations that can benefit specific sites or your whole district.

Developing strong evaluation questions from identified needs will ensure that these questions are relevant and used by the facility or district. Remember to make your questions SMART will ensure that you are able to conduct a relevant evaluation, on a specific population within fixed time-frame.

Developing good evaluation questions is only part of the job of an M&E officer. The M&E officer should seek to prioritize these evaluation questions based on the applicability, feasibility, and political acceptability of the data. In order for your evaluation to make an impact it is important to develop consensus on the most useful questions to answer.

When developing questions, and after the question has been determined, it is essential to think carefully through the ethical implications of the evaluation. Confidentiality, consent forms, coding, and data management should all be detailed in a systematic manner and contact should be made with the HRDC to determine if the project would likely need a full ethical review.

The evaluation question will often have to be revised once potential evaluation designs have been chosen. You will need to go back and forth to make sure that your evaluation design can answer your chosen question and whether your question can be answered by your evaluation design. Evaluation designs may look complicated but the first step is to determine whether the question you want to ask requires an experimental or quasi-experimental evaluation design or if a descriptive evaluation would be best for the question. Quasi-experimental designs are based on the availability of a comparison group and the time-frame that you have for evaluation. As soon as these things are determined the design itself should not be hard to choose.

Once an evaluation design has been chosen you need to return to your evaluation question to determine what types of data and data collection tools you will need. This chapter has provided you with an overview of the data collection methods but subsequent chapters will provide more detail.

Finally, we have presented in this chapter the outline of a complete evaluation proposal. It is important to note that you will be able to fill in many parts of this proposal based on the information in this chapter; however, other parts that make up the proposal will be addressed in further chapters in this workbook.

Self Assessment Quiz

1. Name two differences between outcome evaluations and research

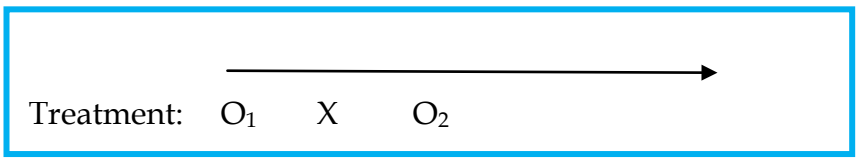
2. What do SMART and CREAM stand for?

3. Name three things to consider during priority building.

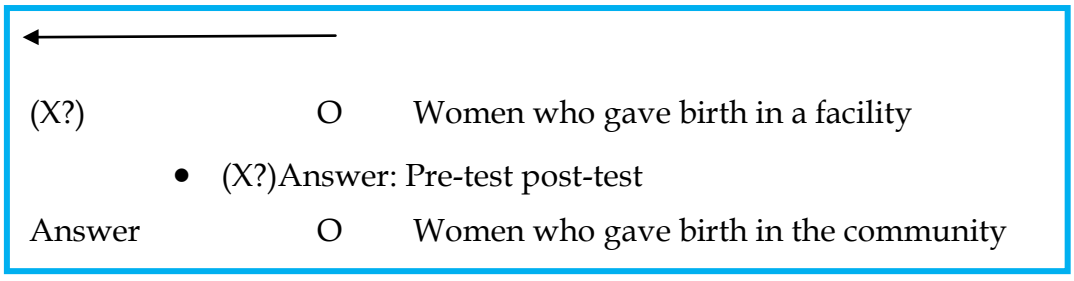
4. Name two practices to ensure good ethics

5. Name each study design

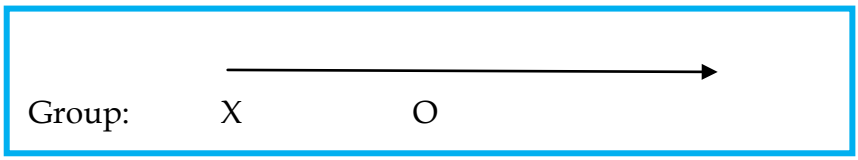
A.



B.



C.



6. Name two important stakeholders.

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Appendices

Appendix 1: Health Research Approval Application Form

Ministry of Health

Republic of Botswana

Application for Approval of Human Research

Section A: Instructions

1. *For research/academic institutions or PHD students attach:*
   - a) *14 copies of the Research Application form*
   - b) *4 copies of the following:*
     - i. *Study proposal.*
     - ii. *Consent/authorization form or a request for waiver of consent/authorization- Setswana, English and back translation where applicable.*
     - iii. *Questionnaires to be used. Setswana, English and back translation where applicable.*
     - iv. *Curriculum vitae/ resume of each member of the Research team*
     - v. *Approval letter from other IRBs*
     - vi. *Grant approval letter*
     - vii. *Any other supporting materials i.e. recruitment scripts, brochures, flyers etc*
2. *For undergraduates and graduates attach one copy of the above listed items/ documents.*

Section B: Application Details

1. Study Title: (Include Version number and date)
2. Date of submission:
3. Type of Research: **i. Basic Science ( )** **ii. Public Health ( )** **iii. Clinical Research ( )** **iv. Human Biology ( )** **v. Other_____**

4. Principal Investigator *(Name & Qualifications)*:	**4(i). Local Contact Details** *Name:*
Postal Address:	**Postal Address:**
Phone Number:	**Phone Number:**
E mail Address:	**E mail Address:**
Name of affiliate Institution/Organization:	**Name of Institution/Organization:**
Department *(If Government)*:	**Department** *(If Government)*:

5. Other Investigators /Co-Principal Investigators			
Name:	**Organization:**	**Email:**	**Telephone Number:**

6. Key Personnel working with data that may be linked to human subjects:			
Name:	**Organization:**	**Email:**	**Telephone Number:**

Section C: Description of Research

1. Brief Description of Study

2. Rationale/Justification *(Why the need to carry out this study in Botswana)*:
3. Study Objectives *(Both General and Specific)*:
4. Expected Results *(Both Primary and Secondary endpoints)*:

Section D. Methodology

1. Study Design
2. Study sites *(Districts, Towns, Villages, Health facilities, Schools etc* **:**
3. Subject Population(s) *(Clinical condition, Gender, age, and other relevant Characteristics)*:
4. Sample size*(The number of subjects to be involved in the study and how these subjects will be selected from the population)*:
5. Subject Recruitment/Sampling Methods *(Explain all procedures in detail)*:

6. Data Collection Methods *(Explain all procedures in detail)*
7. Data Analysis *(Briefly explain how data will be analyzed)*
8. Piloting/Pretesting *(Explain all procedures in details)*
9. Protection of Subjects *(Describe measures to protect subjects from and minimize possible risk of harm, discomfort, or inconvenience)*:
10. Approximate Date Study Recruitment will begin:_____
11. Estimated Duration of entire study: _____

Section E: Subject Information

1. Inclusion Criteria

2. Exclusion Criteria:

3. Does the study involve Vulnerable Groups? *(Tick all that Apply)*?

Elderly	( )
Children	( )
Pregnant women, fetuses, or neonates of uncertain viability or nonviable	( )
Prisoners	( )
Decisionally impaired Persons	( )
Minority and indigenous groups	( )
Low Literacy	( )
Economically Disadvantaged	( )
Other_____	
N/A	( )

4. Does this study involve any use of a drug? No ( ) Yes ( ). If yes, is the drug registered or given exemption status (IND studies) by the Drug Regulatory Unit in Botswana? *If yes attach proof)*_____

5. Reasonably foreseeable risk or discomforts to the subjects *(list in detail)*:

6. Who will cover Subject Injury-Related Costs?

i.	**Sponsor**	( )
ii.	**Third-Party Payers**	( )
iii.	**Subjects**	( )
iv.	**N/A**	( )
v.	**Other**	_____

7. Potential benefits to society and to subjects *(do not include compensation)*:

8. Give details of Botswana based personnel that will be involved ***(Name, functions and qualifications)*****:**
9. Any renumeration given to subjects? Yes ( ) No ( ). If yes, specify:
10. Will the participant incur any financial cost in this study? Yes ( ) No ( ). If yes, specify:

Section F: Data Sources

1. Sources of Data

i. **Focus Group(s)** ( )
ii. **Interviews** ( )
iii. **Questionnaires/Surveys** ( )
iv. **Census/Public Records** ( )
v. **Human Biological Specimen**
( ) **Archive** ( ) **Prospectively Collected** ( ) **Discharged** ( ) **Stored Samples**
vi. **Medical Records** ( )
vii. **Registers** ***(e.g. TB register and Cancer register)*** ( )
viii. **Other** _____

Section G. Study Details

1. Capacity Building (*how will the study build capacity in the country*)
2. Dissemination (*How will the study findings be disseminated*)
3. Other Ethical Body(ies) Involved in the review of the study

Section H: Sponsor Information

1. Name of Sponsor:_____

2. Type of Sponsor:

i. Government ( )
ii. Private Foundation ( )
iii. Industry ( )
iv. Internal ( )
v. Other ( )

3. Sponsor Contact Person:_____

4. Sponsor Contact Telephone: _____

Section I: Contact Information:

PI or other researchers for answers to questions about the study or research-related injuries(*You must offer at least two contacts*)**:**	**The HRDC representative who can answer questions about their rights as research subjects**
i). ii).	**Name**_____ **Head of Health Research Unit** **Ministry of Health** **Private Bag 0038** **Botswana** **Tel: (+267) 3914467** **Fax: (+267) 3914697**

Section J: Investigator's Statement

INVESTIGATOR'S STATEMENT OF ASSURANCE

I promise to abide with existing relevant International Declarations and National procedures and guidelines when undertaking research involving human subjects within the Republic of Botswana and agree to:

1. Ensure that all studies conducted on human participants are designed and conducted according to sound scientific and ethical standards within the framework of good clinical practice.

2. Report to the Health Research and Development Committee any information requested, serious or unexpected adverse events and any information related to national programs.

3. Unless if an emergency treatment for patient care, obtain prior approval from the HRDC before amending or altering the scope of the project or implementing changes in the approved consent form(s).

4. Submit progress reports as required by the HRDC.

5. Maintain all documentation including consent forms and progress reports.

6. Ensure that all members of the research team are aware of their roles and responsibilities in this study.

7. Ensuring, in accordance with the duties outlined for each member, that all members of the team are fully utilized for tasks assigned to them.

Principal Investigator's Name:

Principal investigator's Signature: **Date:**

Principal Investigator's Position:

Local Investigator's Name:

Local investigator's Signature: **Date:**

Local Investigator's Position:

After Completion

1. **An electronic and hard copy of the report should be submitted to the Health Research Unit, Ministry of Health as well as other relevant Botswana Government Institutions/Organizations within 3 months of producing a bound report.**

2. **All continuing renewals should be submitted at least 6 weeks before the expiration.**

Section K. For Health Research Unit use ONLY.

1. Date Received	**6. Review Body [ ] Health Research Unit [ ] HRDC**
2. Final Outcome	
3. Ref No:	
4. Expiration Date:	
7. Continuing renewals extension **Date 1** _____ **Date 2** _____ **Date 3** _____	
8. Final Report Submission **( ) Yes** **Date** _____ **( ) No**	

Appendix 2: Guide to Completing a Consent Form

Ministry of Health

Republic of Botswana

GUIDE - CONSENT FORM

Consent is a process involving the free interchange of information between the prospective subjects and the investigator. Informed consent must be sought under circumstances that provide subjects *(or their legally authorized representative)* sufficient opportunity to consider whether or not to participate and that minimize the possibility of coercion or undue influence. Researchers have the duty to ensure that the participants comprehend the information given. The verbal and written briefing of the participants must be in a manner, level and language that they understand.

A Consent form should at a minimum include the following information:

1. Title of study

2. Introduction

An introductory statement

3. Purpose of the study

A statement on what the research is for. What are the expectations? Etc.

3. Eligibility Criteria

4. Study Procedure

State whether procedure is experimental or not experimental, description of all procedures which will be followed and all treatments or procedures. It should state how treatment will be administered and include visit schedules etc. If the study is clinical, indicate study design i.e. Randomized Trial, Blind Trial, Case Cross-over or Placebo. State the approximate number of subjects to be involved in the study and the duration of the study.

4. Alternative Procedures

A disclosure of appropriate procedures or courses of treatment, if any that might be advantageous to the subject and their attendant risk and benefit. To enable a rational choice about participating in the research study, subjects should be aware of the full range of options available to them.

5. Blood tests

State if blood samples will be collected from subjects and name the types of tests that will be performed on the sample as well as the volume of blood that will be collected during each visit.

6. Risks and/or discomfort

This is a description of any foreseeable risk or discomforts to the subjects. If there are risks to participation, describe them for each procedure or drug. List all expected and occasional side effects. List all side effects, no matter how rare, that are life altering or potentially life altering. State if there are risks associated with the research. Describe more than minimal risks.

7. Handling of Research Related Injury

Describe how research related injuries would be handled by the researcher.

8. Benefits

A description of any benefits to the subject or others which may reasonably be expected from the research. If no direct benefit is anticipated, that should be stated.

9. New information

A statement that participants will be informed of any new findings which develop during the course of study that may relate to their willingness to continue in the study.

10. Costs to Subjects and Compensation

State any additional cost to the subject that may result from the research. State if there is any compensation to the participant.

11. Voluntary Participation

A statement that participation is voluntary (right not to participate) and that refusal to participate will involve no penalty or loss of benefits to which the subjects are otherwise entitled to.

12. Right to Withdraw

Subjects should be informed on their right to withdraw at any point in time and consequences of a subject's decision to withdraw from research. If applicable, describe circumstances under which the subject's participation may be terminated by the investigator without regard to the subject's consent (but subject must be informed).

13. Privacy, Anonymity and Confidentiality

Information on the extent of privacy, anonymity and confidentiality that will be provided to participants. This should describe measures to be used to maintain confidentiality of records and data pertaining to the subjects. A statement on institutions that will be allowed to review/inspect records should be included.

14. Future use of Information

The future possible use of the information and data obtained, including use as a database, archival research or recordings for educational purposes.

15. Storage of specimen

State the period of storage for specimens, where specimens will be stored, explain how you might use stored specimens in the future, blinded or unlinked, procedures for requesting withdrawal of specimens and what procedures will be followed for future use of these stored specimens.

16. Who to contact

Give contact details for
Information on the rights of the participants in the trial (Name of IRB representative)
Questions and Injuries related to study (Name of Researcher)

17. Statement of consent

Write a statement of consent, dates and signature of the participant and study staff member conducting consent.

Appendix 3: HRDC Continuing Review Application form

MINISTRY OF HEALTH

REPUBLIC OF BOTSWANA

HEALTH RESEARCH & DEVELOPMENT COMMITTEE

TELEPHONE - (+267) 3914467

DATE RECEIVED: _____

REVIEW DATE: _____

CONTINUING REVIEW APPLICATION FORM

1. DATE:

2. PROTOCOL NUMBER:

3. PROTOCOL TITLE:

4. PRINCIPAL INVESTIGATOR:

5. ADDRESS:

6. TELEPHONE:

7. E-MAIL:

8. CO-INVESTIGATOR(S):

9. KEY PERSONNEL:

10. GRANT AWARDS TITLE:

11. SPONSOR(S) NAME:

12. STATUS: (PLEASE CHECK ALL THAT APPLY)

- ☐ Continuing
- ☐ Accrual complete with treatment intervention and/ or participant interviews /surveys continuing
- ☐ Subject interventions/data collection ended on (date): ____
- ☐ Open for analysis only. Expected end date: ____
- ☐ Complete (including all analysis). Date completed:____
- ☐ Cooperative Review
- ☐ Other, Please describe: _____
- ☐ Study never activated, closure requested-

(Submit this page only with PI Initial/date) _____ _____

PI Initial Date

13. SUBJECT INFORMATION:
    a. Total approved sample size (of evaluable subjects):
    b. Total enrolled during past approval period (excluding ineligible subjects):
    c. Total enrolled to date (excluding ineligible subjects):
    d. Enrollment breakdown to date by gender and race (excluding ineligible subjects):
    d. Enrollment breakdown in past approval period (excluding ineligible subjects):
    e. Total eligible subjects yet to be recruited:
    f. Percentage of total enrolled to date who withdrew, were excluded, or otherwise were not evaluable subjects:
       In past approval period:

14. OUTLINE GOALS OF STUDY: (a short description **must** be included)

15. DESCRIBE ANY UNEXPECTED OUTCOMES OR PROBLEMS (physical, psychological, social, or with the consent process or enrollment) EXPERIENCED BY SUBJECTS SINCE LAST REVIEW. **Serious Adverse Events, both expected and unexpected, must be reported in writing to HRDC immediately.**

16. WAS ANY SUBJECT WITHDRAWN OR DID ANY SUBJECT VOLUNTARILY WITHDRAW FROM THE STUDY? Yes ☐ No ☐ IF SO, DESCRIBE:

17. HAS THE COMMITTEE APPROVED ANY REVISIONS TO THE STUDY SINCE THE LAST REVIEW? Yes ☐ No ☐ IF SO, DESCRIBE:

18. DO YOU WISH TO REQUEST APPROVAL FOR ANY REVISIONS AT THIS TIME? Yes ☐ No ☐
    - If you propose any change to the protocol, summarize the changes you propose, the reasons for them, and submit two copies of an updated version of your original protocol application, one indicating the proposed changes in bold or "track changes," and the other without bold or track changes.
    - If you have changes to co-investigators or study representatives, please list them and describe their proposed contribution.

    (Remember that no changes may take place until you receive HRDC approval, unless necessary to prevent imminent serious harm to subjects! However, you must report details to the HRDC)

19. SUMMARIZE YOUR FINDINGS FOR:
    a. THE PAST APPROVAL PERIOD:

    b. TO DATE:

20. ATTACH COPIES OF LITERATURE BY AUTHORS OTHER THAN YOU THAT PROVIDE NEW INFORMATION BEARING ON THIS STUDY'S RISK: BENEFIT ANALYSIS. Attached ☐

    If, after performing a search in good faith, you believe there are none, check here ☐

21. ATTACH A COPY OF THE CONSENT FORMS (English and Setswana) YOU PLAN TO USE DURING THE NEXT YEAR, Attached ☐ N/A ☐

22. IF YOU DO NOT PLAN TO TRANSLATE YOUR CURRENT FORM TO SETSWANA, PLEASE EXPLAIN WHY? _____
_____

23. ATTACH A COPY OF ANY ADVERTISEMENTS OR RECRUITMENT MATERIALS YOU PLAN TO USE IN THE NEXT YEAR. Attached ☐ None attached ☐
Will submit as amendments ☐

24. ATTACH THE CURRENT, UNEXPIRED APPROVAL AND/OR REAPPROVAL FORM(S) FROM ALL OTHER INSTITUTIONS INVOLVED WITH YOUR STUDY.
Attached ☐ N/A ☐ From: _____

I certify that this protocol is being conducted in strict adherence to national and international guidelines on the protection of the rights and welfare of human subjects in research.

_____

Principal Investigator's signature **Date**

Self Assessment Quiz Answer Key

1. Name two differences between outcome evaluations and research

Answer:

Scope: a new facility versus a national study

Audience: will the information be shared locally or with the world?

Evaluation problem: is this a problem specific to a district or facility or is it a general problem?

Uses of the Evaluation: is this evaluation intended to create change for local programmes or change procedures or policies globally?

2. What do SMART and CREAM stand for?

Answer: SMART; specific, measurable, achievable, relevant and time-bound. CREAM; clear, relevant, economic, adequate, and measurable.

3. Name three things to consider during priority building

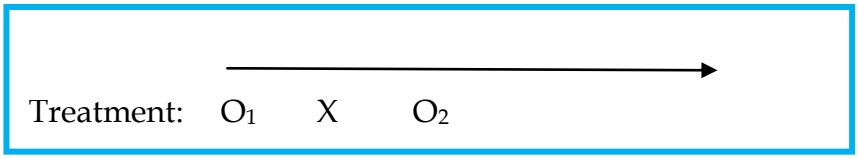
Answer: resources, timing, existing information, political acceptability, applicability, regional standards.

4. Name two practices to ensure good ethics.

- *Training*
- *Consent forms*
- *Participant codes*
- *Ethic certification*

5. Name each study design

A.



Answer A: Pre-test post-test

(X?) O Women who gave birth in a facility

- (X?)Answer: Pre-test post-test

Answer O Women who gave birth in the community

B.

Answer B: Case-control

C.

Group: X O

Answer C: Descriptive study

6. Name two important stakeholders

Answer: funding agencies, government, communities, facilities

Ministry of Health

Republic of Botswana

Application for Approval of Human Research

Section A: Instructions

1. ***For research/academic institutions or PHD students attach:***
   - ***a) 14 copies of the Research Application form***
   - ***b) 4 copies of the following:***
     - ***i. Study proposal.***
     - ***ii. Consent/authorization form or a request for waiver of consent/authorization- Setswana, English and back translation where applicable.***
     - ***iii. Questionnaires to be used. Setswana, English and back translation where applicable.***
     - ***iv. Curriculum vitae/ resume of each member of the Research team***
     - ***v. Approval letter from other IRBs***
     - ***vi. Grant approval letter***
     - ***vii. Any other supporting materials i.e. recruitment scripts, brochures, flyers etc***
2. ***For undergraduates and graduates attach one copy of the above listed items/ documents.***

Section B: Application Details

1. Study Title: (Include Version number and date)
2. Date of submission:
3. Type of Research: **i. Basic Science ( )** **ii. Public Health ( )** **iii. Clinical Research ( )** **iv. Human Biology ( )** **v. Other_____**

4. Principal Investigator*(Name & Qualifications)*:	**4(i). Local Contact Details** ***Name:***
Postal Address:	**Postal Address:**
Phone Number:	**Phone Number:**
E mail Address:	**E mail Address:**
Name of affiliate Institution/Organization:	**Name of Institution/Organization:**
Department *(If Government)*:	**Department *(If Government)*:**

5. Other Investigators /Co-Principal Investigators			
Name:	**Organization:**	**Email:**	**Telephone Number:**

6. Key Personnel working with data that may be linked to human subjects:			
Name:	**Organization:**	**Email:**	**Telephone Number:**

Section C: Description of Research

1. Brief Description of Study

2. Rationale/Justification ***(Why the need to carry out this study in Botswana)*****:**

3. Study Objectives ***(Both General and Specific)*****:**

4. Expected Results ***(Both Primary and Secondary endpoints)*****:**

Section D. Methodology

1. Study Design
2. Study sites ***(Districts, Towns, Villages, Health facilities, Schools etc*** **:**
3. Subject Population(s) ***(Clinical condition, Gender, age, and other relevant Characteristics)*****:**
4. Sample size***(The number of subjects to be involved in the study and how these subjects will be selected from the population)*****:**
5. Subject Recruitment/Sampling Methods ***(Explain all procedures in detail)*****:**

6. Data Collection Methods (*Explain all procedures in detail)*

7. Data Analysis *(Briefly explain how data will be analyzed)*

8. Piloting/Pretesting *(Explain all procedures in details)*

9. Protection of Subjects *(Describe measures to protect subjects from and minimize possible risk of harm, discomfort, or inconvenience*):

10. Approximate Date Study Recruitment will begin:_____

11. Estimated Duration of entire study: _____

Section E: Subject Information

1. Inclusion Criteria

2. Exclusion Criteria:

3. Does the study involve Vulnerable Groups? ***(Tick all that Apply)*****?**

Elderly	**( )**
Children	**( )**
Pregnant women, fetuses, or neonates of uncertain viability or nonviable	**( )**
Prisoners	**( )**
Decisionally impaired Persons	**( )**
Minority and indigenous groups	**( )**
Low Literacy	**( )**
Economically Disadvantaged	**( )**
Other_____	
N/A	**( )**

4. Does this study involve any use of a drug? No ( ) Yes ( ). If yes, is the drug registered or given exemption status (IND studies) by the Drug Regulatory Unit in Botswana? ***If yes attach proof)***_____

5. Reasonably foreseeable risk or discomforts to the subjects (*list in detail)***:**

6. Who will cover Subject Injury-Related Costs?

i.	**Sponsor**	**( )**
ii.	**Third-Party Payers**	**( )**
iii.	**Subjects**	**( )**
iv.	**N/A**	**( )**
v.	**Other**	_____

7. Potential benefits to society and to subjects ***(do not include compensation)*****:**

8. Give details of Botswana based personnel that will be involved ***(Name, functions and qualifications)*****:**
9. Any renumeration given to subjects? Yes ( ) No ( ). If yes, specify:
10. Will the participant incur any financial cost in this study? Yes ( ) No ( ). If yes, specify:

Section F: Data Sources

1. Sources of Data

i. **Focus Group(s)** ( )
ii. **Interviews** ( )
iii. **Questionnaires/Surveys** ( )
iv. **Census/Public Records** ( )
v. **Human Biological Specimen**
( ) **Archive** ( ) **Prospectively Collected** ( ) **Discharged** ( ) **Stored Samples**
vi. **Medical Records** ( )
vii. **Registers** ***(e.g. TB register and Cancer register)*** ( )
viii. **Other** _____

Section G. Study Details

1. Capacity Building (*how will the study build capacity in the country*)
2. Dissemination (*How will the study findings be disseminated)*
3. Other Ethical Body(ies) Involved in the review of the study

Section H: Sponsor Information

1. Name of Sponsor:_____

2. Type of Sponsor:

i.	**Government**	**( )**
ii.	**Private Foundation**	**( )**
iii.	**Industry**	**( )**
iv.	**Internal**	**( )**
v.	**Other**	**( )**

3. Sponsor Contact Person:_____

4. Sponsor Contact Telephone: _____

Section I: Contact Information:

PI or other researchers for answers to questions about the study or research-related injuries*(You must offer at least two contacts)*:	**The HRDC representative who can answer questions about their rights as research subjects**
i). **ii).**	**Name**_____ **Head of Health Research Unit** **Ministry of Health** **Private Bag 0038** **Botswana** **Tel: (+267) 3914467** **Fax: (+267) 3914697**

Section J: Investigator's Statement

INVESTIGATOR'S STATEMENT OF ASSURANCE

I promise to abide with existing relevant International Declarations and National procedures and guidelines when undertaking research involving human subjects within the Republic of Botswana and agree to:

1. Ensure that all studies conducted on human participants are designed and conducted according to sound scientific and ethical standards within the framework of good clinical practice.

2. Report to the Health Research and Development Committee any information requested, serious or unexpected adverse events and any information related to national programs.

3. Unless if an emergency treatment for patient care, obtain prior approval from the HRDC before amending or altering the scope of the project or implementing changes in the approved consent form(s).

4. Submit progress reports as required by the HRDC.

5. Maintain all documentation including consent forms and progress reports.

6. Ensure that all members of the research team are aware of their roles and responsibilities in this study.

7. Ensuring, in accordance with the duties outlined for each member, that all members of the team are fully utilized for tasks assigned to them.

Principal Investigator's Name:

Principal investigator's Signature: **Date:**

Principal Investigator's Position:

Local Investigator's Name:

Local investigator's Signature: **Date:**

Local Investigator's Position:

After Completion

1. **An electronic and hard copy of the report should be submitted to the Health Research Unit, Ministry of Health as well as other relevant Botswana Government Institutions/Organizations within 3 months of producing a bound report.**

2. **All continuing renewals should be submitted at least 6 weeks before the expiration.**

Section K. For Health Research Unit use ONLY.

1. Date Received	**6. Review Body [ ] Health Research Unit [ ] HRDC**
2. Final Outcome	
3. Ref No:	
4. Expiration Date:	
7. Continuing renewals extension **Date 1 _____** **Date 2 _____** **Date 3 _____**	
8. Final Report Submission **( ) Yes Date _____** **( ) No**	

Ministry of Health

Republic of Botswana

GUIDE - CONSENT FORM

Consent is a process involving the free interchange of information between the prospective subjects and the investigator. Informed consent must be sought under circumstances that provide subjects *(or their legally authorized representative)* sufficient opportunity to consider whether or not to participate and that minimize the possibility of coercion or undue influence. Researchers have the duty to ensure that the participants comprehend the information given. The verbal and written briefing of the participants must be in a manner, level and language that they understand.

A Consent form should at a minimum include the following information:

1. Title of study

2. Introduction

An introductory statement

3. Purpose of the study

A statement on what the research is for. What are the expectations? Etc.

3. Eligibility Criteria

4. Study Procedure

State whether procedure is experimental or not experimental, description of all procedures which will be followed and all treatments or procedures. It should state how treatment will be administered and include visit schedules etc. If the study is clinical, indicate study design i.e. Randomized Trial, Blind Trial, Case Cross-over or Placebo. State the approximate number of subjects to be involved in the study and the duration of the study.

4. Alternative Procedures

A disclosure of appropriate procedures or courses of treatment, if any that might be advantageous to the subject and their attendant risk and benefit. To enable a rational choice about participating in the research study, subjects should be aware of the full range of options available to them.

5. Blood tests

State if blood samples will be collected from subjects and name the types of tests that will be performed on the sample as well as the volume of blood that will be collected during each visit.

6. Risks and/or discomfort

This is a description of any foreseeable risk or discomforts to the subjects. If there are risks to participation, describe them for each procedure or drug. List all expected and occasional side effects. List all side effects, no matter how rare, that are life altering or potentially life altering. State if there are risks associated with the research. Describe more than minimal risks.

7. Handling of Research Related Injury

Describe how research related injuries would be handled by the researcher.

8. Benefits

A description of any benefits to the subject or others which may reasonably be expected from the research. If no direct benefit is anticipated, that should be stated.

9. New information

A statement that participants will be informed of any new findings which develop during the course of study that may relate to their willingness to continue in the study.

10. Costs to Subjects and Compensation

State any additional cost to the subject that may result from the research. State if there is any compensation to the participant.

11. Voluntary Participation

A statement that participation is voluntary (right not to participate) and that refusal to participate will involve no penalty or loss of benefits to which the subjects are otherwise entitled to.

12. Right to Withdraw

Subjects should be informed on their right to withdraw at any point in time and consequences of a subject's decision to withdraw from research. If applicable, describe circumstances under which the subject's participation may be terminated by the investigator without regard to the subject's consent (but subject must be informed).

13. Privacy, Anonymity and Confidentiality

Information on the extent of privacy, anonymity and confidentiality that will be provided to participants. This should describe measures to be used to maintain confidentiality of records and data pertaining to the subjects. A statement on institutions that will be allowed to review/inspect records should be included.

14. Future use of Information

The future possible use of the information and data obtained, including use as a database, archival research or recordings for educational purposes.

15. Storage of specimen

State the period of storage for specimens, where specimens will be stored, explain how you might use stored specimens in the future, blinded or unlinked, procedures for requesting withdrawal of specimens and what procedures will be followed for future use of these stored specimens.

16. Who to contact

Give contact details for
Information on the rights of the participants in the trial (Name of IRB representative)
Questions and Injuries related to study (Name of Researcher)

17. Statement of consent

Write a statement of consent, dates and signature of the participant and study staff member conducting consent.

MINISTRY OF HEALTH

REPUBLIC OF BOTSWANA

HEALTH RESEARCH & DEVELOPMENT COMMITTEE

TELEPHONE - (+267) 3914467

DATE RECEIVED: _____

REVIEW DATE: _____

CONTINUING REVIEW APPLICATION FORM

1. DATE:

2. PROTOCOL NUMBER:

3. PROTOCOL TITLE:

4. PRINCIPAL INVESTIGATOR:

5. ADDRESS:

6. TELEPHONE:

7. E-MAIL:

8. CO-INVESTIGATOR(S):

9. KEY PERSONNEL:

10. GRANT AWARDS TITLE:

11. SPONSOR(S) NAME:

12. STATUS: (PLEASE CHECK ALL THAT APPLY)

- ☐ Continuing
- ☐ Accrual complete with treatment intervention and/ or participant interviews /surveys continuing
- ☐ Subject interventions/data collection ended on (date): ____
- ☐ Open for analysis only. Expected end date: ____
- ☐ Complete (including all analysis). Date completed:____
- ☐ Cooperative Review
- ☐ Other, Please describe: _____
- ☐ Study never activated, closure requested-

(Submit this page only with PI Initial/date) _____ _____

PI Initial Date

13.SUBJECT INFORMATION:

a. Total approved sample size (of evaluable subjects):
b. Total enrolled during past approval period (excluding ineligible subjects):
c. Total enrolled to date (excluding ineligible subjects):
d. Enrollment breakdown to date by gender and race (excluding ineligible subjects):
d. Enrollment breakdown in past approval period (excluding ineligible subjects):
e. Total eligible subjects yet to be recruited:
f. Percentage of total enrolled to date who withdrew, were excluded, or otherwise were not evaluable subjects:
In past approval period:

14. OUTLINE GOALS OF STUDY: (a short description **must** be included)

15. DESCRIBE ANY UNEXPECTED OUTCOMES OR PROBLEMS (physical, psychological, social, or with the consent process or enrollment) EXPERIENCED BY SUBJECTS SINCE LAST REVIEW. **Serious Adverse Events, both expected and unexpected, must be reported in writing to HRDC immediately.**

16. WAS ANY SUBJECT WITHDRAWN OR DID ANY SUBJECT VOLUNTARILY WITHDRAW FROM THE STUDY? Yes ☐ No ☐ IF SO, DESCRIBE:

17. HAS THE COMMITTEE APPROVED ANY REVISIONS TO THE STUDY SINCE THE LAST REVIEW? Yes ☐ No ☐ IF SO, DESCRIBE:

18. DO YOU WISH TO REQUEST APPROVAL FOR ANY REVISIONS AT THIS TIME? Yes ☐ No ☐

- If you propose any change to the protocol, summarize the changes you propose, the reasons for them, and submit two copies of an updated version of your original protocol application, one indicating the proposed changes in bold or "track changes," and the other without bold or track changes.
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(Remember that no changes may take place until you receive HRDC approval, unless necessary to prevent imminent serious harm to subjects! However, you must report details to the HRDC)

19. SUMMARIZE YOUR FINDINGS FOR:
a. THE PAST APPROVAL PERIOD:

b. TO DATE:

20. ATTACH COPIES OF LITERATURE BY AUTHORS OTHER THAN YOU THAT PROVIDE NEW INFORMATION BEARING ON THIS STUDY'S RISK: BENEFIT ANALYSIS. Attached ☐

If, after performing a search in good faith, you believe there are none, check here ☐

21. ATTACH A COPY OF THE CONSENT FORMS (English and Setswana) YOU PLAN TO USE DURING THE NEXT YEAR, Attached ☐ N/A ☐

22. IF YOU DO NOT PLAN TO TRANSLATE YOUR CURRENT FORM TO SETSWANA, PLEASE EXPLAIN WHY? _____
_____

23. ATTACH A COPY OF ANY ADVERTISEMENTS OR RECRUITMENT MATERIALS YOU PLAN TO USE IN THE NEXT YEAR. Attached ☐ None attached ☐
Will submit as amendments ☐

24. ATTACH THE CURRENT, UNEXPIRED APPROVAL AND/OR REAPPROVAL FORM(S) FROM ALL OTHER INSTITUTIONS INVOLVED WITH YOUR STUDY.
Attached ☐ N/A ☐ From: _____

I certify that this protocol is being conducted in strict adherence to national and international guidelines on the protection of the rights and welfare of human subjects in research.

_____

Principal Investigator's signature **Date**

Self-Directed Learning Workbook 3:
Chapter Two
Qualitative Data Collection Methods

Interviews with key informants are one qualitative data collection methods

Chapter 2:
Qualitative Data Collection Methods

Estimated time needed for completion: 2 hours

Chapter Overview

In Chapter 2, we will review the most common qualitative methods in outcome evaluation and detail how to choose the right method to answer your questions. We will then detail the specific logistics, tool development, methodology, and data analysis involved in qualitative research.

Learning Objectives

At the end of this chapter, you will be able to:

- explain various types of qualitative tools and sampling techniques,
- describe logistical issues in qualitative data collection,
- identify three types of qualitative data gathering guides,
- identify the appropriate data collection methods for each of these three types of qualitative data, and
- describe analysis procedures for qualitative data

2.1 Introduction to Qualitative Data Collection Methods

This chapter will introduce you to a set of qualitative tools that can be used to gather data to help inform health care programmes. These tools will help you to gather data about who is involved and their perspectives to inform programme design or give you information on health care problems. Remember qualitative data collection methods can be used in combination with quantitative methods as described in Chapter 1 of this workbook.

2.1.1 Rationale for Using Qualitative Methods

Qualitative evaluation methods are designed to find out why people do what they do and how they are doing it. Specifically, the M&E officer uses qualitative methods in order to collect in-depth information on values, opinions, behaviours, and the social context of communities in a health district or of health workers in a clinic. In outcome evaluations quantitative methods are used to understand what kind of decisions people make about their health or a health system and how they came to make that decision; why people choose to participate in an intervention or programme or refuse to participate; and understand stakeholders opinions about the implementation of a programme or intervention. Qualitative methods can be used on their own or in conjunction with quantitative methods.

2.1.2 When to Use Qualitative Data Collection Methods

You will use qualitative methods to gain a better understanding of a problem or practice. Qualitative data gives you an in-depth understanding of a phenomenon particularly when you do not know what is happening, why, or how. You might use qualitative data collection when you would like to know more about a location such as individual clinic or district, a particular group of people such as nurses or pregnant women, or a community such as traditional healers in Tlokweng. Qualitative data collection methods will help you explore questions or ideas about what is going on in that particular context. For example, you find out that there is a problem with programme implementation in one district that succeeded in all other districts. Then, it is time to go to the village and talk to nurses, doctors and patients to find why and how this failure happened from their perspectives. You may also want to understand why and how success happened from the perspective of those in a successful district.

Examples of questions that require qualitative data collection methods are:

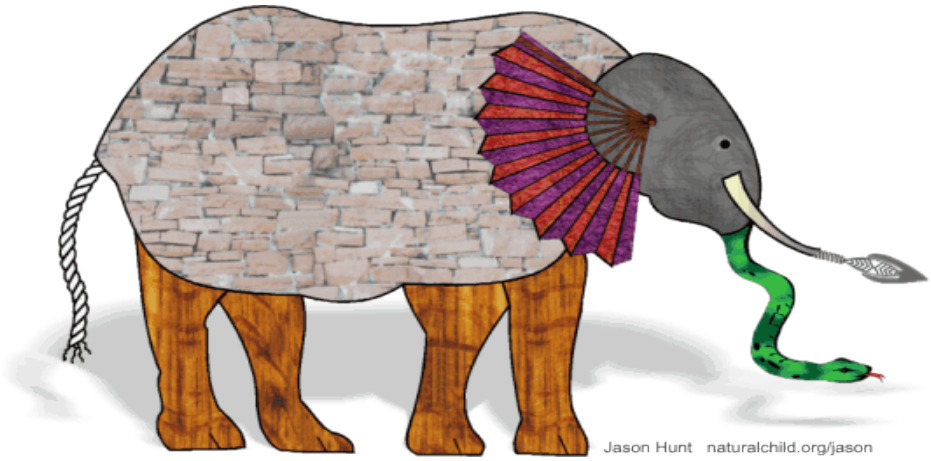
- **Why** do people in village X in your district prefer to seek care for HIV-related conditions from a faith healer?
- **Why** do men not seek HIV testing?
- **How** do girls between the ages of 13 and 18 cope with peer pressure to have sex?
- **What** do boys think about girls who do not agree to have sex?
- **How** do nurses behave with people living with HIV?

Look at the questions above again. These are questions about values, opinions, behaviour, or social context. Answering these questions will help us with prevention, treatment, or management activities.

Collecting views from different people, using different qualitative methods, can help you better understand the issues involved in your qualitative analysis. For example, if you were interested in why women in Chobe district did not give birth in a facility, you may have to ask the women themselves, the community leaders, the women's husbands, and other family members. Each type of person you ask will have a unique perspective on the issue and combining those perspectives will give you a deeper and fuller understanding of the reasons that women do not give birth in facilities. This example illustrates the point that different people have different views and bringing their views together will help us understand the "whole" issue.

The box below shares an old Indian story that helps to illustrate how putting together many different views will allow you to see a better picture of this issues that you are studying.

Six blind men went to visit an elephant, an animal that they had heard a lot about. One man began touching the side of the elephant and thought to himself that the elephant was like a wall. The second man began touching the tusk and thought the elephant was like a spear. The third picked up the elephants squirming trunk and thought the elephant was like a snake. The fourth wrapped his arms around the elephant's leg and exclaimed that the elephant was like a tree. The fifth was brushed by the elephant's ear, reached up and declared an elephant was a like a ladies fan. The sixth, at the back of the elephant, grabbed onto the tail and declared that the elephant was exactly like a rope. On the way back they got into a fierce argument about how to describe the elephant. Finally, they decided that the whole elephant could be described separately in all of these ways but was best described in together.



In the story, each blind man described a part of the elephant using their hands as tools. Putting their understanding together, you get a picture, or understanding, of the reality, the whole elephant.

It is important to understand different perspectives and different views so that we can design programmes or modify them so that they are likely to succeed. For example, in Gonotsoga, the data received by the M&E officer showed that women were not registering their pregnancies until very late. Read through the scenario in Learning Activity 2.1.2 and ask yourself who is involved and what issue or question is being asked in this health care setting. What are the possible solutions to the problem?

Learning Activity 2.1.2

Determining the Goal of Qualitative Data Collection

Directions: Read the scenario below. Answer the following questions based on the scenario.

Scenario:

In Gonotsoga, women would prefer to wait to register their pregnancy at the clinic until very late, 20 weeks or more into the pregnancy. The benefits of waiting were many; from the women's point of view, keeping the pregnancy as secret as possible was beneficial to the pregnancy; traditional birth attendants were able to monitor their pregnancy, and women were afraid of going to register only to find out that they were HIV+. From the medical point of view, before 20 weeks it was important to monitor the pregnancy and test the woman for HIV in order to provide the best care and assure that the woman and child were healthy.

1. What could be a concern, problem, or goal from the medical point of view?

2. Who needs to be involved in identifying the solutions?

3. What are possible solutions?

Discussion 2.1.2

Determining the Goal of Qualitative Data Collection

1. What could be a concern, problem or goal from the medical point of view?

The concern was that pregnant women were not registering with medical services until very late. The M&E officers in this scenario did a lot of exciting work to understand pregnancy decision-making. They asked who was involved with decisions during pregnancy, and they discovered it involved more than just the soon-to-be mother. Decisions included relationships with family and friends and the advice of traditional doctors and traditional birth attendants. They also knew that the clinic itself and healthcare workers were important in encouraging women to come for registration.

2. Who needs to be involved in identifying the solutions?

Understanding the influences on the decision-making process during pregnancy was important to the solution. The M&E officers conducted interviews with mothers, village leaders, and traditional doctors to try to find a solution that would make everyone happy. They also conducted observations at the clinic and spoke with many health care workers. They learned many things and worked with key informants to develop solutions. Principally they learned about women's fear of losing a pregnancy if it was exposed to early and preference for treatment by traditional healers because of their fear of HIV testing. They also learned that women were very hesitant to be seen at the clinic waiting in line to register.

3. What are possible solutions?

The M&E officers suggested trainings for the traditional doctors about the importance of early testing in pregnancy and ways to encourage women to register. They asked traditional doctors to encourage woman to register and have at least one visit before returning to them. They reviewed the clinic layout and attempted to make registration more anonymous so others would not necessarily know when women came to register for pregnancy versus another concern. The M&E officers also suggested training for community health workers, so that they would be able to encourage women to register their pregnancies without asking about, or revealing, the woman's pregnancy.

2.2 Qualitative Data Collection Tools for M&E Officers

There are many tools for qualitative data collection; here we will concentrate on three types of qualitative tools: observation guides, focus group guides, and interview guides. There are many other types of qualitative tools including life history analysis, community mapping, and direct participant observation. You can refer to your colleagues, World Health Organisation (WHO) resources, and the internet to learn more about them. We are focusing on the three tools mentioned because they are more feasible and not as time and resource intensive. Life history analysis and community mapping take a considerable amount of time and resources while direct participant observation requires that the researcher participate in the activities under study. This is often not possible. For example, HIV treatment, or maternal health would not be treatments or activities that most M&E officers could participate in. Therefore, observations, focus groups, and interviews are the most likely choices of tools to understand programmes and processes in your role as a district level M&E officer.

We will describe interviews, focus group, and observation tools and identify the advantages and disadvantages of each. Then, we will outline the key steps to prepare and conduct qualitative data collection and analysis. Also, we will provide some tips and techniques along the way that will help you in your work.

2.2.1 Choosing the Best Qualitative Data Collection Tool

Choosing the right tool or tools for your data collection will be directly related to the objectives of your study. So, it is important that you have taken the time to figure out what you want to learn about the programme or activity that you have been tasked to monitor and evaluate. You may use any combination of these tools, but you should be able to justify your choices since each tool has specific benefits and drawbacks.

Interviews

Interviews are the practice (and art) of asking participants questions about a programme, policy, or problem in health. Interviews are tools where, in a systematic manner, you use a set of questions to ask several people for their experience or perspectives. Here, we specifically refer to open-ended interviews, where the questions are general enough to allow interviewees to express themselves fully and in a manner that suits them. These are often also referred to as *in-depth interviews* because they attempt to gather information in depth rather than record short answers to specific questions. These types of questions avoid one-word answers and encourage the participant to detail stories and examples. You will write or record their responses, and as an indication of their level of comfort with the subject, you may note their body language during the interview. Interviews capture personal opinions, perspectives, and experiences.

Open-ended interviews are best used when you need detailed information on individual opinions or feelings about a process or programme, particularly if the topic may be sensitive or painful for the interviewee. For example, if you wanted to determine factors that led to infant mortality you may need to interview mothers who infants passed away. This would lead to some distress for the mothers, and they may not feel comfortable showing their distress to others in a group setting. Interviews also are useful when you need the opinions of a broad range of stakeholders involved in a process, or with specific roles in implementation of a programme or intervention.

The advantage of open-ended interviews is that you can gather information from a few (6-12) interviews who are experts on the topic; however your interviews should be broad and lengthy to make sure that you have gathered complete information. This small sample size is both an advantage and a disadvantage. By conducting interviews with a small sample your interviews can be detailed, lengthy, and gain in-depth information about the subject under study. It can also be a disadvantage because you are not getting everyone's opinions and insights. In addition, data generated from interviews can take longer to analyse and require more analytic sophistication than other methods. However, the key aspects of sampling in interviews is that you use a few people to find all possible information, stopping when you feel that others will not be able to tell you anything new. This is called *saturation*.

Once you have gathered information from interviews you can analyze the results and use them to build a theory and then transfer the theory that you developed to other populations.

For example, using Gonotsoga pregnancy registration as an example, you conducted interviews with 6-12 women who had just given birth and you found that almost all of them spoke in-depth about their fear of pregnancy exposure, the preference for the traditional doctor, and their fear of HIV testing. You could then use this information to develop a theory that if pregnancy exposure at the clinic was minimized and traditional doctors encouraged registration for HIV testing; many more women would register at an earlier stage in pregnancy. You could then use this theory with other populations.

Focus Groups

Focus groups are another important qualitative method. Focus groups are conducted by bringing a small group of people together to ask them a set of questions about a programme, policy, or problem. The goal is to have participants interact with each other and discuss the topics together. The answers may not be

shared by everyone but it may bring out other opinions within a group setting that individual interviews would not.

Focus groups are best used when seeking group opinion or trying to group norms about a topic. Focus groups allow for a broad range of views on specific topics. Focus groups are also useful when working with the community or patients to understand the motivation and reasons behind quantitative indicators or determining factors in a needs assessment. For example, if there is a district that consistently shows that men do not get HIV testing as frequently as in other districts with similar populations, you could gather together separate groups of men, community leaders, and health care providers to explore why men do not get testing in that district.

Focus groups typically have between 6-12 participants; therefore it is easier to collect a significant amount of information in a short amount of time. However, participants in focus groups have to feel comfortable sharing their views with one another.

In the Gonotsoga example, women may not speak openly with other women about their pregnancy. Therefore focus groups would not be an ideal way to gather information from women. However, health care workers are likely to share their experiences in a group and therefore good information could be gathered from conducting a focus group with Gonotsoga health care workers. It is important to keep in mind that focus groups should not include members who are in a hierarchy to one another for example by age or seniority and ideally the participants should not know each other. Heirarchies and social differences may inhibit some participants in the focus group from talking openly; instead they would defer to others opinions.

For example, often focus groups will separate men and women when addressing issues of gender and sexual behaviour. In addition, placing nurses and doctors in one focus group can sometimes lead to the conversation being dominated by doctors and little participation from the nurses.

Observation

Observations are the act of closely watching what is going on in a specific setting or situation. You observe who does what, who talks to whom, and what happens when people interact with each other or do not interact with each other. Observations are either participatory or non-participatory. *Participatory observations* are where the evaluator participates in whatever activity is being observed. *Non-participatory observations* are where the evaluator does not participate in the activity but instead is a passive observer.

An example of participatory observation in our Gonotsoga example would be observation at the clinic queue. You, as an evaluator, could queue up with others, including women who are waiting to register, and observe wait time, privacy, patient discomfort, and other factors that may be important in women's decisions to register. In this case you are participating in the queue.

An example of non-participatory observation, in this case, could be accompanying community health care workers on their rounds and observing the conversations of the community health workers and woman in Gonotsoga.

To conduct an observation, you enter a setting with a list of things you want to observe or watch out for and take notes on what you see. For example, you may find that, in an observation of an out-patient waiting area, the female triage nurse was comfortable talking to women about possible sexually transmitted infections (STIs) but never brought up possible STIs with men. This led to many more women than men being sent to STI clinics and receiving HIV testing.

Reflection

Take a moment and consider the following:

Think about who you are and how this may impact the qualitative research you do as an M&E officer.

- What would you consider when planning to do a qualitative study in a health district?
- Ask yourself where you come from, how old you are, your gender, do you have a university degree, etc.

These personal characteristics will influence how participants see you when you visit the health district.

Developing trust will help to make data collection easier.

Observations are best used when the researcher would like to determine reasons and processes that would be difficult for one person to articulate. In the example above, answers from interviews with the nurse and the patients may not contain anything about the nurse's discomfort with talking to men about sexuality. However, a quick and focused observation makes it clear that it is an important factor in low male HIV testing rates. If you were to study the flow of patients through a clinic, or the relationship between a provider and their patient, interviews with separate parties may not give you a full picture of what is occurring. Observations are used for naturally occurring behaviours in the usual context.

Observation can be used alone or it can compliment other qualitative methods. Interviews and focus groups sometimes only collect information on what the participant thinks happens or thinks should happen. If you add observations to interviews and focus groups, then you can compare ideal behaviours with real behaviours. The drawbacks to observations include the fact that the presence of an observer may influence 'normal' processes, a single observation may not be sufficient and it may be necessary to conduct multiple observations to discern patterns, and the inability of the observer to adequately understand emotions or motivations.

You as a Subject

Yes, you may serve as a subject in qualitative research. This means that who you are as a person will impact what kind of data you collect from participants. Since qualitative research involves interactions with people, it takes time to develop enough trust with your participants to get the most accurate information from them about a health issue. Therefore, your age, race, ethnicity, class, and gender influence

how participants see you initially. Similarly, the age, race, ethnicity, class, and gender of your participants influence how you see them.

As human beings, we carry a lot of pre-conceived ideas about groups of people that may influence both how we ask questions and how we interpret answers to these questions and the data we collect.

For example, if you are a man interviewing women about their sex lives, then the answers you will get may be different from a woman interviewing other women about the same issue. However, if you are a man interviewing men about their sex lives, then you may get more complete answers than a woman would if she was interviewing men about the same issue.

Just you being you can have ramifications for qualitative data collection. This might mean that it may be more difficult for you to elicit the information you are seeking, alternatively, who you are might create an alliance that allows you access to information that others cannot get. So, before you begin data collection, there are two things that it is important for you to keep in mind: 1) who your participants are and 2) what you need to learn from them. If you need to ask both men and women about their sex lives, then a team of interviewers with both men and women would be the best approach when going into a health district to do the study. That way, you can have women interview women and men interview men. However, sometimes an interviewer of the opposite gender can get better responses from a participant than someone of the same gender. It all depends on the context and comfort of the participant with you as a researcher and your comfort with the topic (for example, sex) and with the type of participant (for example, sex worker). Being aware of your own prejudices will help you to counteract them.

Figure 2.2.1 Qualitative Methodology

	Appropriate For	Strength of Method
Focus groups	• Identifying group norms • Eliciting opinions about group norms • Discovering variety within a population	• Elicits information on a range of norms and opinions in a short time • Group dynamic stimulates conversation, reactions
Interviews	• Eliciting individual experiences, opinions, feelings • Addressing sensitive topics	• Elicits in-depth responses, with nuances and contradictions • Gets at interpretive perspective, i.e. the connections and relationships a person sees between particular events, phenomena, beliefs
Observations	• Reveals actual practice rather than ideals • Provides context • Addresses social interaction and practices	• Very dependent on the skill of the observer • Analysis takes time • Can be intrusive • Takes more time • Multiple observations with different participants is key

Source: ITECH 2007

2.3 Selecting Participants

2.3.1 Participants

The definition for a participant is any person from whom you would like to gather information, such as perspectives on a particular programme or activity. Identifying who you would like as a participant depends on the question that you would like to answer. For example, if your study question is about doctors' perspectives on childbirth decision-making, then your participants should be doctors. But, if your study questions in about doctors and patients on childbirth decision–making, then your participants will include both doctors and pregnant women. Further, you will want to know which doctors and pregnant women. Where are they located and when are they there? Is it all doctors in all districts, or are they in only one district? If you start with a SMART study question than determining the participants should be fairly straightforward. Once you have defined your criteria for a participant, then you can consider your sampling method.

2.3.2 Qualitative Sampling

Qualitative information does not have to answer questions about 'how many' or 'how much'. These questions are better addressed through quantitative methods that will be discussed in the next chapter. Therefore, sample sizes do not need to be calculated for significance like they do in quantitative methods. Generally fewer participants are needed to answer qualitative questions like why and how. Sometimes you are able to answer your evaluation question with five in-depth interviews and sometimes you will need fifty participants to get a full range of answers to your evaluation question.

The reason that qualitative data collection methods do not use sampling equations is because significance is measured through data saturation in qualitative methods. *Data saturation* is the point at which further interviews are not adding to the findings or are simply repeating what was already found in the previous interviews. For example, if interviews were conducted with women in Gonotsoga and after eight interviews, you were getting the same information about fear of testing, fear of revealing pregnancy, and faith in traditional birth attendants; you would want to conduct perhaps two more, to make sure that there were other areas not explored. Without further information you would conclude that you had reached data saturation and that you had documented the main reasons for late registration of pregnancies. While every person is different, you are looking for these commonalities between participants.

While the number of participants you select is often dependent on data saturation as the evaluation proceeds, there are five basic sampling techniques to ensure that the data you collect is able to adequately answer your research question:

Purposive Sampling:

In a purposive sample, the aim is to deliberately select participants based on the characteristics that are relevant for your evaluation. For instance, to collect information in the Gonotsoga decision-making intervention described earlier, you may choose to interview women of childbearing age, the traditional birth attendants, nurses, doctors, and community leaders. This would give you a selection of the types of people that are likely to have information on this subject.

Key Informant Sampling

Key informant sampling is a type of purposive sampling where you target specific people who have the most in-depth knowledge about the subject. These do not necessarily have to be the target group for the evaluation. For example, in the case of pregnancy registering you could contact the traditional birth attendant who is most active in the community, a woman who runs a support group for pregnant women, and a community health worker who is particularly concerned about registration.

Theory Based Sampling

Theory-based or theoretical sampling is the process of including participants based on the theories that are emerging from your ongoing analysis, and based on your need to 'test' the different theories that are emerging. In the Gonotsoga example, you would begin with initial interviewees, for example, mothers-to-be. Based on your findings from interviewing these women, you may begin to include traditional birth attendants and community health workers in your sample. As you begin to think that these are the most influential people in registration decisions, you may seek to find specific examples of when this is not the case. In theoretical sampling, the idea is to keep collecting data until no new data emerges. This is called "sampling to saturation."

Tree Sampling

Tree sampling, also called *snow-ball sampling*, is a technique by which you start one interview and then allow that participant to refer you to another participant for another interview, and that participant refers you to another participant, and so on and so forth, like branches on a tree. The disadvantage to this method is that the data you are gathering may be specific to whom you were referred to, which may only be people only in one specific community. This could pose a problem if you want to interview a particular community or group of people, but you are never referred to anyone on that community. Therefore, it is important to keep in mind groups of people that could be excluded and attempt to gain entry into this group.

Convenience Sampling

Convenience sampling is often used in mapping out systems when there is little budget for qualitative methods, or when there is a clear but unsystematic pool of participants. This method is often used when you are under time constraints that do not allow you to contact study participants beforehand. For example, if you arrive to a study site and you must conduct interviews, observations, and focus groups with only those who are willing and able at the time. The disadvantage to this sampling method is that you are limited to those who are there at the time and may limit the different perspectives other people, not present, may have.

Exercise 2.3.2

Putting Tools, Participants, and Samples Together

Directions: Think through how you would apply what you know so far about choosing data collection tools, participants and sampling methods using the scenario outlined below. First, identify what the M&E officer needs to do in this case. Then, try each type of sampling method after you identified the participants and consider what tool or tools will work best for this case. If a tool doesn't work, why do you think so? If a sampling method does work, why do you think so? Weigh the pros and cons of your decisions.

Recall the Gonotsoga example of late registration for pregnant women:

In Gonotsoga district, based on M&E data, the Ministry of Local Government (MLG) determined that late registration was a significant problem. An intervention was designed to get more mothers register by offering them a registration kit that included a baby jumper, soap and a blanket. You have been given a chance to talk to registered mothers, pregnant women in the community, maternal and child health (MCH) nurses, and the MLG staff who designed the intervention.

Determine who you would include as participants for interviews, observations and focus groups and why.

Interview participants:

Observation participants:

Focus Group participants:

Discussion 2.3.2

Putting Tools, Participants, and Samples Together

The M&E officer is tasked with understanding how the intervention is working in the district from the perspective of those who helped design the intervention for the community.

Here are ways to think about participants and qualitative tools used in this study:

Registered women:

Participation of registered women could be achieved through focus groups. Observation does not need to be conducted because they have already registered. However, some observation could be conducted on the types of women who are in the queue to register. Focus groups would ask for information about why women chose to register and what factors influenced this decision.

Pregnant women in the community:

Pregnant women in the community may be too concerned about revealing their pregnancy to be able to feel comfortable participating in a focus group. Interviews, in this case, would be more indicated. Interviews would gather in-depth information on each woman's concerns and reasons for late or early registration.

MCH nurses:

Information from MCH nurses could either be collected by focus group or interview depending on how many nurses worked at the facility and the logistics of running a focus group. If few MCH nurses work at the facility then individual interviews would be indicated. If there are many MCH nurses at the facility and it is relatively simple for them to meet at the same time, a focus group could be used to gather information about the intervention.

MLG staff:

Gathering information from MLG staff involved in the intervention would be best achieved through individual interviews. Most likely different staff would be involved in different aspects of the intervention process and individual interviews would allow them to focus on their specific aspect, giving you more information about the process as a whole.

2.4 Qualitative Guides

So, now that you know your study questions, participants, sampling method, and research tools, the next step is to determine what you are going to ask and observe so that you can answer your question. The next step will help you to identify interview and observational protocols.

2.4.1 Guides

The word guide has many uses depending on the context. In qualitative research, a guide refers to the interview and focus group questions as well as the observational goals. These guides are used by the M&E officer to collect data in order to answer a particular question(s) and prevent the collection of unnecessary data that may not inform the programme, policy, or intervention.

When developing qualitative data collection guides you need to keep in mind the information presented in previous section of this chapter. Keep guides simple and focused on the objective of the study while keeping the research question in mind. Continually ask if the question will inform your work as an M&E officer who is tasked to study a programme, policy, or intervention. Interview and focus-group guides are designed similarly and observation guides provide a map for your time in a particular context.

TIP:

It is important to pilot your qualitative guides. Piloting refers to testing your interview questions, observation plan, and focus group structure in order to work out any misunderstandings, clarify questions, and figure out logistics at the site. You can test your interview questions with someone in the office or community member. If possible, it is important to visit the observation sites beforehand to get a sense of the context, such as who is there and building design. If you cannot visit a particular site beforehand, visit a similar site if you are unfamiliar with a particular clinic setting.

Interview and Focus-Group Guides

Qualitative interview guides can be structured, unstructured, or can employ both techniques. In unstructured qualitative tools you may have only a list of topics that you would like to cover or one or two main broad questions. For example, in the Gonotsoga, scenario, you may have a guide for interviews with pregnant women that include: stages of pregnancy, concerns during pregnancy, steps taken to ensure a good pregnancy, thoughts about registration, ideas on when or if she would register, possible benefits of registration, possible drawbacks to registration.

In structured tools you would develop guiding questions and probing questions and may even write "uh huh" or "tell me more" in your guide to remind yourself to probe deeper.

Example: In the Gonotsoga scenario, one of the areas in your un-structured tools would be filled in with probing questions. For example, "steps taken to ensure a good pregnancy" could include specific questions:

Steps taken to ensure a good pregnancy:

- What kinds of specific foods or medications are important?
- What kinds of practices are important?
- Who is it important to tell and why?
- Who is it important to hide it from and why?
- What is the role of the traditional birth attendant in your pregnancy?

These questions are called probes. When starting out with qualitative methods it is a good idea to structure your tools so that you remember to cover all the topics that are important to the evaluation, and have probing questions in case you get stuck. As you get more comfortable with qualitative methods some of the probing and question development may become spontaneous in the interview or focus group and your guides can become less structured.

Observation Guides

An observation guide is a guide of what you want to view and take notes about while you are in a particular context. It tells you what to be sure to look for in the setting so that you do not miss key information, interactions, or processes that will inform your work as an M&E officer. When you are observing a setting with a lot of activity where people must conduct complex tasks or navigate a system to ensure care, it is easy to miss something by getting distracted. Therefore, an observation guide helps you to note steps in a patients flow through a clinic, for example. An observation guide can be structured, unstructured, or both; it may include an established form, or not, that lists the steps that must be observed. During observation, you must take notes of what you see, hear, and experience. So, what you focus on in your observation must inform the question you are asking as an M&E officer. If you are observing who checks in pregnant mothers, then it is important for you to observe that process rather than when pregnant mothers leave the clinic to go home.

An example of an observation guide for registration in Gonotsoga may look like the following:

To observe during clinic queue:

- structure of the queue,
- physical space for waiting,
- wait times,
- body language of women waiting,
- types of conversations in the queue, and
- interaction between patients in the queue and health care workers.

Using a guide will help you to collect the best and most relevant data for your role as an M&E officer. Also, the design of the interview, focus-group, and observation guides gives you focus when you are in the field. Since qualitative data is dependent on getting information from people, there some essential techniques to master for your work described below.

2.5 Techniques for Gathering Qualitative Data

All qualitative methods require patience and flexibility since the implementation of qualitative methods is often loose and unstructured. In the example of interviews above, it is important to pay close attention so that, if an area of inquiry was already covered, you do not ask it again. For example, the interview asks about "steps to ensure a good pregnancy". If right at the beginning the participant mentions traditional birth attendants, you should be flexible and skip to the questions about traditional birth attendants with the participant and then omit those questions further in the interview.

It is very important in interview and focus group to let the participant lead the conversation. If the conversation gets off track you can ask if you can come back to that theme later but say that you would really like to know about something else. Types of questions, the style of the questions, language, and literacy all become significant factors to consider when using qualitative methods. In general you should avoid yes and no questions, ask factual questions to establish a base before asking opinion questions, and begin with easier questions before moving on to more sensitive questions.

TIP:

Time determines research. If you have been given two weeks to collect your data, then you will need to plan accordingly with the appropriate number of interviews, focus groups and observations. Remember that qualitative research generates a lot of data in text, audio, and visual format that you will need to prepare for analysis. For example, one 40 minute transcript can take 2-4 hours to transcribe. If you conduct 20 interviews, that is 80 hours of transcription before you can get to analysis, and this does not include the other data sources you will be collecting. Therefore, research must consider the amount of time you have to be in the field collecting data as well as when you are expected to submit a report.

2.5.1 Types of Questions

There are various types of questions and not all of them are appropriate to qualitative methods. We will identify both good types of questions and bad types of questions here. The aim of qualitative methods is to secure rich, in-depth information without the influence of the researcher's thoughts or actions.

TIP:

One of the most important qualities in a good qualitative researcher is humility. You, as a researcher, are there because you do not know something and your participants can help you find it out. By entering the conversation with humility, gratitude, and a clear sense that you do not have the answers, participants will be more willing to open up and help you find them.

Open-Ended and Closed-Ended Questions

Open-ended questions are generally an excellent type of question. *Open-ended questions* do not have fixed responses nor do they lead a participant to answer with only a single word (yes or no) or a short phrase. *Closed-ended questions* are the opposite, questions that only allow for or encourage fixed responses. Closed-ended questions often give very little useful data. For example, we know that women have complained about the time-schedule of the hospital.

Two examples of a *closed-ended* question would be:

"What is the best time for the hospital to open?"

"Do you know about the clinic's services?"

These questions are closed-ended because there are only a limited range of hours or periods in the day that can be indicated. It encourages the participant to answer with a short answer "at eight am" or "early in the morning".

By contrast *open-ended* questions could be:

"What do you think about the hospitals hours?"

"Please describe the clinic's services"

These questions have a multitude of answers and will probably elicit richer information. Closed-ended questions can be used but they should be used as probing questions that follow open-ended questions.

Probing

Probing adds more detail to the main questions or topics in the guides to interviews, focus groups, and observations. These questions are follow-up questions designed to stimulate further conversation and guarantee that certain sub-topics are covered in the conversation.

A probing question intended to support the primary question, "What do you think about hospital hours", might be:

"What about on weekends or holidays?"

"Does your opinion about the hospital hours depend on what sector of the hospital you have an appointment?"

"Why are these hours so difficult?"

Probing questions can also be general and used as a reminder to move the conversation to a deeper discussion.

Examples of general probing questions are:

"Would you give me an example?"

"Would you explain that further?"

"How did that make you feel?"

Probes include questions or statements that can be used to elicit further information in a casual and conversational manner. These can include:

"I'm not sure I understand what you're saying"

"Is there anything else?"

"Does anyone else want to add to this?"

By asking probing questions you can ensure a smooth flow of conversation and by writing them down ahead of time you can make sure that you are focused on the conversation flow rather than worrying about what question to ask next.

Other Verbal or Non-verbal Communication

Confirmation that you are listening, such as saying "uh huh", or "ok" are also important to keep the conversation flowing. In addition, silence is a good tool. Leaving periods of silence in the conversation often forces participants to elaborate without the necessity of more questions. These are skills that have to be developed over-time. A good qualitative evaluator should always keep in mind ways to elicit more information from focus groups and interviews by keeping engaged with the participants.

Leading Questions

Leading questions are questions that influence a participant to respond in a certain manner. They often include judgement words in the question such as "good", "bad"

etc. Leading questions can be detrimental to your data because you do not get true responses but rather responses influenced by your very questions. Using the example above a leading question might be:

"What are the worst things about the hospital hours?"

This question already leads the participant to think that there are bad things about the hospital hours and they have to make something up even if they feel that there is nothing bad in order to answer the question. A non-leading question might be:

"What has been your experience with hospital hours?"

By asking the question in this manner it does not assume that there are problems with hospital hours and it gives the participant a chance to respond to the question even if they feel that there are no problems with the hours.

Indirect

Indirect questions can be important when asking about sensitive topics or easing into sensitive topics. Often people feel uncomfortable talking about their own relationship or feeling about a sensitive subject but are able to articulate what others feel. These types of questions can also be used if your position (or assumed position) in the facility, district or community would make it difficult for participants to give you personal examples of conflict or dissatisfaction. For example, if you are studying a new programme that shifts responsibilities from nurses to lay counsellors and you are concerned about their relationship a direct question would be:

"Can you describe your relationship with nurses?"

An indirect version that does not put participants on the spot might be:

"What are the relationships like between lay counsellors and nurses?"

As we have seen, the types of questions you ask, including other verbal or non-verbal communication, can have a huge impact on the flow of the conversation. In addition, it is important that the language, reading level and style of the questions fit with the participants.

2.5.2 Language and Level of Questions

The language used during interviews and the style and level of the question are extremely important when using both qualitative and quantitative methods. Translation difficulties, literacy levels, and taboo or shocking words, often lead to discomfort and frustration on the part of participants and impact the quality of the information that is received.

Literacy Levels

As stated previously, the literacy and level of complexity of your questions is extremely important for putting your participants at ease. Where possible use questions without jargon, academic words, or clinical concepts when you are not absolutely certain that the participants will understand them. If there are terms that need to be used and you are uncertain is the participants understand them; ask.

Here are examples of the same question asked to someone with a high, medium, and low literacy level:

> *"What are the mechanisms for transmission of the HIV virus?*
>
> *"Can you explain to me the various manners in which someone can contract the HIV virus?"*
>
> *"What are some ways people can get HIV?*

If you ask the first question and get a blank stare from your participants you can ask them "do you know what I mean by mechanisms?" or you can simple change the word and ask the question in a simpler manner.

Language

Taboo words and shocking subjects should not be ruled out in developing research. Sometime the use of the words and information about these subjects is important to the research question and can yield rich information. Employing these words and asking about shocking subjects, however, should only be done once a relationship has been established with the participants. If there is open and honest communication happening about a not-so-controversial topic, and participants are relaxed and comfortable, then the researcher can ease into these topics. In addition, humour or personal openness can often help participants feel at ease.

For instance, asking this question to participants:

> *"Can you describe the type of anal sex that you engage in?"*

This type of question may lead to silence, discomfort or very clinical answers. Asking a different question, with humour, such as:

"Who here can describe the wildest type of anal sex?

"What is the wildest type of anal sex that you have heard of?"

Then probing with questions about how prevalent these practices are and what some other, more benign, practices are can allow both humour and informality into the interview.

Learning Activity 2.5.2

Interview Questions

Directions: Review the questions below and change them to be more appropriate for an interview.

1. What has been your experience in working with clients who may have been victims of domestic violence?

2. Do you think health service providers who suspect that a client was a victim of intimate partner/conjugal or sexual violence would actually ask their client about it? Why wouldn't they?

3. Do you believe you should help a woman who was a victim of violence? Why or why not?

4. What usually happens with a woman comes into a health facility with injuries or after a rape? What kind of violence-related services would she find? What type of service provider would assist her?

5. What situations would make it difficult for you to treat a woman?

Discussion 2.5.2

Interview Questions

1. What has been your experience in working with clients who may have been victims of domestic violence?

Answer: Domestic violence is a term that many might not be familiar with. It is better to ask about violence in the home or between loved ones. In addition, it may be important to detail what you mean by violence. Participants may not included slapping and pushing as violence, instead focusing on punching, biting, and other forms of violence that leave signs.

2. Do you think health service providers who suspect that a client was a victim of intimate partner/conjugal or sexual violence would actually ask their client about it? Why wouldn't they?

Answer: This question also contains language that may be hard for a participant to understand and definitions that are not entirely clear. In addition, it is leading the participant by implying that it is wrong not to ask about violence. A better question might be. "When there are signs of violence, like hitting or punching, on someone in intimate areas, would health care workers feel comfortable asking that person? Why are the reasons why or why not?"

3. Do you believe you should help a woman who was a victim of violence? Why or why not?

Answer: this question puts the participant in a position of defending their actions. They may either become uncomfortable in the interview or tell you what they think that you would find appropriate rather than what they would actually do. This could be re-structured, "Are health care workers able to help women who are victims of violence? Why or why not?

4. What usually happens with a woman comes into a health facility with injuries or after a rape? What kind of violence-related services would she find? What type of service provider would assist her?

Answer: This series of questions narrows the answer to the first question rather than expands on it. It is important to ask one question at a time (sometimes with why or how after it) and then list out other questions as probes.

What usually happens when a woman comes into a health facility with injuries after a rape?

--Who does she see? And after that?

--What services is she offered? And after that?

5. What situations would make it difficult for you to treat a woman?

Answer: this question is very vague and can take the conversation away from the objective of the interview. Instead it could be changed to a series of more specific questions:

"What are the main causes of discomfort between a woman and her provider?

"When a woman would be uncomfortable getting treated here?"

"When would you be uncomfortable treating a woman?

Translation

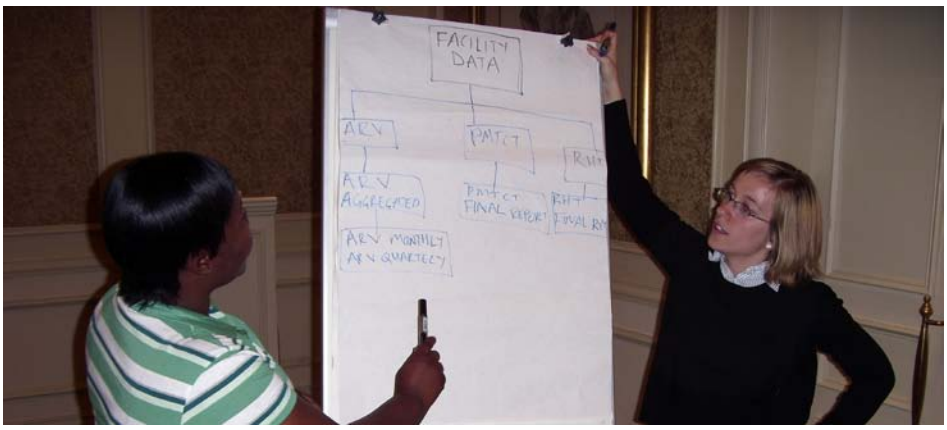
In many setting the researcher and the participants do not speak the same language, or the participant may understand the researcher's language, but does not feel as comfortable answering questions in that language. The use of translators is essential in this situation but there are a few keys things to keep in mind:

- Clear explanations should be given to the translator about their role. They should understand that they should not condense or change the participant's responses or attempt to "explain" the participant's answers to the researcher. Instead they should, as much as possible, provide a word-by-word translation and allow the researchers to follow up with additional questions if they do not understand.

- These same explanations should be given to the participants so they understand clearly how the interview, focus group or observation will proceed.

- Translators should be provided ahead of time with the interview, focus group, or observations guides and be given a chance to clear up any ambiguity in how they would translate key questions, or ask for explanation for words that they do not understand. Often a clear word in one language has multiple meanings in another.

- The translator and researcher, if possible, should pilot the guides and work out any issues in their roles. In addition, debriefs should be conducted after the sessions to allow either the researcher or the translator to clear up any doubts or concerns.



2.6 Data Collection and Management

At this point, you have identified your participants, chosen your sampling method, qualitative tools, and developed protocols to collect the data you need to answer your question. You are now ready to go into the field to gather data. This is the most exciting part because you get to collect data that will be analysed to inform programmes, policies, and interventions. Also, it provides you the opportunity to meet and learn from a new group of people that you are serving. This step of data collection and management requires you to monitor your research closely since there are legal issues and methodologies to be considered. These are described below.

> **TIP:**
>
> Do not forget to bring your interview, focus-group and observation guides with you in the field. These can be typed up on paper. Also, bring along a notebook to take notes during and after you completed a task. This will help you remember what worked and did not work at that time, or inform M&E practices in your organisation. Even if you are make audio recordings it is always important to have additional notes and back-up information in case something goes wrong with the recording.

2.6.1 Pre-Analysis Methodology

Whether you choose to develop structured or unstructured guides, your plan for the analysis of the information received should be thought about ahead of time. Later in this workbook we will discuss qualitative analysis but there are a few things that are necessary for any data analysis plan.

Teams:

> **Tips for working with teams:**
>
> - Explain to each member of your team and their role to the participants.
> - Assure participants that each member has to abide by the same ethical and privacy considerations that you abide by.
> - Practice in your team so that you each are comfortable in your roles.
> - Do not allow team members to get up and leave the room during the interview. If it is not possible for all participants to arrive at one time for a focus group, be sure to designate someone to greet the participants, consent them and integrate them in the group without disruption to the conversation.

Good qualitative data collection often requires the use of teams of evaluators. Teams of evaluators either divide up tasks in the data collection process or, if covering

multiple sites, divide the sites for more efficient collection. Team members generally include:

- Evaluation coordinator: this is the person responsible for the field implementation and training of team personnel. This is the manager of the study process and lead evaluator. They will be responsible for supervising the other members of the team and assuring that good, quality information is being recorded and the logistics are running smoothly.

- Team lead: if the evaluation includes multiple simultaneous sites, each team should have a team lead who is the manager of that team. This person is responsible for carrying out the study as the evaluation coordinator has designed it and should keep in regular communication with the evaluation coordinator.

- Evaluation assistants: evaluation assistants are often responsible for note-taking, data entry, or may have specific tasks in a focus group such as the time-keeper. Focus groups, because of the amount of data collected and difficulty of simultaneously leading a conversation and note-taking, should at least have a note-taker so that the flow of the conversation is not interrupted during note taking. Ideally, a focus group should have time-keeper to make sure that there is time to cover all topics. The evaluation assistants should serve in these rolls. Their job should not be passive but rather they should ask for clarification if they are not able to understand a participant for note-taking and signal the lead evaluator if time is running short.

- Logisticians: logisticians are responsible for assuring the smooth functioning of data collection and organisation. Logisticians are responsible for assuring that the right participants are at the right place at the right time, they should be familiar with the equipment for data collection and data organisation systems, and help ensure that everything is tested and well organised. Logisticians also are responsible for travel details, purchasing, financial management, and participant compensation.

- Transcriber: generally, for beginning qualitative researchers, it is important to have whole interviews or focus groups transcribed if they were recorded. Transcription is a process where everything said in an interview or focus group is written down. It is important in this process to also include pauses, and non-verbal communication that was noted by the note-taker, because this can give you important clues about participants comfort or agreement with what they are saying. For instance, in a focus group you may ask about violence in couples, and all the women hesitate to answer and then one woman answers that it does not happen in their community and the others roll their eyes. This kind of communication may be more important that words and should be captured when the focus group is transcribed. Transcription is a long process and requires fast typing skills and patience.

The teams involved in one-on-one interviews, focus group and observations vary. With one-on-one interviews the goal of the team should be to not overwhelm the participant. In observations the goal should be that the team members not stand out or get in the way of the routines that your are observing.

Code Books

When you analyse qualitative data you will want to begin by determining what broad areas information belongs in. Areas of interest, or themes, are called codes. Codes are a way to organise information into important topics so that similar information can be analysed together. In the case above, violence against women is one broad category. Other interviews may include discussions of violence from a spouse, from neighbours or from teachers. If you are interested in describing all types of violence that a woman may face you may want to "code" or mark passages like this, that refer to violence, with the code "violence". Alternatively, you may want to specify specific kinds of violence; verbal violence, physical violence, economic violence.

Developing a code book is the process of listing out all the topics that you would like to analyse and then giving them a definition so that there is little confusion when analysing the data. In this instance the code violence may look like:

> *Violence: reference to any violence against a woman. This includes spouses, boyfriends, neighbours teachers or any other authority figure. It includes verbal insults, physical violence, and the use of money or economic conditions to control women.*
>
> *Verbal violence: reference to any verbal violence against women. This includes verbal insults, belittling comments, or embarrassing comments.*
>
> *Physical violence: reference to any physical violence against women. This includes hitting, tripping, smacking, biting, or any other act that causes physical harm to women.*
>
> *Economic violence: reference to any economic violence against women. This includes withholding necessary money or goods, demanding demeaning or violent services for economic goods, or threatening to withhold economic goods if there is any protest against violence.*

Typically, you can develop a list of codes before you go into the field to collect data. As you collect data and then analyse it, you may refine your original codes, add new codes, or get rid of codes that you find are not relevant to the evaluation objective.

Data collection

The manner in which data will be collected should be identified before the evaluation begins. This is so that you can have trainings, consent forms, and data management policies that apply specifically to the type of data you collect. The main forms of data collection are done via written notes or audio-video recordings. While audio and video recording assist in providing an accurate representation of the data recorded, it is often difficult to obtain permission to record voices or images of participants. In addition, even if permission is obtained, often the answers to the same question will vary greatly if there is a recording device present. It is important to weigh the benefit of getting an accurate recording of answers given with the drawback of possibly getting incomplete answers to sensitive questions. However, even when audio and video recording, it is important to have a note-taker to record subtle non-verbal communication. It is also important to have a written back-up in case there are any problems with the recording. If you decide on written notes it is important that the note-taker records verbal and non-verbal communication and practices short-hand for common words and phrases. The pilot testing of the instruments can help the note-taker determine what these would be.

Data Storage

It is important to identify a data storage system prior to beginning data collection. A good filing and storage system will make data collection and data analysis easier. An organisation system may include file folders that specify a district, then type of method (interview or focus group) and then a specific number or type of group.

For example, a short organisation system may look like this:

Chobe District

- Interviews
  - Director MLG
  - Programme supervisor
- Focus Groups
  - Young women
  - Older women
  - Husbands

The organisation of data stored in folders or notebooks should be the same as the organisation of data stored electronically. If there are recordings of the interview or focus groups these should be stored with their transcripts, either physically as in the case for tapes, or electronically with digital recordings.

Logistics

Data collection for qualitative data can be challenging in both study logistics and participant logistics. Qualitative data, due to its length and specific privacy issue should be well organised before collection begins. A key aspect of this organisation is how participants will be greeted, consented, and assured of their privacy and confidentiality. This should be scripted and rehearsed before data collection begins.

Because of the personal and open nature of qualitative methods there are specific logistical considerations when beginning field-work. These include issues such a participant ease, confidentiality, recording equipment, and data collection teams.

Participant Ease

Rapport is a term often used in describing a key element in qualitative research. Rapport is a harmonious or sympathetic relationship. Rapport is the relationship established between the researcher and the participant throughout the research process. Rapport includes trust, agreement and affinity. Humility and empathy are the best ways to establish rapport. In addition, there are specific procedures that can be utilised to put participants more at ease and more amenable to openness.

Greetings and introductions

It is good practice to always introduce yourself and offer words of greeting to your participant. A few questions about the weather, the location, or other routine conversational questions can put your participant(s) at ease and establish a tone for the meeting.

Use of names and titles

Conducting a casual interview does not necessarily mean using first name or even using names at all. Addressing the person as you would normally address them when being introduced by a colleague would often be appropriate. While calling someone "Kagiso" instead of "Dr. Morakanyane" or "Goitse" instead of "Ms." might seem more casual it may bring up resentment by your participants.

Privacy and confidentiality

It is essential, whether in a focus group, interview or observation to not only guarantee privacy to your participants but to also re-assure them that their information will be kept private. By openly addressing any concerns about privacy

or the use of the information, even before the participants fill out a consent form, you demonstrate that this is of your up most concern.

Reasons for data collection

Clearly establishing why it is important to you that your participant provides information that is open and candid may help you gain your participants' support. By telling them, for instance, that you understand that the desire and ability to give birth at a facility are very personal, you are directing them to the kind of information that you need and affirming that you will not judge that information.

Consent

Before an interview can occur or a participant's answers used as data, you must get informed consent from participants. *Informed consent* is a process to make participants aware of the scope of the evaluation and implications. During interviews, focus groups, or observations there are a number of things that can make your participant nervous. It is important that this is specified in informed consent.

Participant Consent Process

There are generally two forms of consent: oral and written. Written consent is often required by an ethics review board unless a case is made that it is not appropriate. For instance, in situations of illiteracy, using oral consent rather than written, would be more understood and appropriate. Often consent forms are long and include technical language that makes participants uncomfortable. They are often not sure exactly what they are agreeing to. You should explain the aims of the research project and the procedures for the interview, focus group, or observation before handing participants consent forms. Once you have handed them the forms be sure to give them a brief overview of what is in the form and why it is so important. Explain that this is their guarantee that the research data will only be shown to specific people and in specific ways. Another key aspect of consent is that the participant should be given all the time that they need to read over the form before signing. If they feel rushed through the process they will most likely be nervous about what they say throughout the interview.

Consent for recording a participant's response

Consent to record interviews or focus group, or in some cases record video of observations, is a highly sensitive area for participants. While you will guarantee their anonymity, participants will often feel nervous that the tape could be heard by someone that they know. Most often recording is done when it is not possible to take notes on everything said during a conversation or when an observation is so detailed it needs further review. In either case recording is a way to make sure that

all of the data is captured and that interview notes or observations can be reviewed at a later data to assure completeness. It is essential to explain this rationale to participants. Making light of your inability to record all of the interesting ideas or detailed procedures will help your participants understand that we are all human and often miss important information.

Equipment:

Audio and video equipment itself can be a major distraction if not properly managed before the session. Stopping interviews part way through to change batteries, asking participants to shout into a microphone, and repeatedly checking the recording device time to see how long your session has lasted break the rhythm of the group or interview and can eventually irritate participants who are giving their time to your project.

Tips for using audio and video equipment:

- Always check your batteries or socket connection and change to new batteries if you have any doubt that your batteries are low.
- Be sure to test your microphone so that you know its range. If the range of the microphone is low and you need to record your focus groups, limit the size so that everyone can be in close proximity to the microphone.
- If the microphone only allows for your voice or the participants voice to be recorded clearly place the microphone near the participant. You are much more likely to remember your questions than their responses.
- To keep track of time use a conventional watch when possible. Checking the recording device or checking a cell phone on silent gives the impression that you are impatient and may lead your participants to cut their conversation short.

2.6.2 Data Collection Considerations

Figure 2.6.2 below, outlines some considerations that will ensure that data collection is a success when conducting interviews, focus groups and observations. Issues to consider include size, length, location, confidentiality, and recording of the information.

Figure 2.6.2 Considerations for Data Collection

Qualitative Method	Size	Length	Location	Confidentiality and Privacy	Audio Recording
Interview	• Ideally should be conducted individually. • Can be conducted with up to three people if time, money, or logistics are difficult. • Particularly useful with vulnerable groups such as children or sex workers.	• Can vary greatly but generally an interview with one person should be no longer than 1.5 hours. • After 1.5 hours the quality of the data will decrease as the participant gets tired.	• Interviews should be conducted in an area where there will be no interruptions with daily tasks. • Get the commitment from the participant to hold all calls and put their cell-phone on silence during the interview. • Let the participant choose the time and the place most convenient to them.	• Individual interviews often contain information that can be directly traced back to the participant. o Give the interview a number (or unique identifier), o Guarantee a private space, o Use caution when storing and the information are necessary procedures. • Explain these procedures to your participant so they are at ease and ready to share information.	• Because recordings may be easily traceable, interview coding and storing the recordings safely are very important. • Restrict access to those who will analyse the data. • Take care to restrict access of the data from anyone who might use the data inappropriately.

Qualitative Method	Size	Length	Location	Confidentiality and Privacy	Audio Recording
Focus Group	• Should have between six and twelve participants. o Fewer and it is often difficult to establish a flowing conversation. o Having greater than 12 participants often leads to just a few participants dominating the conversation.	• Should run no more than two hours. • Often the focus group leader will be able to "feel" the energy in the group and know when participants are getting tired. • If pushed to respond when tired, participants may start to tell you what they think you want to know (to get the focus group over with) rather than what they really think themselves.	• Should be conducted somewhere private where other people will not be walking by or walking into the group. • Should be conducted somewhere comfortable so that participants can focus on the questions rather than, for example the heat or the rocks digging into their thighs. • Should be conducted in a circle with the evaluators spaced throughout the participants. • Allow all participants to see one another and for a conversation to flow naturally. • If all the evaluators are grouped in one spot the conversation tends to focus on that spot and participants will not speak spontaneously.	• Privacy and confidentially are particularly difficult in a focus group because you cannot guarantee that some participants will not talk about each other outside the focus group. • Emphasise to everyone involved that anything said in the focus group should stay there. • Maintaining confidentiality is another reason why it is beneficial to have the same kinds of people in the room. This way there are shared experiences between the participants and less room for judgement.	• Recording can be difficult because of multiple people talking at once, making recordings unclear. • The group should receive instructions at the beginning about talking one at a time and the evaluator should ask participants to repeat information if someone has spoken over them.

Qualitative Method	Size	Length	Location	Confidentiality and Privacy	Audio Recording
Observation	• Best conducted by creating as little disturbance to normal routines as possible. • The number of observers in any given situation should be minimised. • It is often better to have one person gather less information on a normal situation than many observers gathering a lot of information in which the interactions are abnormal given the presence of too many observers.	• Can be of any length but the observer should remain alert during data collection. • Multiple observations of a single type of encounter (for example a nurse-patient visit) will yield better, more consistent information.	• Location will be dictated by your question. Examples of locations include: o Women's homes o In health facilities such as in pre-natal exam rooms, waiting rooms, or in the maternity wards. • The ideal location will give you access to routine real-life occurrences and minimise the influence of your presence.	• Can be difficult in observation situation because you often do not know, or do not have the chance to consent participants. • It is important to get permission of community leaders or facility staff before beginning observations. • You should also refrain from writing down or recording any information that could identify participants unless they give you documented permission. • If there are few participants, like in a clinical exam, then consent can be obtained by all parties.	• Recording the data can be difficult in an observational situation. • It is more difficult to control the environment and obtain a good audio recording. • Video recording should be done with extreme caution because of privacy and confidentiality issues. • If video recording is used there should be explicit explanation of who will have access to the recordings, how they will be analysed, on when they will be destroyed for security reasons.

2.7 Data Analysis

Now that you have your data in the form of interviews, focus groups, and observations, what do you do with that data? Data analysis for qualitative methods involves a process of building connections between what different people say or ideas expressed. The connection can be used to build theories. For example, you may connect responses from men not wanting to get an HIV test because of embarrassment with observations that the HIV testing site is open to the road and anyone waiting can be easily seen. You can then develop a theory about the visibility of an HIV testing site leading to increased stigma for men. The data analysis process involves breaking apart the small concepts, or themes, and then reformulating these concepts to start to map out their relationships.

2.7.1 Coding

Coding is a way to quickly organise your data into themes. As we discussed earlier in the chapter, a code is a short word or phrase that sums up the idea behind a quote or paragraph in the data. For instance if a participant responded to a question about childbirth with this quote:

"I went to my first pre-natal visit at the hospital. They told me I was about 5 months pregnant. They gave me pills to take but I've ran out and my mother-in-law won't let me go back there. I think that I'll end up giving birth here because the midwife is a friend of our families. My mother-in-law might not like it if we don't have her deliver the baby. I thought about sneaking away, because I know that it is good to give birth at the hospital but I would need someone to bring me food while I was in labour. I think my sister-in-law would be too afraid to bring me something."

There are a number of codes that could be used for this paragraph. How you decide on the codes depends on what type of information you think will be most useful. For example, there is information about mother-in-law and sister-in-law influences. This could be coded as "in-laws" or "family" or "household" or kept as "mother-in law" and "sister-in-law". In general, codes should be broad unless there is reason to believe that a specific code will be necessary to understand a specific context. In this example, if you are interested in overall family influences versus community influences or monetary influences you would keep the general code "family". However, if you were interested in what type of family influences specifically affect women's childbirth you may separate "in-laws" or "mother-in-law" so that information on those specific groups would be available to you quickly.

You should develop a code book where codes are defined and then labelled. Sometimes you can create shorter labels for codes especially when there are many sub-codes within a general code. The "in-laws" example above is general code, and it includes sisters-in-law and mother-in-law. If the general code is 'in-law' and has a label 'IN', then a sub-code label for sister-in-law could be IN-S. A code book is especially important if you have several researchers coding the same text to validate

findings. The code book serves as a reference for all researchers involved with the study so that everyone is in alignment and not creating their own codes for the data.

2.7.2 Coding Process

After you have created a list of general codes and sub-codes you are ready to start applying these codes to the text or notes from your data gathering. You begin with the text and then highlight the entire phrase or phrases that pertain to that specific code. You assign the code by writing it, or typing it, on the side of the page next to the highlighted text. There are various ways that this can be accomplished using a computer programme or by hand using hardcopies of data like transcripts and notes:

- Cutting and sorting: the text is cut off the page and sorted into codes. If this is the technique you use you should always put an interview reference number on the bottom of each cut out so that you can quickly refer back to the interview, focus group, or observation that this came from. An alternative to cutting would be to re-write the quote on note cards and then sort the note cards.

- Excel spreadsheet: In the excel spreadsheet you would type out each phrase into a spreadsheet in one column and then place the code in the next column. Alternatively you could place codes into a column and then put quotes that fit under that code into the next column. This is a simple method that allows for easy sorting based on the code.

- Electronic Analysis Software: There are a few different software packages that are used in analysing qualitative data. These include NVivo and Atlas.ti. The software allows you to code the data directly and then sort codes and create code maps. However, these packages are often costly and require time to learn through the included manuals.

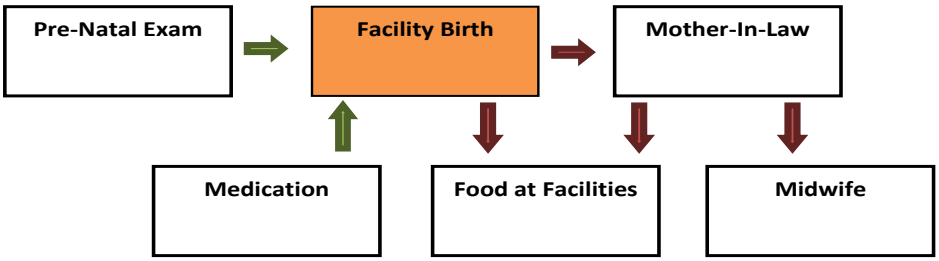
- Hand-coding: If you are working alone or in a small research group, then you can hand-code transcripts. This involves applying the codes onto a typed or photo-copied transcript by highlighting or underlining sections of the text then drawing a line to the margin to label it with the appropriate code. Most independent researcher's hand-code and it is the best method if you do not have access to a computer.

2.7.3 Interpreting Codes

Code interpretation is really a process of mapping relationships between codes, and then generating themes or theories about these relationships. There are many approaches to interpret the coded data into themes. You can look at the codes for a particular question or within a specific participant type like pregnant women. Also, one could organise codes around a particular time period, setting or step in an

organisational process such as patient in-take at a clinic. Another option is to determine the frequency of codes or themes among participants. You can examine these frequencies and make some interpretations of the data between high and low frequency themes. The analysis of the codes starts with the research questions and discovers what relationships influence the policy, programme or intervention that you are seeking to understand as an M&E officer. For the quote above, where a woman talks about why she could not give birth at a facility, a code map representing the relationships that determine women's use of birth facilities is shown below.

Figure 2.7.3 Code Relationships



In this case, the boxes represent codes. The box "facility birth" is orange because this code represents our main question and therefore our main analysis and we would like to see how the other codes relate to this one. The green arrows represent a positive factor for facility births while the red arrows represent a negative factor. Mapping codes is a continual process in data analysis. Other data may lead the evaluator to change the direction of these codes or change the relationship of these codes to one another. It is important to note that although the code map was designed on a computer, one could easily draw the map by hand and label it accordingly. In fact, during analysis, most code maps are drawn on paper until a complete analysis is finished; then the results are represented by diagrams. These are similar to the one in figure 2.7.3 but include relationships that are generalised across participants. These diagrams can then be explained through direct quotes from the participants.

Learning Activity 2.7.3

Coding

Directions: There are two quotes below. During the research process you have developed the codes below. Write the codes that pertain to these quotes underneath the quotes. Then pick out the quotes that overlap and discuss how they might be similar or different.

Codes: *Early pregnancy, challenges in getting pregnant, clinic visits, midwives, religion, hiding pregnancy, neighbours, family members.*

"My mother would be very upset with me for getting pregnant so young. She might convince me to get rid of my pregnancy. I'm afraid of her knowing. I wanted to go to the clinic but there are lots of aunties around who might tell my mother that they saw me there. It is better when it is too big to take it out."

Codes:

"My husband and I have been trying for a long time to get pregnant. It has been very hard and people talk a lot. I was pregnant before but I lost it very early. I don't want to risk losing it again. Maybe God will bless me this time but there are many people in my village who will not want to see me carry this baby. I have to protect it until it is big enough. The midwife has helped a lot. She understands my fears and has given me things to help protect my child."

Codes:

Interpretation:

Discussion 2.7.3

Coding

"My mother would be very upset with me for getting pregnant so young. She might convince me to get rid of my pregnancy. I'm afraid of her knowing. I wanted to go to the clinic but there are lots of aunties around who might tell my mother that they saw me there. It is better when it is too big to take it out."

Codes: *Early pregnancy, clinic visits, hiding pregnancy, neighbours, family members.*

"I have been trying for a long time to get pregnant. It has been very hard and people talk a lot. I was pregnant before but I lost it very early. I don't want to risk losing it again. Maybe God will bless me this time but there are many people in my village who will not want to see me carry this baby. I have to protect it until it is big enough. The midwife has helped a lot. She understands my fears and has given me things to help protect my child."

Codes: *Challenges in getting pregnant, midwives, religion, neighbours.*

Interpretation: *Neighbours and family play an important role in the reasons why women hide their pregnancy. In some cases, it is because they would tell family members who could force the woman to terminate the pregnancy or in some cases it is because they could be full of jealousy that could harm the baby. In both cases it is important to hide the pregnancy from neighbours until the baby is big and cannot be removed.*

2.7.4 Data Triangulation and Checking

You need to confirm that your data is accurate by checking your findings in a few quick ways. *Triangulate* your data by confirming that your findings fit with your focus group and observational data as well as any previous studies. If there is a misalignment, then do some additional work to sort out if there is a change emerging. For example, if pregnant women stated in an interview that their husband came with them to the clinic, then you should be able to find that husbands are accounted for in the observation data of the clinic.

Checking is the process where you ask another participant a question based on a response from a previous participant. Like the example above, you can ask other pregnant women if their husbands come with them to the clinic.

Code Alignment refers is to the process where more than one person codes the same transcript or set of data, and then compared how each person coded the data to come to an agreement about the findings. Each person may have a different interpretation of the data and will apply a different code. So, it is good to get someone to validate your coding decisions. In the example of pregnancy registration, observing women's behaviours in the cue and interviewing midwifes could provide you with data triangulation. You data would be verified if women are attempting to hide their presence in cue for registration, and midwifes talk about women's fears of exposing their pregnancy to neighbours. We will talk more about triangulation in Chapter 4 when we discuss quantitative data analysis.

2.7.5 Representation of Findings

Once you have a conceptual map of the codes and their relationship to other codes, you can begin to analyse those relationships and write a report of this analysis. In the case of the code structure above, we could represent the data analysis in different ways. One approach would take each code and explain its relationship to the other codes or the central code and then use quotes from our data to help give context to the interpretation. Another approach would be to construct a grid listing the factors influencing facility birth and the degree to which they are inhibiting or facilitating. See Figure 2.7.5 below for an example of identifying relationships.

Figure 2.7.5 Example of a Relationship Table

Title: Factors Affecting Registration of Pregnancy

Factor	Positive	Negative
Early pregnancy		X
Neighbours		X
Challenges getting pregnant		X
Family members	X	X
Midwifes		X

In representing the findings code maps and tables are frequently used to represent themes and data. For example, in Figure 2.7.5 above, it can be explained that pregnant women experience neither totally positive nor totally negative reasons to register. However, the table shows that there are many more negative reasons to register than positive. Therefore, the findings suggest that programmes and interventions may need to specifically address these issues. Then, you can use quotes from participant types to elaborate on this mix of factors that influence women's registration, which could inform a particular programme, policy, or intervention that you are tasked to examine as an M&E officer. Also, based on the conceptual map in Figure 2.7.3, you may have a section of a report dedicated to the role of neighbours, and another section might address midwifes as one of the main inhibiting factors. In these cases you would pull the quotes from the data that were either most representative or most illustrative of the analysis. There are more ways to represent the findings, and sometimes the best demonstration of the results is a single quote that captures many of the themes in your research.

Chapter Summary

In this chapter, we have presented the key steps of the qualitative methods of data collection and analysis for your work as an M&E officer. Interviews, focus groups, and observations will be the core of your work in the field. Like the blind men who wanted to understand an elephant through touch, which we discussed in the beginning of this chapter, qualitative research is a method to uncover what people think and perceive about a health programme, policy, or intervention. As an M&E officer, you will go into the field with tools to collect data about something you do not fully understand, and these tools allow you to keep an open mind while keeping you focused on your research question.

The three types of qualitative tools (interviews, focus groups, observations) and how to develop sampling techniques, protocols, and data collection methods in order to use these tools appropriately were described. Along the way some tips for data collection and logistics to consider when working on a team and with study participants like the consent process were outlined. Finally, how to analyse data including coding and data confirmation techniques were outlined, and the options to represent and discuss your findings were presented.

You are encouraged to go through this chapter again and examine the learning activities more than once to practice the skills presented. Qualitative methods take time to master, but these can provide excellent tools to understand community member values, perspectives and understandings of health policies, programmes, or interventions. As M&E officers, you will be participating in exciting work to improve health programmes, which include listening to the people involved. Finally, it is good to remember that who you are as a researcher will influence the kind of data you collect from your participants.

Self-Assessment Quiz

1. During an interview, why is it important to probe participants with additional questions?

2. How does a research question help you select your participants in your study?

3. What are some important factors for data collection and management?

4. What the four steps of data analysis?

5. How can qualitative methods inform your job as an M&E officer?

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Self-Assessment Quiz Answer Key

1. During an interview, why is it important to probe participants with additional questions?

The act of probing allows you to collect the most accurate information from the participant. It gives the participant time to really think about their answer and correct any misstatements, and it allows you as the interviewer to understand their answer without jumping to conclusions. Also, probing will limit your need to go back and interview the participant again about the same question since you will have got your answer the first time.

2. How does a research question help you select your participants in your study?

A research question in qualitative methods identifies what you need to know and sometimes it outlines who is involved as well. Therefore, you can make decisions about whom you can include in your study. Even if the study is interested in pregnant mothers' use of birth facilities, it is does not mean you only need to interview pregnant mothers. Rather, you need to consider all the possible individuals involved in pregnancy and childbirth in a community, and then make a decision about who to include and not to include in the study. Also, as an M&E officer, your focus may be a specific programme or intervention that would limit your participants, or you may be limited by budget and time.

3. What are some important factors for data collection and management?

It is important to develop rapport with participants so that they are comfortable with the study, and it is important to secure consent prior to conducting the interview, focus group and observation. If you are working on an evaluation team, then you should identify each person's responsibilities in the study. Data management requires careful labelling of sources including the date, time, and participants as well as the study title so that the data is not mistaken for another evaluation.

4. What the four steps of data analysis?

The steps include coding, organising codes, interpreting codes, and representation and discussion of themes and findings. The first three steps may be repeated until the findings are confirmed and then discussed in a report. Data analysis requires confirmation through triangulation, checking and code alignment processes.

5. How can qualitative methods inform your job as an M&E officer?

Qualitative methods are designed to solicit values, perspectives, experience and knowledge of a health policy, programme and intervention. These are important data to collect because it informs how patients and health care staff make decisions about health care access.

Self-Directed Learning Workbook 3:
Chapter Three
Quantitative Data Collection Methods

Written surveys are an important quantitative data collection method

Chapter 3:

Quantitative Data Collection Methods

 Estimated time needed for completion: 3 hours

Chapter Overview

As an M&E officer, you will need to have a basic understanding of quantitative data collection methods in order to complete your own investigations as well as to understand and interpret studies using quantitative methods. This chapter will introduce you to the basics of quantitative data collection methods, reviewing concepts that will help you decide on the best quantitative methods and data collection tools given your study design and evaluation interest. The most frequently used method to collect data is the survey. It is likely that you will have to interpret population-based survey data from the *Botswana AIDS Impact Survey (BAIS)* as well as create smaller scale surveys to investigate public health issues in your district. Because we only review the basics, further resources on the internet and at the end of this chapter should be referenced when trying to implement quantitative data collection methods that are not adequately covered in the scope of the short self-directed learning module.

Learning Objectives

At the end of this chapter, you will be able to:

- describe when to use quantitative data collection methods,
- describe 4 quantitative data collection methods and the advantages and disadvantages of each,
- explain 5 sampling strategies and the advantages and disadvantages of each,
- explain how data quality concerns affect the design of data collection tools,
- outline the process of designing a survey tool,
- list 9 tips for designing good survey questions, and
- design a database structure for entering and analyzing survey data.

3.1 Introduction to Quantitative Data

The term quantitative data is used to describe a type of information that can be counted or expressed numerically; height, weight, the number of people with a certain marital status, or the percentage of people with HIV are all examples of quantitative data.

You will remember from the last chapter that qualitative data, which usually comes in the form of words rather than numbers, attempts to answer questions about *how* and *why* things are happening. With qualitative data, an evaluator can provide detailed descriptions of the values, opinions, behaviours, and the social context of individuals or their communities. Qualitative data is collected with fewer respondents because it is often time-consuming to collect and analyze.

Quantitative data, on the other hand, is best used for answering questions such as *"How much?"* and *"How many?"* With quantitative data, an evaluator aims to collect standard responses from a lot of individuals in order to describe a certain variable or set of variables in a population as a whole.

Here is an example that compares quantitative and qualitative data collection methods for an evaluation of the prevention of mother-to-child transmission (PMTCT) programme. Using qualitative data collection methods you could interview a couple of PMTCT clients about their experiences at the clinic, to find out why some clients do not pick up baby formula from the clinic. For example, they may say it is because it takes too long. Quantitative data collection would require you to ask many clients specifically about different reasons for not picking up formula and then you would count how often this happens among the antenatal clinic (ANC) client population within your district.

Table 3.1 below provides an example of a qualitative and a quantitative question.

Table 3.1 Example of Qualitative vs. Quantitative Questions

Qualitative question example:

"Can you describe your experience accessing PMTCT services at this clinic?"

Quantitative question example:

"Is waiting time a barrier to your accessing services for baby formula at this clinic?"

Quantitative data collection usually takes less time to collect and analyze for each respondent. As you can imagine, asking someone to answer an open-ended question such as "Can you describe your experience accessing PMTCT services at

this clinic?" will take longer than asking them to answer a Yes/No question such as, "Is waiting time a barrier to your accessing services for baby formula at this clinic?" Similarly recording responses to these questions will take longer for the open-ended question, where the answer could be several paragraphs, as opposed to entering a simple Yes/No.

The advantage of asking such an open-ended question is that it allows the evaluator to gain a deeper understanding of patient's experiences with PMTCT services and is likely to reveal things that the evaluator didn't already know. But because of the vast amount of information that such questions produce, only a few interviews can be done. This information can then be used to design quantitative data collection tools, which focus in on a few factors of interest that emerge from the interviews, such as waiting time to collect baby formula at the clinic. Following the qualitative data collection with a quantitative study that collects data from a larger number of PMTCT clients can then inform clinic and district staff *how many* patients report waiting a long time to get baby formula from their clinic. This data could then be compared between clinics and interventions could be designed to reduce that waiting time.

3.1.1 Qualitative vs. Quantitative Data Collection Methods

As described in the case above, depending on the question you want to answer, qualitative or quantitative data collection methods might be more appropriate. In general, qualitative data collection methods seek to explore a problem or process. Qualitative data collection methods use open-ended and semi-structured instruments, such as in-depth interviews, focus groups, and participant observation. Using these qualitative instruments means that the evaluator can use a more flexible, iterative style of eliciting and categorizing responses to questions, based on the types of responses received from the participants.

Quantitative data collection methods seek to confirm ideas about problem or process. Because a pre-set list of ideas that we want to quantify exists, quantitative data collection instruments use a more rigid style of eliciting and categorizing responses to questions. In quantitative data collection, structured methods are used, such as questionnaires, surveys, and structured observation. Structured means that the questions are fixed and the answers often have fixed categories.

Difference between Qualitative and Quantitative Data

Qualitative and Quantitative research methods differ primarily in four key areas:

- their analytical objectives,
- the types of questions they pose,
- their data format, and

- the degree of flexibility built into study design.

Table 3.1.1 briefly outlines these four key areas.

Generally, quantitative methods are fairly inflexible. With quantitative methods such as surveys and questionnaires, for example, researchers ask all participants identical questions in the same order. The response categories from which participants may choose are "closed-ended" or fixed. The advantage of this inflexibility is that it allows for statistical or numerical comparison of responses across participants and study sites. However, it requires a thorough understanding of the important questions to ask, the best way to ask them, and the range of possible responses.

Table 3.1.1 Comparison of Quantitative and Qualitative Research Approaches

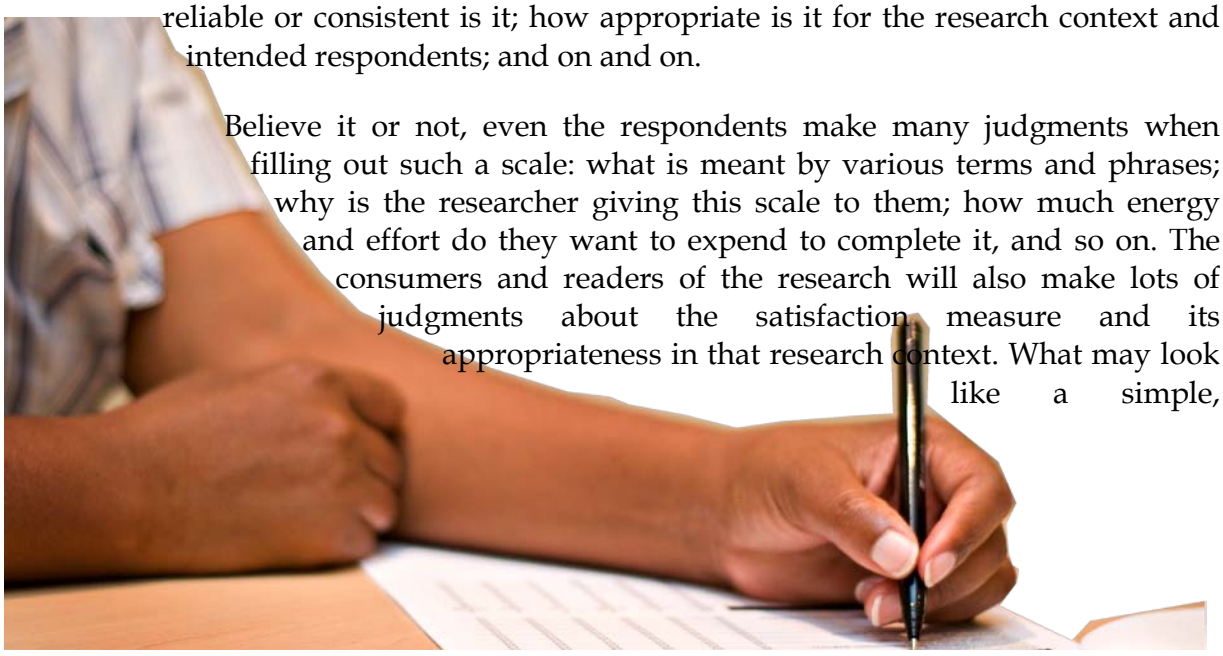
	Qualitative	Quantitative
Analytical objectives	• To describe variation • To describe and explain relationships • To describe individual experiences • To describe group norms	• To quantify variation • To predict causal relationships • To infer characteristics of a population
Question format	• Open-ended	• Closed-ended
Data format	• Textual (obtained from audiotapes, videotapes, and field notes)	• Numerical (obtained by assigning numerical values to responses)
Flexibility in study design	• Some aspects of the study are flexible (i.e. the addition, exclusion, or wording of interview questions) • The data collection is unstructured (or semi-structured) so participant responses will affect how and which questions researchers ask next • Study design is iterative, that is, data collection and research questions are adjusted according to what is learned	• Study design is stable from beginning to end • The data collection is structured and fixed so participant responses do not influence or determine how and which questions researchers ask next. The structure of the questions is decided in advance. • Study design is subject to statistical assumptions and conditions

Relationship between Qualitative and Quantitative Data

Although at first glance they might seem to be very different, qualitative and quantitative data are actually closely related to each other. Most quantitative data is based upon qualitative judgments; and all qualitative data can be described and manipulated numerically. There are certain questions that do not require qualitative judgement (such as age) but most do require some judgement. Even for a question as simple as family size, it requires qualitative judgement to determine how to categorize "family"; is this your whole family including uncles and aunts? Is it the family that you dine with? What if you are a student living with your uncle; is your uncle's family your family or is your family still back in your district?

In the example, clients are not picking up infant formula. In order to quantify reasons why clients are missing their pick-up, the quantitative researcher needs to make judgements about why this may happen in order to include these items in a questionnaire. For example, the researcher may think that lack of money for the bus, distance from the clinic, dislike of formula, and fear of stigma are the main reasons that should be included in the questionnaire. Without further development or testing, which we will discuss later, the researcher could miss the importance of waiting times at the clinic.

You can also think about a very common measure in health services studies, a patient satisfaction scale where participants rate how satisfied they are with the services they have received on a scale of 1-5, what type of measure do you think is involved? Even though it is typically a quantitative measure, the researchers who develop such instruments had to make countless judgments in constructing them: how to define satisfaction; how to distinguish it from other related concepts; how to make sure the items would be understandable to the intended respondents; what kinds of contexts it could be used in; what kinds of cultural and language constraints might be present; and on and on. The researcher who decides to use such a scale in their study has to make another set of judgments: how well does the scale measure the intended concept; how reliable or consistent is it; how appropriate is it for the research context and intended respondents; and on and on.



Believe it or not, even the respondents make many judgments when filling out such a scale: what is meant by various terms and phrases; why is the researcher giving this scale to them; how much energy and effort do they want to expend to complete it, and so on. The consumers and readers of the research will also make lots of judgments about the satisfaction measure and its appropriateness in that research context. What may look like a simple,

straightforward, cut-and-dried quantitative measure is actually based on lots of qualitative judgments made by lots of different people along the way. This is why it can be simplest to use already validated measures and scales when appropriate and available if you do not have the resources to create and test your own.

Similarly, data that one thinks of as qualitative can be reduced to numbers. For example, after doing a long, in-depth interview with a patient about their satisfaction with their health services, an evaluator might count the number of times that a patient mentioned staff attitudes, confidence in the quality of care, or waiting times.

3.1.2 Determining When to Use Which Method

As we have seen above there are advantages to both qualitative and quantitative data collection methods, it really just depends on the types of questions you want to ask in your evaluation, how much you already know about your topic area, and what resources you have to collect and interpret the data. The table below provides a useful set of issues to consider when determining which method to use.

Table 3.1.2 Considerations for Determining Which Method to Use

Issues to Consider	Use Qualitative measures when you…	Use quantitative measures when you…
Purpose of research	Are seeking a richer, more personal picture of individual motives, decisions, or practices.	Need to calculate numerical indicators/parameter estimates of populations
	Are exploring categories, words or phrases used in a population of interest; to develop an awareness of the categories that define an area of investigation.	Have identified salient categories, know which words or phrases are used, and want to know the distribution of these ways of thinking or health practices among your intended audience.
	Wan to help clarify or illuminate quantitative research findings	
Sample Size	Can answer your questions with a relatively small number of participants; want to know more about a small group of people.	Have the ability to sample systematically so that the sample is statistically representative of the population.
Analytic Capabilities	Are competent to analyze the findings and have been trained in interpretation and coding.	Have good statistical & analytic skills.

Remember that you can always use mixed methods when addressing an evaluation problem. Chapter 1 of this workbook explained the different ways that mixed methods could be used.

3.2 Quantitative Data Collection Tools

In the previous chapter we talked about several qualitative data collection tools including: interview guides, focus group guides, and observation guides. In this section we focus on four types of *quantitative* data collection methods: structured interviews, self-administered questionnaires, observation checklists, and secondary data sources. We will also discuss in-depth how to create a survey which is one of the most common ways to collect quantitative data. Surveys can be used to guide both structured interviews and self-administered questionnaires.

3.2.1 Types of Data Collection Tools

Structured Interviews

An interview is a data-collection technique that involves oral questioning of respondents. Answers to the questions posed during an interview can be recorded by writing them down (either during the interview itself or immediately after the interview), by tape-recording the responses, or by a combination.

Interview guides can take on one of two forms: semi-structured and structured. Semi-structured interviews, a qualitative data collection tool which was covered in the last chapter, use an interview guide that may have just a couple broad topics or questions and allow for complete flexibility in the answers. In this type of interview, other questions may arise during the conversation and researchers are free to explore these questions.

Structured interviews use standard questionnaires, sometimes called interview schedules, to ensure that all respondents are asked exactly the same set of questions in the same sequence. The exact wording of each question is specified in advance, and the interviewer reads each question to the respondent following a standardized "script" so as to solicit information the same way from each person they interview.

Self-Administered Questionnaires

As the name suggests, a self-administered questionnaire is a data collection tool in which written questions are presented to a respondent for them to complete by themselves. The questions can be either open-ended or closed-ended. A self-administered questionnaire with mostly open-ended questions would elicit more qualitative data. A close-ended questionnaire would be more similar to a structured interview and would produce more quantitative data. However, many people do not like to write extensively and open-ended self-administered questionnaires tend to get less information than interviews or close-ended questionnaires.

A written questionnaire can be administered in different ways, such as by:

- gathering all or part of the respondents in one place at one time, giving oral or written instructions, and letting the respondents fill out the questionnaires; or
- delivering questionnaires by hand, post or e-mail to respondents and collecting them later.

Observation

Observation is a technique that involves systematically selecting, watching and recording behaviour and characteristics of living beings, objects or phenomena. It can be undertaken in different ways:

- **Participant observation:** The observer takes part in the situation he or she observes. For example, an observer joins in with the participants in a community education campaign.
- **Non-participant observation:** The observer watches the situation, openly or concealed, but does not participate. For example, an M&E officer observes the flow of patients through a clinic and how information on that patient is collected and stored.

Observations can be *open* (e.g., 'following' a health worker with his/her permission during routine activities) or *concealed* (e.g., 'mystery clients' pretending to be a patient). It is important that you are very clear about your observation methods when presenting your evaluation proposal to the HRDC. Patient and provider permission may be required if you are going to be conducting any observation of consultations.

Observations can provide additional information on behaviour of people, adding to what is collected through interviews and questionnaires. Observations can also check on the information collected through interviews especially on sensitive topics such as alcohol or drug use, or stigmatising diseases. For example, whether community members share drinks or food with patients suffering from feared diseases (leprosy, tuberculosis (TB), AIDS) are essential observations in a study on stigma. This technique is also useful for organizational studies, such as observation of clinic operations, activities of field workers, and administrative procedures. The researcher should note, however, that when people are being observed, they may behave in ways that are not typical of their day-to-day behaviour and this can lead to an inaccurate portrayal of a 'normal' interaction. This is why observations should be done many times of the same event in the same setting (individual, clinics, health care workers), not just once or twice.

Observation can be qualitative or quantitative. With qualitative observations you may have a guide that helps the evaluator remember what kinds of things to observe but the actual observation will be written down in an open format. Quantitative

observations use a checklist or fixed scale do observe. This allow for quantification of the observations. In qualitative observation of clinic flow the observer may be more interested in documenting how people reacted to being referred to different areas, if they were confused or frustrated, or if they argued amongst themselves for space in the waiting room. A quantitative observation of flow may include, how many referrals were made to each person, if the person arrived at the referral location, or how many people were in the waiting room. If observations are made using a defined scale they may be called *measurements*. For example, in nutritional surveillance we measure weight and height by using weighing scales and a measuring board. We use thermometers for measuring body temperature.

An observation checklist is another type of structured, prepared form for collecting quantitative data. Checklists are often used to collect data on multiple individuals or sites. Similar to a structured interview or self-administered questionnaire, observation checklists ensure that data collectors observe the same set of factors for each individual or site.

Using Available Information

There are often large amounts of data that has already been collected by others, although it may not necessarily have been previously analysed. Examples of specifics of datasets in Botswana include; the electronic Botswana HIV Response Information Management System (eBHRIMS), the population census, District Health Information System (DHIS), the *Botswana AIDS Impact Survey (BAIS)*, Demographic Health Surveys, vital records, and health programme statistics. Several of these datasets or data summaries are available through the internet (see the list of internet addresses in the bibliography).

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 cases of certain diseases.

Analysis of health information system data, population census data, 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.

In order to retrieve and compile data from multiple existing sources, the researcher may have to design an instrument such as a checklist or compilation sheet. This

instrument would then act as a guide to the researcher as they reviewed each of the existing sources, ensuring that the relevant information was collected from each one.

In designing such instruments, it is important to inspect the layout of the source documents from which the data is to be extracted. For health information system (HIS) data, for example, the data compilation sheet should be designed in such a way that the items of data can be transferred in the order in which the items appear in the source document. This will save time and reduce error. The advantage of using existing data is that collection is inexpensive. However, it is sometimes difficult to gain access to the records or reports required, the data may not have answers to all of your questions of interest and the data may not always be well-organised or complete.

3.2.2 Determining Which Data Collection Technique to Use

Table 3.2.2 summarizes the advantages and disadvantages of the various data collection techniques.

Table 3.2.2 Advantages and Disadvantages of Various Data Collection Techniques

Method	Data Collection Tools	Advantages	Possible Constraints
Structured Interviewed	• Interview guide • Checklist • Questionnaire • Tape recorder	• Is suitable for use with people who are both literate and illiterate. Permits clarification of questions. Has higher response rate than written/self-administered questionnaires. • Is easy to analyze.	• The presence of the interviewer can influence responses. Reports of events may be less complete than information gained through observations. • Important information may be missed because spontaneous remarks by respondents are usually not recorded or explored.
Self-administered questionnaires	• Questionnaire	• Is less expensive. Permits anonymity and may result in more honest responses than if the evaluator is asking the question. Does not require research assistants. • Eliminates bias due to phrasing question s differently with different respondents.	• Cannot be used with illiterate respondents. There is often a low rate of response. • Questions may be misunderstood. • Participant may share the questionnaire with other or seek advice on answers.

Evaluator administered questionnaire	• Questionnaire	• Is useful for illiterate populations • Assure that only the participant is involved in the response	• Requires research assistants • Can be more time consuming to explain scales
Observation	• Measurement tools: watch, counter etc. • Checklist	• Gives more detailed and context-related information. Permits collection of information on facts not mentioned in an interview. • Permits test of reliability of responses to questionnaires.	• Ethical issues concerning confidentiality or privacy may arise. Observer bias may occur. (Observer may not only notice what pertains to the study). The presence of data collector can influence the situation being observed. • Thorough training of research assistants is required.
Using available information	• Datasets	• Is inexpensive, because data is already collected. Permits examination of trends over time.	• Data is not always easily accessible. Ethical issues concerning confidentiality may arise. Information may be imprecise or incomplete.

Learning Activity 3.2.2

Data Collection Tools

Directions: Below we reviewed the Chobe intervention discussed in Chapters 1 & 2: In Chobe district, based on M&E data, the district leadership determined that infant mortality was very high. An intervention was designed to get more mothers to give birth in facilities by offering them a post-partum kit that included a baby jumper, soap, and a blanket. Read through the related questions below and provide answers based on the information you just learned about data collection methods.

1) Which of the four quantitative data collection tools might you use to find out how attractive the post-partum kit is to ANC clients? Why would you choose this method?

2) What if you wanted to find out whether the kits were being used? Which of the four methods would you use and why?

Discussion 3.2.2

Data Collection Tools

1) Which of the four quantitative data collection tools might you use to find out how attractive the post-partum kit is to ANC clients? Why would you choose this method?

Possible Answer: *First, you might use available information by looking up what other studies have found about the provision of post-partum kits, either in Botswana or in other similar contexts. It is not likely that information already exists in your district on this topic, so additional data collection is likely needed.*

With observations it might be difficult to capture how ANC clients feel about the post-partum kits. Even if they are rather excited about the provision of the kits, they may not reveal any outward signs that show their feelings when the kit is discussed.

If the population is literate it might be easier and cheaper to have the nurses hand out a stack of self-administered questionnaires to ANC clients. However, you would have to weigh this against the likelihood that not all clients will complete the forms and may not correctly fill in all the fields.

A structured interview would be best if there are illiterate clients, although this is a more time consuming and costly approach. A structured interview by a trained data collector would also help to ensure better data quality as they are more likely to correctly fill in the fields as compared to self-administered questionnaires.

2) What if you wanted to find out whether the kits were being used? Which of the four methods would you use and why?

Possible Answers: *Available information likely does not exist for this project in your district. Structured interviews and self-administered questionnaires may provide some information on whether the kits are being used, but some ANC clients may tell you want they think you want to hear (i.e. that they have been using them and in the intended way), rather than how they are actually using them.*

Going to ANC client's houses and making observations to determine whether the post-partum kit is being used would help to strengthen evidence from interviews or questionnaires – ask if the baby has worn the jumper and ask if the blanket is still amid the baby's things?

3.3 Quantitative Methods: Probability Sampling

Once you have determined what kind of instrument you want to use, you will need to determine how many people need to fill out that instrument, or be observed, to be able to analyze the data with certainty. This is your sampling. Let us say you want to know how many PMTCT clients reported a long waiting time to get baby formula at a given clinic. Asking all PMTCT clients at the clinic if they experienced long waiting times may be time-consuming and costly. If PMTCT clients only come to the clinic once a month you would have to sit at the clinic for a month just to collect all the data! Probability sampling is a technique that can help us to get a reasonable estimate to answer this question, without having to ask all PMTCT clients.

SAMPLE OR CENSUS?

A sample is a small part of a population that is used to understand the whole population. A census is getting an accurate count from the whole population. Under what circumstances would you study a sample of population units and under what circumstances might you perform a complete census? If the universe, a term that is defined in the box on the next page, were very small, for example, 20 health centres, one hospital, or 50 peer educators, you would do a census, that is, include all units in your study. You might also do a census of a large universe if the elements were easily and quickly accessible.

For example, if the records of all visits to AIDS outpatient clinics were computerized, you might obtain data from all the records rather than from a sample.

In the previous chapter on qualitative data collection methods we discussed non-probability sampling strategies. Non-probability sampling is distinguished from probability sampling by the fact that subjective judgments, such as who constitutes a "key informant", play a role in selecting the sampling units. Because qualitative data collection generates detailed descriptions and is often time-consuming to collect and analyze, probability sampling is rarely needed with qualitative data collection methods.

Another reason that qualitative data collection methods often do not use non-probability sampling is because the for qualitative evaluators significance is achieved once they reach data saturation, which is the point at which further interviews are not adding to the findings or are simply repeating what was already found in the previous interviews. To reach this point, evaluators might not need to have as many participants as quantitative data would require for statistical significance.

3.3.1 Introduction to Probability Sampling

(The section on sampling adapted from *Designing HIV/AIDS Intervention Studies: An Operations Research Handbook* (Fisher & Foreit 2002)).

A sample can be thought of as a model of a larger population. A sample consists of a relatively small number of individuals or other units that are selected from a larger population according to a set of rules. For example, you may *randomly* select 100 People Living with HIV and AIDS (PLHA) who are part of a total population of 600 PLHA served by a rural clinic. If you have a good model, you may be able to generalize from your sample of PLHA to all PLHA that attend the rural clinic.

Similarly, if you use a sample consisting of all types of women in the country, you may be able to generalize your results to the total population of women. The advantage of studying a sample of cases as opposed to all cases is that the research can be done more quickly, less expensively, and often you will get more detailed information than in a large *census* (survey of the entire population). In fact, given limited evaluation budgets and typically large population sizes, there is usually no alternative to sampling.

Basic Sampling Terminology

If information from a person, or subject, is gathered from an interview survey or a questionnaire survey, the subject can be referred to as a **respondent**. A more general term that may be used to describe the unit studied, regardless of the type of study or the type of unit being studied (for example, a person, clinic, village, or patient record) is a **case**.

The **population** or **universe** consists of all the members of a group. The population is also the total collection of units from which you select your sample. A **sample** is the subset of the population that you examine in order to generalize about the total population.

Sampling units are the **elements** into which a population is divided. For example, if there are 2,000 rural health centres in a country and you select a sample of 285 rural health centres, the sampling unit is the rural health centre.

Sampling frame is a list of the population from which the sampling units are drawn.

Probability sampling is a technique you can use to maximize external validity, or generalizability, of the results of the study. Quantitative data collection methods, which focus on answering the 'how many' or 'how much questions' frequently use probability sampling so that their results are as generalizable as possible.

For example, you might want to evaluate the impact of a national radio campaign on the attitudes of adults toward people living with HIV and AIDS. Such a study would probably involve comparing the results of two sample surveys. The first might be a nationally representative survey of adults conducted before the campaign, and the second a survey of the same group conducted after the campaign. Similarly, if you were studying the effect of an intervention to increase dual protection among married couples, you might introduce the intervention in one district and use a matched district as a control (a district where you do not use the intervention but just monitor people's normal protection behaviour). You would then conduct a survey that was representative of all married couples in the districts and compare the prevalence of dual protection.

Three factors determine how accurate a sample is as a description of a population:

1. The methods used to select the sample must not bias the sample, that is, the sample must be truly representative of the larger universe. For example, if you wanted a sample of women ages 15–49 and selected only unmarried women who are friends of the interviewers, this would be a biased, unrepresentative sample.

2. The characteristics of the sample must be consistent with the characteristics of the population of interest (for example, if the population is unmarried women, the sample must consist of unmarried women).

3. The numerical estimates provided by the sample must accurately represent the true values in the population. For example, if the true number of condom users in a population is 30 percent and your sample estimates that it is between 35 and 45 percent, the sample is not an accurate representation of the population. However, if you estimate that the true number of condom users is between 28 and 32 percent, your sample is a fairly accurate representation of the population.

The essence of probability sampling is that each element of the larger population (that is, each couple, each field worker, or each clinic) has a known, nonzero probability of being selected. This is achieved through random selection of units for the sample from a list or sampling frame. The random process guards against the introduction of bias into the sample and against other types of systematic bias. In other words, if you are randomly sampling from a specific sampling frame (group of people or units), each person (unit) has the same chance of being selected.

A *sampling frame* is a list of the population from which the sampling units are drawn. In the rural health centre example, your sampling frame would be the list of health centres maintained by the Ministry of Health (MOH) that are located in rural areas. The accuracy of the sampling frame is important for meeting the criterion that the characteristics of the sample be consistent with the characteristics of the total population.

The completeness of a sampling frame is critical to the "representativeness" of a sample chosen from the frame. If the Ministry's list of clinics were out of date and did not include clinics opened after 1999, the sample would be representative only of clinics open in 1999 or earlier, not of new clinics. Similarly, the sample frame would also be inaccurate if some health centres that had been closed in 2000 were still included on the list, or if some centres were inadvertently listed more than once.

Finally, the sample size must be large enough to deliver the level of accuracy or precision required in your estimate of the value in the total population. We will discuss five commonly used probability sampling techniques that prevent bias: simple random sampling, systematic sampling, stratified sampling, cluster sampling and multi-stage cluster sampling. Then we will explain key elements in estimating sample size. While this chapter will prepare you to work with a sampling specialist, it will not make you a sampling specialist. When you conduct probability sampling you should always seek assistance from an experienced professional.

3.3.2 Simple Random Sampling

In simple random sampling, each element of the larger population is assigned a unique number, and a table of random numbers or a lottery technique is used to select elements, one at a time, until the desired sample size is reached. Bias is avoided because the person drawing the sample does not manipulate the lottery or random numbers table to select certain individuals.

Simple random sampling is usually reserved for use with relatively small populations with an easy-to-use sampling frame. For example, if the medical record files (the sampling frame) of 600 outpatients (the universe) are ordered consecutively from 1 to 600, it will be quite easy to draw a simple random sample of 100

outpatients. However, this procedure can be very tedious when drawing large samples.

When drawing a random sample from a sampling frame, you need to generate a list of random numbers in order to know which units to select as part of the sample. You can do this using many different online or computer programmes (Excel, EpiData or any analysis software such as SPSS, STATA, SAS). From the example above, once you have your medical record files numbered 1-600, you would then generate a list of 100 random numbers. Once you have that list of random numbers (example: 2, 43, 96, 301 …whatever the random number generator spits out) then you pull the medical record file with that corresponding number. Then you have your simple random sample.

TIP: In Excel you can create a random number column with the function "=RAND()*1000".

3.3.3 Systematic Sampling

This is a modification of simple random sampling, which is ordinarily less time-consuming and easier to implement. The estimated number of elements in the larger population is divided by the desired sample size, yielding a sampling interval (let us call it k). The sample is then drawn by listing the population elements in an arbitrary order and selecting every "kth" case, starting with a randomly selected number between 1 and k.

In this example, your sampling frame would be a list of rural health centres arranged alphabetically by health centre name. If your desired sample size is 285 rural health centres drawn from a universe of 2,000 rural health centres, the sampling interval, or the chance of one health clinic being in the sample, which we will call *t*, is 2,000/285 =7. You would then choose a randomly selected number between 1 and 7 as your start. If your random number is 3, the first unit selected would be the 3rd rural clinic listed in the sampling frame, the second would be the 10th (k+t = 3+7) clinic listed, the third the 17th (k+t+t), the fourth the 24th (k+t+t+t), and so on until the sampling frame is exhausted.

Systematic sampling is useful when the units in your sampling frame are not numbered, when the elements are not numbered serially, or when the sampling frame consists of very long lists.

3.3.4 Stratified Sampling

Populations often consist of strata, or groups that are different from each other and that consist of very different sizes. For example, rural health centers, urban health centres, and hospitals are often very different kinds of establishments. Similarly, the proportion of urban and rural residents in a district or of HIV infected and HIV negative patients attending prenatal clinics are likely to be very different. To ensure that all relevant strata of the population are represented in your sample, you would use a technique called stratified sampling.

Stratification may be used in conjunction with either simple random sampling or systematic sampling. When stratifying, each stratum is treated as a separate population. You would arrange your sample frame by strata, and then draw a random or systematic sample from each. Estimates for each stratum are then combined to produce an estimate for the total population.

You can draw either a proportionate or disproportionate stratified sample. If it were important that the age distribution of your sample is the same as the age distribution of your population, you would draw a proportionate sample by separating the groups and then use the same sampling formula on each group separately (for example, if your strata were ten-year age groups between ages 15 and 44, you might sample every 100th person aged 15–24, every 100th person aged 25–34, and every 100th person aged 35–44). Proportionate stratified samples are perhaps the most commonly used type of stratified sampling.

However, in evaluations, you sometimes encounter situations in which strata are so different in size that it is impossible to get a needed minimum sample size. If you use a single sampling fraction, you must draw a disproportionate stratified sample. For example, if your strata are 4,000 rural health centres, 3,000 urban health centres, and 50 hospitals and you want to estimate the proportion of AIDS-related visits in each strata, you would have to use a smaller sampling fraction for hospitals than for health centres.

3.3.5 Cluster Sampling

Cluster sampling is the most commonly used probability sampling technique in the behavioural sciences. Cluster sampling refers to techniques in which samples are selected in two or more stages.

Cluster sampling is used when it is not possible to get an adequate sampling frame for the individuals you wish to study, or when a simple random sample technique would result in a list of individuals so dispersed that it would be too costly to visit each one. The disadvantage of a cluster sample is that it increases sampling error and requires a larger sample size for reliable estimates of population characteristics. If

the cost of the larger sample size outweighs the costs associated with un-clustered sampling, clustering should not be used.

A cluster is a group of sampling units rather than an individual unit. Examples of clusters include all the AIDS patients in a hospital, all the peer educators in a district, all the women in a town, all the children in a household, or all of the schools in a district.

Example: You would probably use cluster sampling to study AIDS widows. No list of AIDS widows exists, but you do have a list of households. Your strategy would be to first select a random sample of households. If the clusters contained a small number of individuals— for example, only one or two women of marriageable age per household—then you might interview all of the individual sampling elements included in the cluster.

However, if the number of sampling elements per cluster is large (for example, the number of AIDS patients in a hospital); you would select a random sample of elements from within the cluster. This is referred to as *two-stage cluster sampling*.

3.3.6 Multi-stage Cluster Sampling

Sometimes, when populations are extremely complex, it is necessary to go beyond two stages in cluster sampling, a technique referred to as multi-stage cluster sampling. For example, if you do not have a list of households for your survey of AIDS widows, you might have to begin with a random sample of villages (called the primary sampling unit or PSU), and when you arrive at each village, make a list of households (called the secondary sampling unit) and draw a random selection of households to visit. When you arrive at a household, you would randomly select a woman to interview, or interview all eligible women. In either case, you would apply a sampling fraction to each village, such as one out of five households or one out of ten eligible women.

3.3.7 Sample Sizes

Many handbooks contain formulas for estimating sample size because the size of the sample is one of the most important determinants of the accuracy of survey estimates. However, we will not provide formulas for sample size estimation. Formulas differ among sampling strategies (for example, those used in cluster

sampling are different from those used in simple random sampling); population size; the type of variable being studied; experimental design, if any; and type of statistical comparison planned. Explaining all of these formulas is beyond the scope of this chapter and presenting any single formula would be of little relevance to most evaluations. Rather, in the remainder of this chapter we will discuss some of the basic factors that affect sample size, to familiarize the reader with the concepts necessary to work with a sampler or select an appropriate formula from any standard textbook on sampling.

We will begin our discussion of sample size estimation with an important warning. If your objective is to obtain a probability sample that is representative of a relatively large population, such as in a typical descriptive survey, you need to obtain the assistance of a sampling specialist. A nationally representative health survey may have sample sizes of 5,000 to 6,000 or more individuals. Sample sizes of this magnitude will allow accurate estimates of several different variables for different subpopulations, but the cost may be hundreds of thousands of US Dollars.

A sample size appropriate to the needs of an evaluator depends on two concepts: ***precision*** and ***confidence level***. Precision is the amount of sampling error that can be tolerated by the evaluator. Confidence is the level of certainty that the true value of the variable being studied is captured within the *standard error*, or sampling error. A standard error is simply the difference between the true value of the variable in the population and the estimated value of the variable obtained from the sample.

In calculating sample size, the evaluator and programme decision maker must first decide how much precision they need in their estimate and how much confidence they need in the result. The greater the precision and confidence required, the larger the sample size needed. For some purposes, an error of ±10 percent might be tolerable, but for other purposes a standard error greater than 1 percent might not be tolerable. Usually, the degree of precision needed depends on the consequences of accepting a study finding as true when in fact it is not true—in other words, it is an error. If people may die because of an error, a great deal of precision is needed in the estimate. However, if the practical effects of an error are likely to be trivial and easily fixed, less precision may be acceptable.

Another important factor in determining sample size is the amount of resources available for the study. Do you have the resources for your study to afford a 1 percent error, or must you settle for a 5 percent error? Most people would prefer small errors, that require large samples which, in turn, require large resources. The availability of resources usually determines the upper limit of the sample size used in surveys.

Remember:
The "right" sample size for a particular application depends on many factors, including the following:

- Cost considerations (e.g., maximum budget, desire to minimize cost)
- Scientific Considerations (necessary power to detect planned effect)
- Administrative concerns (e.g., complexity of the design, research deadlines).
- Minimum acceptable level of precision.
- Confidence level.
- Variability within the population or subpopulation (e.g., stratum, cluster) of interest.
- Sampling method.

In discussing with a statistician or sample expert how large a sample you will need for your study, it is important to have a fairly good understanding of several key concepts, some of which have been introduced above. One of these concepts is the *standard error.*

The *standard error* is expressed as a range around a point estimate of a variable in a study. Suppose you interviewed a sample of 200 peer educators and found that 40 percent (the point estimate) had talked to someone about HIV and AIDS that day. It is quite unlikely that exactly 40 percent of your universe of peer educators talked about HIV and AIDS on the day of the interview. It is more likely that the true number is slightly different than your point estimate, by, say, plus or minus 3 percent. The interval extends above and below your point estimate (in this case 40 percent) because half the time the true population value will be below your point estimate, and half the time it will be above your point estimate. Thus, given an error of ± 3 percent, you would say that the number of all peer educators talking about HIV and AIDS on that day is between 37 and 43 percent. If you want greater precision, you need to have a smaller sampling error and therefore a larger sample size. A sample that captures the true population value within ± 3 percent provides a considerably more precise estimate than a sample that captures the true value within an interval of ±10 percent.

What can be somewhat confusing is that this standard error interval is referred to as a *confidence interval*. In contrast, the *confidence level* is the degree of certainty (expressed as a probability) that the evaluator has that the true population variable is captured within the confidence interval. Thus, in reporting the result of a survey of HIV prevalence, the evaluator might say something like,

"The survey estimates HIV prevalence in this region at 15.6 percent. We are 95 percent certain that true regional prevalence is between 13.6 and 17.6 percent,"

or more simply,

"We can state with 95 percent confidence that HIV prevalence is 15.6 percent, plus or minus 3 percent."

So far, we have discussed sample size as a way of influencing the precision of an estimate of a single variable or observation. But in evaluations, the evaluation team is usually interested in comparing two or more observations. For example, you might ask: Has the proportion of sex workers who used a condom with their last client increased over time? Is the observed difference in increased condom use the result of your educational campaign or is it just due to sampling error? Is the difference between HIV and AIDS knowledge scores of experimental and control groups due to your new teaching approach or is it just chance?

Evaluators should determine the sample size needed to detect real differences between variables during the project design phase by using an appropriate sample size formula. These formulas all require minimum information that the evaluator must be able to provide the sampler, including the following:

- **The baseline value of the dependent variable.** For example, is the baseline value 10 percent prevalence, 12 Pula per case treated, or 200 visits per month?

- **The size of the difference between two estimates that you want to find statistically significant**. The smaller the difference between the two estimates, the larger the sample needed. The reason for this is that standard errors must be smaller to detect a small difference than a large difference.

For example, attributing a 1 percent change (for example, from 2 to 3 percent) in condom use to an intervention rather than to sampling error implies the need for a confidence interval around each point estimate that is less than ± 0.5 percent (the upper bound of your confidence interval around 2 percent is 2.5 percent; the lower bound of your confidence interval around 3 percent is also 2.5 percent). However, you need a much smaller sample size if you want to attribute a 50 percent difference (for example, from 20 to 30 percent) in condom use to your intervention rather than to sampling error. The confidence intervals only need to be less than ± 20 percent.*(Note: it is VERY difficult to ever expect to see a 50% difference in condom use or most other behavioural variables in a traditional pre/post intervention study. The 50% was used as an example).*

- **The significance level.** This refers to the probability that the size of the observed difference between the two measures could have been produced by sampling error or by chance rather than by the intervention. The smaller the significance level, the lower the probability that the change could be the result of chance. Thus, a significance level of .1 means that the probability that the observed difference was produced by chance is 1 in 10. A significance level of .01 means that the probability that the difference was produced by chance is 1 in 100. Traditionally, significance levels are usually set at .05 (or 1 chance in 20). The

smaller the probability of finding a difference that is the result of chance or sampling error, the larger the sample size required. Thus, to reduce the probability that the result is due to chance from 1 in 20 to 1 in 100 can, for a given difference, increase required sample sizes from 70 to 90 percent.

- **The confidence level.** This is the probability that the true value is within the specified confidence interval (see above). Usually, other issues also need to be addressed in the sample size formula. If a cluster sample will be used, it is necessary to adjust sample size upward. If the sample is from a small universe (less than 10,000 units), a multiplier (the finite population correction) can be used to adjust sample size downward.

3.4 Developing Questionnaires

A questionnaire is a structured series of questions that allows the researcher to collect data from a targeted group of people about their opinions, behaviour, or knowledge of a health issue or health programme in their community. In developing a questionnaire you need to find and/or create the questions, format responses to the questions, understand the sensitivities that might affect data collection, test the questionnaire, and prepare the people that will administer the questionnaires. We use a questionnaire if the data are not available from other sources in order to answer our research question. A questionnaire will standardize our measurements so we can generalize our findings from the study sample to the national population, gender, community or health district.

Below we will describe how to develop a questionnaire. This will include how to create good questions, and then how to structure, format, and pre-test your questionnaire. Also, we discuss how to prepare your interviewers who will administer the questionnaire in a health district. Finally, we describe how to enter and manage the data resulting from your questionnaire.

In putting together a questionnaire you can either use questions that already exist or create your own. Most questionnaires will have a mix of questions. The questionnaire will use most questions or scales that already exist, but it will include some newly developed questions for data specific to the health issue and context of the study such as the community or study population like women, youth, or ethnicity. In the section below, we discuss how to select the right existing questions or questionnaires for your study as well as how to adapt existing questions and create your own questions.

3.4.1 Working with Existing Questionnaires

As you determine the data you need, you should remember there are lots of already established questionnaires, questions, and scales that already exist. Using existing questions has many advantages. The most basic advantage is that it can save you the time of trying to develop your own questions. Also, using existing questions allows you to draw on the experience of experts who have spent a lot of time developing and testing the questions, checking specific items, and scales for validity, and reliability. Finally, using the same tools and questions as others allows you to compare your findings. For example, conducting a study in your district using the same questions as those used in the national *BAIS* would allow you to determine whether the percentage of young people who can correctly identify ways of preventing the sexual transmission of HIV in your district is lower or higher in your district than the national average. Whenever possible, existing questions should be used when creating your questionnaire.

However, one should not blindly choose questions and scales just because they already exist. When you find a questionnaire that you think you might want to use, you should look at it critically. Usually, there is an article or report associated with the tool that describes how it was developed, what tools it was based on (if any), information on the reliability and validity (particularly for scales), findings of its use and any limitations or problems they had when using the tool. All of this is useful information in deciding whether or not to use these questions. In addition to the information provided by others, you should also review the tool to determine whether it is suitable for your context. For example, including several detailed questions on men having sex with men or anal sex may not be appropriate for the general Botswana context, but may be appropriate for surveying a community of men who have sex with men (MSM).

The advantages and disadvantages for using existing questions are summarized in Table 3.4.1.

Table 3.4.1 Advantages and Disadvantages for Using Existing Questions

Advantages	Disadvantages
• Saves time in developing questions • Questions will have been already pre-tested and may have been assessed for reliability and/or validity • Their use will permit comparison between studies and possibly combining data. (e.g. a district survey that may have same questions as DHS so can compare) • An easy way of drawing on the expertise of others	• May have poor design or poor accuracy • May not be suitable for use in your specific study population • Prior questionnaire on topic or research question may not exist

Where to Find Existing Tools and Scales

Most topics have been researched or evaluated, and the tools are increasingly becoming available through the Internet. Resource 3.1 (at the end of this chapter) includes a list of tools available either through the Ministry of Health in Botswana or other websites on the Internet.

Adapting Existing Questionnaires

Adaptation is the intentional modification of a question or questionnaire to create a new question or questionnaire. The goal of adaptation is to fit the questionnaire or question to the needs of the population, location, language or mode or any combination of these factors (Harkness *et al*. 2010). The key question to ask yourself of an existing questionnaire is: Does this fit my needs? If not, then what do I need to modify and why and in what way?

(The types of adaptations below adapted from *Questionnaire Design in Cross-Cultural Survey Guidelines* (Harkness *et al*. 2010))

- **Units of measurement** may need to be changed to fit the context. A basic measurement unit would be translating Fahrenheit to Celsius temperatures.

- **Comprehension** to ensure that examples or explanations make sense in the context. For example, if you ask a patient how many miles the nearest health clinic is located from their home, then they may not be able to answer the questions in miles. But, if you ask the same question references some form of time or daily activities, then you are more likely to get a more accurate response to your question.

- **Conceptual coverage** ensures that you are providing the general understanding of a health event in a particular community. For example, among some communities in the US, a headache is often described as "pounding", but a headache in another context may have another patient description.

- **Cultural discourse norms** acknowledge how certain groups should be addressed in a particular context. For example, it may be important to recognize social status, age, and other interpersonal relationships to ensure that people participate in the questionnaire.

- **Cultural sensibilities** are incorporated into questionnaires so that people are not offended or misunderstood by how the topic is represented. For example, in some contexts, images of a mother nursing her child may be ok as a cartoon but not as a photo. However, in other contexts, cartoons of nursing mothers may be too abstract and photos are more accepted. It all depends on where you are and who is participating in the questionnaire.

- **Design elements** of the questionnaire are important to consider as well. The direction of the text will be important depending on the language for the questionnaire.

- **Lexicon and Grammar** should be contextually relevant. This means that the response options to a question should make sense in the context.

- **Level of difficulty** of the questions should remain low. Therefore, the questions may need to be re-written to adjust to the level of education. In a community that does not have a high literacy rate, college level vocabulary may not be appropriate. In one survey developed among illiterate women designed to understand water usage in Sudan, commonly understood symbols were used as response options instead of words to ensure participation.

3.4.2 Creating Your Own Questions

As we have stated above, whenever possible, existing questions should be used when creating your questionnaire; you should adapt a questionnaire or question using the criteria above. However, existing questions may not already exist. In this case, it may be necessary to develop your own questions for a questionnaire. In this section, we will discuss the types of questions you can develop for your questionnaire and provide 9 tips for creating good questions.

Questions on a questionnaire can take on two main formats: open-ended and closed-ended questions. With *open-ended questions* no answers are provided. The question is asked and an open space is provided for the response to be captured or recorded. In an interview, probing may be used to ensure that relevant aspects of the topic are covered by the answer. With *closed-ended questions* the possible answers are specified and the respondent chooses among them. The most notable difference between these two types of questions is that open-ended questions do not have pre-stated answer categories.

An example of this difference between these two types of questions is seen below:

- Are you very satisfied, somewhat satisfied, somewhat dissatisfied, or very dissatisfied? (closed-ended)
- How satisfied are you? (open-ended)

Open-ended Questions

Within a questionnaire, which would primarily contain quantitative, close-ended questions, open-ended questions should be used for eliciting and recording *simple* facts to which there are a large number of possible answers—for example, occupation, country of birth, address, and amount of alcohol drunk in a particular period of time. Open-ended questions can be used to give more information and context to quantitative question. For example, if in one question, participants responded that they quit smoking because of pressure from a family member, a follow-up question could ask about the relationship between the participant and the family member. In this case there are such a range of responses (e.g. my father-in-law, my second cousin, my step-sister) that it would be difficult to close the responses. These are called *short-answer open-ended questions*, in comparison to long answer open-ended questions, which would elicit answers that are a couple sentences or a paragraph in length. Long answer open-ended questions should be avoided in structured questionnaires because they are time-consuming and difficult to analyze, particularly if you are surveying a large number of people with your questionnaire.

Tips for creating open-ended questions

1. Specify the unit that you would like your answer in, both in the question stem and next to the response space.
2. Create answer spaces to match the answer requested. Having answer spaces that
   - Original Question: Please write your birth date below.

     _____
   - *Revised Question:* Please write your birth date below.

     ___ ___ / ___ ___ / ___ ___

     Day / Month / Year

In addition to recording basic information (age, address, phone number, etc.), short-answer open-ended questions are useful for behaviours that individuals may have difficulty recalling, particularly socially undesirable behaviours. For example, when a group of people were asked how many cigarettes they smoked per day, the percentage who reported smoking more than 4 cigarettes a day ranged from 16.2% to 37.5%, a difference of 20 percentage points (see Figure 3.4.2.a). For many individuals, it can be difficult for them to recall exactly how many cigarettes they smoke per day. To answer the question, they might think through how many cigarettes they smoke in the past few days and try to average how much smoke on the weekend. When making these types of mental calculations, respondents look to the question itself to give them clues in how to answer. In this case, the respondents are using the response sets to help them figure out what "normal" behaviour is. They may then try to judge how they relate to the normal population, which they

figure is based on the middle values provided in the response set, or about 2 ½ cigarettes for the low scale and 4 cigarettes for the high scale. They then try to determine whether they smoke more or less than the average person. This is how a closed-ended scale can influence participants' responses.

Table 3.4.2.a Percent of Individuals reporting smoking more than 4 cigarettes per day

	Low Scale	**High Scale**
Response sets	A) 0 to 1 B) 2-3 C) 4-5 D) More than 5	A) Less than 2 B) 3-5 C) 5-7 D) More than 8
% Reported smoking more than 2 cigarettes per day	16.2%	37.5%

In cases like the one above, in which the behaviour is usually perceived in a negative or positive light (i.e. people do not usually like to report that they watch a lot of television, but they would want to report that they spend a lot of time with their family), closed–ended questions can lead to a greater degree of error. For example, if reporting of intake of beer is usually perceived as a more negative behaviour. It is possible to get nearly 50 per cent less reporting of beer intake when a closed-ended rather than an open-ended question was used. The advantage of open-ended questions in these cases is that subjects cannot be influenced by the response options.

However, open-ended questions are more difficult to enter and analyze. For example, the following question was used in a questionnaire for lay counsellors:

"HOW MUCH TIME DO YOU SPEND WITH CLIENTS ON AVERAGE?"

☐ minutes

While some lay counsellors recorded simple responses like "20 minutes" many wrote in "20-35 minutes" or "Depends on the type of client, for infant feeding 5 minutes, for post-test counselling of HIV patients 45 minutes". These types of answers present problems when trying to analyze the data.

Closed-ended Questions

Self-administered questionnaires should contain close-ended questions and be designed with simpler responses. For example, an interviewer could ask: "How often do you drink a glass of milk?" and the interviewer would be able to record both the frequency (e.g. 2 times) and the period (per day, week or month). This may be too complex for a self-administered questionnaire. Instead, a close-ended question with a response list (e.g., ranging from: "never or less than once a week" to "more than 3 times per day") should be used for a self-administered questionnaire.

Selecting Question Response Options

It is very important that question response options are written correctly. The choice of question response options will directly influence the data you will collect from the questionnaire. Use the following guidelines when developing question response options.

Answer options for closed-ended questions should:

- be simple and brief;
- be few in number (or subjects may skip the question or choose a response earlier in the list);
- be mutually exclusive (if only one is to be selected). If not, add, "mark all that apply" or ask explicit "yes/no" for each response;
- be exhaustive of all possible responses, or else add a final open category (e.g., "Other. Please give details _____");
- not influence the response. Respondents are reluctant to place themselves in the extreme category of an undesirable behaviour. E.g., for alcohol intake, add an extreme category, e.g., 6+ per day, to encourage response a category like 4-5 day, which in comparison seems less extreme;
- not include "don't know", except when some respondents would truly not know the answer. E.g. for family history, a "don't know" is needed for those who are adopted. Generally a "don't know" category leads to a smaller % of usable responses; and
- be in a logical sequence.

Learning Activity 3.4.2

Question Response Options

Directions: Using the tips listed above, read the question below and describe all of the problems with the response categories given.

Question: ***WHAT SPREAD DO YOU USE ON BREAD?***

Butter ❑

Regular margarine ❑

Low fat or diet margarine ❑

Discussion 3.4.2

Question Response Options

The following is a list of possible problems with the response categories listed above:

- *Not mutually exclusive.*
- *Better question: "What spread do you usually eat on bread?" or add an instruction to "Mark all that apply"*
- *Not exhaustive. Add responses "Other spread" and "I do not eat bread with a spread"*
- *Not good sequence: Specific "Low fat margarine" needs to be needs to be before "regular margarine" which is a more general option.*

Question Responses Format

Determining the format of your responses is important and will determine the analysis that you can perform after gathering data. If you recall from Workbook 2; data, or variables, can be categorical or nominal. In generating a response format you will have to keep in mind which kind of variable you have. As you recall, variables are things like age, sex, town, etc.; anything that may vary from person to person.

In statistics, a variable has two defining characteristics:

- A variable is an attribute that describes a person, place, thing, or idea.
- The value of the variable can "vary" from one entity to another.

Categorical Data

Categorical data are names or labels and can be assigned to a category. Categorical data can be further divided into *nominal* or *ordinal* data.

- ***Nominal Data***

  Nominal data can be assigned a code which can be a name or a number. The number is only a label. Items with that number can be counted but cannot be put in any order or measured. An example is gender (male or female can be given the code 1 & 2 respectively). 'Male' and 'Female' do not follow any particular order - you cannot say that one comes before the other. Nor can you add or subtract males from females; or females from males.

- ***Ordinal Data***

  Ordinal data are numbers or values that have a natural order but do not contain a zero point. You can count the numbers and put them in order, or ranking. However, unlike true numbers, you cannot meaningfully calculate the distance between the values. For example, it is possible to ask worker to order things contribute to their satisfaction 1-5. Perhaps 1st ranked is a good salary, 2nd is subsidized housing, 3rd is good relationships with supervisors, 4th is good relationship with colleagues and 5th is reasonable working hours. What you would not know is the measurable difference between when the different reasons – was it a close decision between salary and housing or did salary far surpass housing? Do salary and housing combined make the other reasons insignificant or do they all contribute almost equally? All we know is that salary was ranked before housing which was ranked before supervisors etc. We do not know what the measured difference between these reasons would be.

Numerical Data

Numerical data usually represent and describe a quantity that can be measured. The data can have *discrete* or *continuous* values.

- ***Discrete Data***

  Discrete data are measured with numbers that are distinct and separate. Discrete data are usually used in cases where we are counting something, such as number of people, equipment, services provided. Data is considered discrete if the thing you are counting, because of its nature, cannot be divided. For example, if we are counting the number of people in your immediate family, we would not say 5.5. People cannot be divided just as a vaccine cannot be divided if you`re counting vaccine's delivered.

- ***Continuous Data***

  Continuous data are numbers that can have any value, including infinity and have a set interval. Continuous data can be counted, ordered and measured. These numbers have a set zero point. For example, weight can be written based on rounding to the nearest kilo (75kg) or it can be written in a more exact manner with 2 decimal points (74.87kg). This data is continuous because it can be any number, or fraction of a number in relation to zero.

It is important to decide what type of response you need from your variable to answer the question; for example, how to use this information for creating good questions.

Tips for Creating Good Questions

1. **Have clear measurable goals for each question.** You should know exactly why you are asking the question and what it will be used for when you have it. Think through how each question relates to your main research question or study objective – do you need to know the answer to the specific question in order to address your study objective or would it just be nice to know? Make sure that each question will be something that you will present in your analysis.

2. **Use simple language that anyone can understand.** For people to answer questions they need to be able to understand them. Try not to use overly technical or complex words or phrases or abbreviations. For example, rather than asking "How many occupants are there in this household?" you would ask "How many people live here?" A general rule is to stick to words shorter than six or seven letters where possible (Friedman 2009). If you anticipate it may be a hard concept to explain or ask about, ask some people in your target population beforehand to get a sense of the ways people are most comfortable approaching the topic and answering the questions.

3. **Avoid vague words.** Avoid vague words in your questions such as "usually", "normally", and "regularly". These types of words can be interpreted many different ways and are not specific enough. Also, it is better to ask about "usual" behaviour over a specific period of time, e.g., usual intake of alcohol over past 12 months.
    - Question: *How old were you when you first began to smoke cigarettes regularly?*
    - Revised Question: *How old were you when you first smoked one or more cigarettes a day for one month or longer?*

4. **Avoid questions that are too precise**. While precision is desirable for amount or duration of exposure, respondent burden may be too high if too much precision is requested. For example, you would not want to ask smokers to estimate their average daily cigarette consumption for each year of their smoking life. This would be too difficult for them to be able to accurately estimate.

5. **Avoid biased questions.** Avoid "biased", "leading", or "loaded" questions. These are questions that suggest to the respondent that a particular answer is preferred. Biased questions are more likely when asking about attitudes or beliefs than factual data. In the example below, the original question uses the strong negative word "banned," so subjects may say no.
    - Question: *Do you think that sex work should be banned?*
    - Revised Question: *Do you think that sex work should be permitted or not permitted?*

6. **Avoid double negatives.** A double negative is when a question that is phrased negatively can have a negative answer. With these questions, it is unnatural to say "yes" when the answer really means "no."
    - Question: *Should the traditional authority not be responsible to the district representative?*
        - ❑ Yes
        - ❑ No
    - Revised Question: *Who should the traditional authority be responsible to – the district or the regional representative?*
        - ❑ District Representative
        - ❑ Regional Representative

7. **Ask one question at a time.** Consider the example below. While a respondent might regularly compile the report, he or she may not be responsible for regularly submitting the report. This type of question would then be difficult for the respondent to answer – should he or she only count the times that they compiled *and* submitted? Or should they count the times that they either compiled or submitted? In order to avoid confusion, it is best to use break down the question into several more simple questions.

- Question: *In the last year, how many times did you compile and submit the quarterly report?*
- Revised Questions:
    - *In the last year, how many times did you compile the quarterly report?*
    - *In the last year, how many timed did you submit the quarterly report?*

8. **Avoid questions that require calculations.** Questions that require calculations place undue burden on respondents and may lead to estimations that may not accurately reflect reality. In the example below, most subjects would need to break it down into the number of times they walked each week and the minutes walked per session, and then multiply these together (and then convert to hours!). This question can be simplified by breaking it down into two simple questions that participants can answer.
    - Question: *In the past year, about how many hours per week did you walk for exercise?*
    - Revised Questions:
        - *In the past year, about how many times/sessions per week did you walk for exercise?*
        - *How many minutes did you walk each session?*

Potential Problems & Solutions When Creating Questions

Recall

A disease or the behaviour of interest may be influenced by exposures or behaviours that occurred months or years before diagnosis. It is hard to ask a person to recall things from a long time ago. Some approaches to improve recall are now supported by an increasingly strong body of research on memory.

Ways to improve recall of past exposures, behaviours, etc, include:

- Lists of alternative answers. Example: When asking a question on recreational activities you participate in over the last 10 years; give a card with list of 40 activities. (Then ask sub-questions on each of those activities.)

- Pictures. Example: To recall type of ART drugs taken in the past, show photographs of different packaging, including the pill itself, the packaging, and the brand and generic names.

- Use lead-in questions to help the participant recall a specific time period. E.g. In 2002, where did you live?

- Use of a ***life events calendar***, on which subjects place personal landmarks (e.g., marriage, birth of children) and/or job and residential histories. (Because this is complex, it should only be used for interviewer-administered questionnaires when the interviewer has been well trained in this method.)

Figure 3.4.2b Example of a Life Events Calendar

Recall of Types of Antiretroviral Medicines Ever Used

First draw line for marriages and periods of "living as married" in black marker, pregnancies in blue marker, and then record periods of Antiretroviral use in red. Then ask detailed questions for each of the periods of Antiretroviral use if they are not consistent.

Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1998											
1999											
….											
….											
2010											

Life events calendar and lead-in questions are examples of ***autobiographical sequences.*** These are groups of events clustered in time, and often organized within some wider framework (e.g., a job or an illness) within which memory appears to be organized. Entry into an autobiographical sequence, e.g. by calendar time, place lived, or some highly impactful event such as illness or family death, may assist in recall of events or behaviours of lower impact.

Use of these approaches also improves the accuracy of recall of the *dates* of events, as well as recall of the events. Most life events are not stored with dates. Instead, people attach dates to events by relating them to datable events (e.g., marriage, deaths, births) and time periods (jobs, places of residence, studies).

These calendars also provide the respondent time to think about the question. Evidence suggests it might take many minutes or even hours to retrieve some information.

After items are decided upon and are phrased into questions, then you create the questionnaire and test it.

Social Desirability and Effect of the Interviewer on the Respondent

This is a possible factor in all interview situations. The respondent may mistrust the intention of the interview and avoid certain questions or give misleading answers**.** Such bias can be reduced by adequately introducing the purpose of the study to informants, by phrasing questions on sensitive issues in a positive way, by taking sufficient time for the interview, and by assuring informants that the data collected will be confidential.

It is also important to be careful in the selection of interviewers. In a study soliciting the reasons for the low utilization of local health services, for example, one should not ask health workers from the health centres concerned to interview the population. Their use as interviewers would certainly influence the results of the study.

Respondents generally want to "look good" in the eyes of others. None of us likes to look like we do not know an answer. We do not want to say anything that would be embarrassing or considered "incorrect." If you ask people about information that may put them in this kind of position, they may not tell you the truth, or they may "spin" the response so that it makes them look better. This is known as *social desirability* and can be a problem in a survey where the interviews are face-to face.

Another example is if you are asking about condom use. Most people have seen the campaigns and know they *should* be wearing a condom each time they have sex to reduce the risk of HIV transmission, but they may not. So they may tell you what they think you want to hear instead of the truth if you ask about consistent condom use. In order to minimize this, the instructions could include reading a passage that states "We know that most people want to use condoms in every encounter but are often not able to. We would like to know in your last 10 encounters how many times you were able to use a condom." This way you minimize the judgement in the question by acknowledging that there could be other factors that prohibit condom use beside a failure of responsibility on the part of the participant.

Sensitive questions

Sensitive or threatening questions are those that ask respondents about behaviours that are illegal, against the norm or tradition, or are generally not discussed in public without tension. Sensitive questions can cause respondents to feel embarrassed, ashamed, or sad. Behaviours or attributes that are socially desirable (e.g. exercise, eating vegetables, taking medicines) tend to be over-reported. Those that are socially undesirable (e.g. illegal drug use) tend to be underreported. Questions about income, savings, age, and assets are sensitive but have not been found to lead towards consistent over or under-reporting. If these types of questions are required based on the needs of the study, then you should work with the appropriate

administrative channels to ensure confidentiality of your participants and so you can explain to them that they will be protected.

There are many strategies to elicit more accurate answers to sensitive questions. The following are a few:

- Select a more impersonal mode of administration of the survey so people feel there will be less judgement of their answers. Instead of having interviewers ask the questions, create a self-administered questionnaire that is pre-coded so no names are used.
- Assurances of confidentiality of answers in cover letter and by interviewer at the beginning of the survey and sometimes again right before a very sensitive question.
- Extensive interviewer training and pre-testing of interview if a personal interview is to be used for the survey
- If in-person interview is used in survey, could ask in a straightforward way, using a very accepting demeanour and voice tone and in order to increase the level of comfort and of the interviewee to yield accurate answers.
- Use open ended-questions (see above)
- Use a minimizing introduction (see below)

3.4.3 Questionnaire Structure

In addition to the questions, every questionnaire should contain an introduction, instructions (including skip patterns), linking phrases between topics, and a conclusion.

Introduction

The purpose of the introduction is to gain respondent participation and cover some of the ethical obligations to the subjects. During a face-to face interview survey, the introduction statement is read by the interviewer given after the respondent has already given informed consent. When you are using a self-administered questionnaire, the introduction is usually part of the letter soliciting subject's cooperation. This introduction should include:

1) who is soliciting the information (i.e. The Ministry of Local Government (MLG) or an non-governmental organization (NGO)),

2) who is administering the questionnaire,

3) what is the purpose of the questionnaire,

4) definitions of key concepts or ideas,

5) overview of the type of questions,

6) how many questions,

7) how long it will take someone to complete the questionnaire, and

8) confidentiality and anonymity of participation.

Here is an example of an introduction:

We appreciate your willingness to complete this questionnaire. This questionnaire was developed by the Ministry of Health. We would like to understand your use of the district health centre in your area. The results of this study will be used to inform how the clinic is run in the future to provide you access to health care. The questions ask you to inform us about when you use the district health centre and what type of conditions you seek treatment. There are 20 questions, and it should take 15 minutes to complete. Your responses are anonymous, and your individual identity will not be shared by anyone outside the study team.

If you have questions about this questionnaire, please let the interviewer know at this time.

Instructions

Instructions help to ensure that both interviewers and respondents completing the questionnaire are clear about what the questions are asking and how they should respond. Questionnaires should include general instructions at the beginning for entire questionnaire, as well as specific instructions for certain questions.

Face to face Interview

- General instructions form part of interviewer training and an interviewer's manual rather than on the questionnaire.
- Question-specific instructions should appear with those questions in the body of the questionnaire, as well as in the instructions for the interviewer and should be given a special font.

Self-administered questionnaire

- General instructions should be short and simple. Usually on first page of

questionnaire.

- Question-specific instructions given in special font (e.g. italics) after some questions. These include instructions to "mark all that apply" when more than one response may be appropriate, instructions to skip questions (discussed below), and instructions about the meaning of specific questions.

Question Order

In order to ensure good rapport with your participant and gather the data in the correct order, it is important to design your questionnaire with a logical sequence. Generally, you should know who you are interviewing before the beginning of the questionnaire. Therefore, it is important to ask demographics questions first. This will allow you to tailor the questionnaire to their role in the community. Also, it does not take long to complete the demographic questions. Most importantly, you want to ensure that your participants are comfortable with you and trust you. Therefore, you should begin with less sensitive questions. In this next section, we will discuss how to set up the order of your questionnaire.

General Principles

Questions about a particular topic should be grouped together, from the general to the specific within a topic. This approach, by focusing first in a general way on a particular behaviour or experience, assists and allows more time for recall of the specific details and also allows the respondent more time to feel comfortable with the interviewer.

The First Question

It is common to place the demographic questions (e.g., race, religion, income) at the beginning of an interview. This data collection is less sensitive and does not take too much time to collect. Also, it is important to know who you are interviewing at the beginning. These questions are of low interest to the respondents, but some of them are sensitive. After your demographic questions, you should begin with a question or set of questions that relate directly to the topic of the research. This will command the subject's interest.

Example: In a study of voluntary counselling and testing (VCT) use and HIV status, you could begin with questions on recreational activities involving local VCT campaigns.

Logical Sequence

Within any topic, questions should follow a logical sequence. This is the sequence that the respondents might be expected to follow in thinking about the topic.

Example: For collecting residential or job histories, it is usual to proceed in reverse chronologic order, beginning with the present and proceeding to successively earlier ones. This approach also gives the respondent more time to recall the events of the more distant past.

Example: Birth outcomes, such as c-sections, premature birth etc., might be more easily recalled in chronological order of first birth/pregnancy to last.

Distributing Sensitive Questions

Sensitive questions are challenges for both the interviewer and participant. The participant will expect sensitive questions, if the study is explained well in the introduction. Therefore, how questions are grouped together is important. It is logical to have a sensitive question within a group of related questions. Therefore, plan your questionnaire to have sensitive questions distributed throughout the related topical areas. If you have safe condom questions earlier in the questionnaire, then position one sensitive condom question at the end, the questionnaire will not make sense. Keep the questions grouped based on topic and strategically move from each set of grouped questions so that the participant feels comfortable with the questionnaire. Do not surprise your participant at the end with sensitive questions. Remember that they expect these types of questions throughout the interview or questionnaire.

Linking Statements

Linking statements break the subject's concentration on a particular topic, provide a brief pause, and establish his or her concentration on a new topic. These types of statements may also be used to break the monotony of a long series of questions on one topic.

- To signify a major change in questioning:

  Example: The food we eat is an important part of our everyday lives. I would now like to ask some questions about the foods that you usually eat and the amounts that you eat of them.

- To break the monotony of a series of breast feeding attitude and behaviour questions:

  Example: Next, I would like to ask about your thoughts on breast feeding.

Skips or Branches

Skips or branch points in a questionnaire are used when some succeeding questions are not applicable to all respondents. For example, let us say in your questionnaire you have the question "Do you currently have TB?" followed by "What type of TB

treatment are you currently on?"

The second question ("What type of TB treatment are you currently on?") would not be relevant to those who answered "No" to the previous question, those who do not have TB. Thus you would want to add a skip pattern to make it clear that the interviewer or respondent should skip the question and move on to the next. Below is an example of how you might structure this questionnaire.

Example:

20. Do you currently have TB?
    - ☐ Yes
    - ☐ No (GO to question 22)
21. What type of TB treatment are you currently on?_____
22. Have you been treated for TB in the past two years?

Paper and pencil questionnaires rely on good instructions and navigational aids for the interviewer or respondent to follow the skip patterns. These are especially needed for self-administered questionnaires, where failure to correctly follow the skip patterns can be a major source of missing data.

Skip instructions should be:

- Placed immediately after the ***answer*** that leads to the branch point in the questionnaire.
- Always worded positively ("Go to question 4") rather than negatively ("Skip question 3").
- Be very clear and not confusing to those who are to complete the questions and subsequent questions more than for those who should skip them.

Interviewers should be well trained, and practice sessions should occur before they are tested on their ability to read the instructions carefully and following the skip patterns correctly even before they are sent to do interviews.

A way to avoid skips in a self-administered questionnaire is the inclusion of a specific "inapplicable" category among the alternative answers. In the example below, use of the "I currently do not have a main partner" response category provided an alternative answer for everyone and eliminated the need for a skip.

Example:

On average, how often do you have sexual relations with your main partner?

- ❑ 1-4 times a month
- ❑ 5-8 times a month
- ❑ 9-12 times a month
- ❑ Almost everyday
- ❑ Never
- ❑ I currently do not have a main partner

Concluding the Interview or Questionnaire

In a face-to-face interview, the conclusion should consist of the interviewer's comments, any ethical referrals, reminder of confidentiality, an expression of appreciation, and an opportunity for the respondent to make any additional comments or ask questions.

In a self-administered questionnaire, the conclusion should consist of request for the respondent to check that all questions have been answered (or that all pages have been completed, for a long questionnaire), the address for the return of a mailed questionnaire (return envelope should be included, but could get lost), a brief reminder of the confidentiality of the survey, an expression of appreciation, and an opportunity for the respondent to make any additional comments or ask questions.

Formatting Questions

It is important to format your questionnaire so that it can guide participants and interviewers as well as give a professional appearance. Surveys that look like their rough drafts may be perceived as unfinished, and participants may worry about how their information will be handled by the researcher. The first step in formatting individual questions (for both self-administered questionnaires and face to face interviews) is to identify the separate parts of questions with different fonts:

Interviewer-administered Questionnaires:

- CAPITAL LETTERS for the question
- **Bold face** for the alternative responses that are not to be read to respondent; or **BOLD CAPITAL** letters for the alternative responses to be read
- *Italics* for instructions not to be read; *CAPITAL ITALICS* for instructions to be read

Self-administered Questionnaires:

- **Bold face** for questions
- Regular typeface for alternative responses
- *Italics* for instructions

The different typefaces for questions, responses, and instructions help to lead the interviewer or respondent to the correct parts of the question. The use of capital letters (of the appropriate font) provides a consistent cue to the interviewer of what is to be read aloud.

Other visual changes, e.g., underlining words, can be used to emphasize a change in concept, for example when the time frame differs between questions. However, do not overuse.

Include specific instructions and prompts (for interviewers) with the question as needed. Record responses to closed-ended questions by using check boxes. Use of vertical answer formats (except for scales) makes it clear which box goes with which response. For scales or ratings (e.g., a scale for an attitude or for degree of pain), it is better visualized on self-administered questionnaires if horizontal.

Example:

1. No Pain

2. A little Pain

3. Some Pain

4. Lots of Pain

5. Severe Pain

May be less visually helpful than:

1. No Pain **2.** A little Pain **3**. Some Pain **4.** Lots of Pain **5.** Severe Pain

Provide spaces or boxes for coding open-ended questions that will be coded after the interview (e.g., occupational coding). It is also helpful for data entry if the response numbers are consistently placed toward the right hand margin. If you do not want the coding on the page, the codebook will also have the coded questionnaire, but it is recommended to do both to limit data entry errors**.**

Example: If key entry is to be used, pre-code closed-ended responses into numbers to facilitate key-entry.

Yes ❑1

No ❑2

Presentation of Self-administered Questionnaires

Presentation of the questionnaire is particularly important if it is to be self-administered, both for ease of use and to give a professional appearance that will encourage response.

Key standard ways to format and present the self-administered questionnaire include the following:

- use a booklet format;
- put title of project and instructions on first page;
- include a graphic and/or colour for visual interest;
- consider coloured background with white response boxes (for both open–ended or check marks) – this may reduce missing data, as white boxes stand out from a coloured background;
- use a two-column format-- easier to read, because participants may skip words when reading longer lines of text. Also allows more questions per page;
- the vertical answer format will increase the amount of space between questions, and that is good so that questionnaire not look too congested;
- consecutively number pages and questions;
- question numbers should extend to the left of questions to stand out;
- subsections of questions should be indented and identified with letters rather than numbers;
- questions should not extend over more than one page; and
- make skip patterns clear, e.g., through use of arrows after response and instructions.

3.4.4 Pre-testing and Pilot Testing Questionnaires

There are two methods for developing a questionnaire: Pre-Testing and Pilot Testing. *Pre-test* is used for the early testing of the questionnaire; this can be done with colleagues or friends and helps you to correct any obvious errors. *Pilot test* is for later testing of the study field methods, and should be organized just like you want your study to be organized but with just a few people. When you pre-test, the subjects selected should be similar to the target population in terms of age, education, and study eligibility criteria.

Pre-testing is a method of determining if your survey was well constructed, user-friendly and gives you the answers that you expect. For example, perhaps you ask an open-ended question "How long does it take you to fetch water?___" expecting that the participants will respond in hours. However once you pre-test your survey on a few people you find that someone wrote in "it depends on if my neighbour's car is working". This will tell you that you have to revise your question. You can specify that the answer should be in hours, you can ask them to give you an average, or you can ask them about a normal day.

Pre-testing your survey questionnaire is essential, even if the questionnaire is mostly based on previous questionnaires. It is an important step that will help you determine if there are problems with ambiguous questions, leading questions, length of the survey, survey language, and questions that are worded incorrectly or felt are too personal for people to answer. In pre-testing, you would survey a much smaller group of people who have the same characteristics as your target survey group, and then discuss their answers and overall impressions of the survey with them.

Pre-testing gives you both qualitative feedback and quantitative feedback (you can look at the data the interviewers collected). It also lets your interviewers practice their reading of the questionnaire, the skip patterns, etc. By looking closely at the data gathered by the questionnaire, you should be able to determine if the questions were understood, answered, skip patterns worked or lead to entire questions being skipped, etc. Pre-testing and then taking the time to think through the survey and change it accordingly must be planned in advance as it can take a while, but is very worthwhile to the success of the survey.

What You Need to Know from a Pre-Test

- Are all the words understood?
- Are the questions interpreted similarly by all respondents?
- Does each closed-ended question have an answer that applies to each respondent?

- Are some questions not answered?
- Do some questions ask questions that lead to unclear answers?

Cognitive/Intensive Interviews

Cognitive interviews with respondents are good when designing new questions for a questionnaire. The aims of these types of interviews are to understand which questions are misunderstood and which questions are too complex and need to be decomposed into simpler questions.

To do this, you ask respondents to think out loud while coming up with response or explain how they came to their response after the answer has been given. You tell them this first and then you ask the question. You can also use specific probes about how a specific question was answered.

> *Example: For the question "How many people are in your household?" you would ask after the respondent had filled it out if he/she included himself/herself in the count.*

Because this is a time consuming but informative form of pre-testing, each respondent is only asked in detail about only 4-8 questions.

Expert reviews are always a good first step. An expert can be a colleague at the same level as you, or a boss or someone that understands the importance of the process you are undertaking to ensure the quality of the questionnaire. You should ask them to review the questionnaire and specifically look to see if all necessary items have been included, and to make specific suggestions or give advice on working, format, etc.

The study statistician, data processing supervisor, and M&E officer also need to review before data collection begins. These members of the study team can provide advice on feasibility and troubleshoot any issues during study implementation and data collection.

Pilot Testing a Questionnaire

In pilot testing, as was explained above, it is important that you try to produce the same conditions that will take place during the administration of the actual questionnaire but with fewer respondents. Once the questionnaire is administered you can use debriefings, observations and response distributions to understand which questions may have been confusing, unclear, sensitive, or repetitive.

Pilot testing with Interviewer and Respondent Debriefings

Debriefings are discussions with the participants or interviewers about the questionnaire. Debriefings can be interviews, or group meetings conducted

immediately or soon after the questionnaire are completed. These are completed in order to discuss if there any misunderstandings of questions and the study process. Issues to be discussed can include the time to complete the questionnaire or data collection challenges like everyone forgot to bring a pencil with them for the participant to complete the questionnaire.

Interviewers should always be debriefed after they have pilot tested the questionnaire on a number of participants. This is to help understand which items caused the most problems in terms of getting adequate answers and what percentage of the time these problems occurred. In addition, some questions may not have been confusing for participants but may be difficult for analyzers. If, for instance, many measurements of time, weeks, months, years were used to answer one question (ex. "How long have you worked here?__") than the analyzer might have difficulty in entering and analyzing this data. In some case you could even get a response that said "5" without knowing whether this was 5 days, 5 months or 5 years.

Respondent debriefings should always be done for self-administered questionnaires. Tell the respondent before the interview/questionnaire that their help is needed to identify any problems with the questionnaire.

After they complete the interview/ questionnaire, ask:

- which questions were confusing or hardest to answer and why,
- for which questions the answer they wanted to give was not an alternate response,
- whether any questions were offensive,
- whether they found it easy to follow the skip patterns, and
- why they skipped a question.

Questions could also be asked about specific items the researcher has concerns about, e.g., did the participant notice that the time reference changed for a particular question?

Observation of Interviews

This is done to identify interviewer behaviours such as rewording of question or tones used when asking specific questions. This also helps to identity respondent behaviours such as expressing uncertainty about the answer. This should be completed by an experienced observer who can rapidly note the verbal and non-verbal communication interactions between the respondent and interviewer.

Observations should also note how long it took for respondents to complete the questionnaire and each section in the questionnaire.

Item Non-response and Response Distributions

This can be completed after a reasonable number of representative pilot participants have completed the questionnaire/interview.

For each question, examine the:

- distribution of responses → change response categories if some responses get very low or high response (except when extreme category added for sensitive questions)
- percent of non-response (% missing/refusal and % explicit "don't know")

This step is designed to improve format of the questionnaire and reduce sensitivity of any given question. It may be that your response categories are not appropriate or refined enough for participants to respond completely. Therefore, if a question garners a low response, then you should look at adjusting the response options. Also, you may need to adjust how the question is asked to get participants to respond. One way to understand the response rate is to conduct interviews. In interviews with the pilot testing participants find out why they didn't respond or why they think others would not respond to a particular question. This will inform whether you keep the question, re-phrase the question or adjust the response options.

3.4.5 Revising the Questionnaire

Typically a questionnaire is tested and revised several times before it is finalized. Once problems are identified during a pre-test, they can be resolved though changes in questionnaire wording, questionnaire format or interviewer training. However, often a revised question that fixes problems identified by some respondents will lead to problems for other respondents. Often adding explanations to make the question clearer to some respondents will make the question longer, more burdensome or even confusing to others. Thus only modify questions that are problematic for a moderate proportion of subjects (e.g., 10% or more) and/or that have a simple fix.

3.5 Interview Preparation

Interviews are among the most challenging and rewarding forms of measurement. They require a personal sensitivity and adaptability as well as the ability to stay within the bounds of the designed protocol.

TIP: When recruiting and selecting interviewers it is important to get a sense of the candidate's personality. Ideally the person should be non judgemental, calm, patient, and comfortable talking to all kinds of people. Avoid candidates that do not listen well, speak out of turn, and add explanation that aren't in the question, or explain the questions in a conceited manner.

3.5.1 The Role of the Interviewer

The interviewer is really the "jack-of-all-trades" in survey research. The interviewer's role is complex and multifaceted. It includes the following tasks:

- **Locate and enlist cooperation of respondents**

  The interviewer has to find the respondent. In door-to-door surveys, this means being able to locate specific addresses. Often, the interviewer has to work at the least desirable times (like immediately after dinner or on weekends) because that is when respondents are most readily available.

- **Motivate respondents to do good job**

  If the interviewer does not take the work seriously, why would the respondent? The interviewer has to be motivated and has to be able to communicate that motivation to the respondent. Often, this means that the interviewer has to be convinced of the importance of the research.

- **Clarify any confusion/concerns**

  Interviewers have to be able to think on their feet. Respondents may raise objections or concerns that were not anticipated. The interviewer has to be able to respond candidly and informatively.

- **Observe quality of responses**

  Whether the interview is personal or over the phone, the interviewer is in the best position to judge the quality of the information that is being received. Even a verbatim transcript will not adequately convey how seriously the respondent took the task, or any gestures or body language that was evident.

- **Conduct a good interview**

  Last, and certainly not least, the interviewer has to conduct a good interview! Every interview has a life of its own. Some respondents are motivated and attentive, others are distracted or disinterested. The interviewer also has good or bad days. Assuring a consistently high-quality interview is a challenge that requires constant effort.

3.5.2 Training Interviewers

One of the most important aspects of any interview study is the training of the interviewers themselves. In many ways the interviewers are your measurers, and the quality of the results largely lies in how well they do their jobs. Even in small studies involving only a single researcher-interviewer, it is important to organize in detail and rehearse the interviewing process before beginning the formal study.

Here are some of the major topics that should be included in interviewer training:

- **Describe the entire study:** Interviewers need to know more than simply how to conduct the interview itself. They should learn about the background for the study, previous work that has been done, and why the study is important.

- **State who is sponsor of research:** Interviewers need to know who they are working for. They, and their respondents, have a right to know not just what agency or company is conducting the research, but also, who is paying for the research.

- **Teach about ethics and informed consent:** Interviewers are the most important people to ensure that participants were fully informed of the research and any implication is could have to the participant. They are also essentially in assuring ethical data collection and storage. Training interviewers on proper ethical behaviour, the importance of informed consent, and proper handling of data is essential.

- **Teach enough about survey research:** While you seldom have the time to teach a full course on survey research methods, the interviewers need to know enough that they respect the survey method and are motivated. Sometimes it may not be apparent why a question or set of questions was asked in a particular way. The interviewers will need to understand the rationale for how the instrument was constructed.

- **Explain the sampling logic and process:** Naive interviewers may not understand why sampling is so important. They may wonder why you go through all the difficulties of selecting the sample so carefully. You will have to explain that

sampling is the basis for the conclusions that will be reached and for the degree to which your study will be useful.

- **Explain interviewer bias:** Interviewers need to know the many ways that they can inadvertently bias the results. And, they need to understand why it is important that they not bias the study. This is especially a problem when you are investigating political or moral issues on which people have strongly held convictions. While the interviewer may think they are doing good for society by slanting results in favour of what they believe, they need to recognize that doing so could jeopardize the entire study in the eyes of others.

- **"Walk through" the interview:** When you first introduce the interview, it is a good idea to walk through the entire protocol so the interviewers can get an idea of the various parts or phases and how they interrelate. Explain respondent selection procedures, including reading maps and CPUs. Many people may not know how to follow directions on a map. In personal interviews, the interviewer may need to locate respondents who are spread over a wide geographic area. And, they often have to navigate by night (respondents tend to be most available in evening hours) in neighbourhoods they are not familiar with. Teaching basic map reading skills and confirming that the interviewers can follow maps is essential.

- **Identifying households:** In many studies it is impossible in advance to say whether every sample household meets the sampling requirements for the study. In your study, you may want to interview only people who live in single-family homes. It may be impossible to distinguish townhouses and apartment buildings in your sampling frame. The interviewer must know how to identify the appropriate target household.

- **Identify respondents:** Just as with households, many studies require respondents who meet specific criteria. For instance, your study may require that you speak with a male head-of-household between the ages of 30 and 40 who has children under 18 living in the same household. It may be impossible to obtain statistics in advance to target such respondents. The interviewer may have to ask a series of filtering questions before determining whether the respondent meets the sampling needs.

- **Rehearse interview:** You should probably have several rehearsal sessions with the interviewer team. You might even videotape rehearsal interviews to discuss how the trainees responded in difficult situations. The interviewers should be very familiar with the entire interview before ever facing a respondent.

- **Explain supervision:** In most interview studies, the interviewers will work under the direction of a supervisor. In some contexts, the supervisor may be yourself; the chief health officer; or another lead interviewer. In order to assure the quality of the responses, the supervisor may have to observe a subsample of interviews, listen in on phone interviews, or conduct follow-up assessments of interviews

with the respondents. This can be very threatening to the interviewers. You need to develop an atmosphere where everyone on the research team, interviewers and supervisors, feel like they are working together towards a common end.

- **Explain scheduling:** The interviewers have to understand the demands being made on their schedules and why these are important to the study. In some studies it will be imperative to conduct the entire set of interviews within a certain time period. In most studies, it's important to have the interviewers available when it is convenient for the respondents, not necessarily the interviewer.

3.6 Ethics and Confidentiality

"Like all social research, surveys should be carried out in ways designed to avoid risks to participants, respondents, and interviewers." (Fowler 2002, p.147)

Ethics and confidentiality is covered extensively in Chapter 1 of this workbook, which has detailed information on the HRDC, but will be reviewed here. Potential for risk to subjects (anyone participating in research) could include physical, psychological, social, economic, or legal harm. One must pay attention to the special needs and rights of vulnerable populations such as minors, mentally incompetent, victims, prisoners, persons with neurological impairment, pregnant women, and those with serious illness.

An ethics committee must approve all research. Botswana has their own ethics review and most often, the funders or donors of a project have one as well. These reviews ensure the potential findings of the research will justify the risk to subjects. This process also serves to make all researchers fully informed of purpose and competent to conduct research with appropriate scientific integrity.

3.6.1 How do we protect confidentiality?

As researchers, the integrity of the data we collect can be extremely influenced by our ability to keep information we receive confidential. If people do not trust that their information is safe and will be held confidential, they may not give honest answers, particularly in regard to very sensitive subjects.

Strategies for protecting confidentiality are specific to each situation and will require specifically tailored strategies. The ways in which confidentiality might be breached should be carefully considered before data collection begins and explicit strategies be put in place for protection. All individuals involved in the study should be trained on confidentiality.

3.6.2 Informed Consent

An informed consent form should include the following:

- Name of organization and interviewer conducting research; funder of research; IRB #
- Brief description of purposes of research
- Extent to which responses are confidential
- Confidential vs. Anonymous
- Voluntary nature of research; no negative consequences for non-participation
- Ability to answer some questions
- What will happen during the study/follow-up
- "Information" from interviewer – Written vs. Verbal
- Risks/possible benefits of the study
- Alternatives
- Payment for participation
- Cost of the study (to be in it)
- Whom to contact
- Leaving the study
- Release of study records and privacy
- Agreement to be in the study, signature or verbal with fingerprint or witness

    - Other ethical responsibilities the researcher has to the interviewers include:

- Researcher must make sure interviewer has full, accurate information about research
- Not putting the interviewer in the position of being deceptive or misleading
- Researcher must address interviewer safety and fear of crime
- Provision of transportation, escorts, change in schedule, other risk reduction measures
- Involvement of community members in various stages of research (gatekeepers)
- Respect for research site and minimal impact due to presence
- Payment to participants
- Handling of "harmful" information: keeping confidentiality *and* providing assistance
- Some benefit to *all* participants, including interviewers

3.7 Data Preparation and Quality Assurance

Data preparation involves checking or logging the data in; checking the data for accuracy; entering the data into the computer; transforming the data; and developing and documenting a database structure that integrates the various measures.

3.7.1 Logging the Data as it is Received

In any research project you may have data coming from a number of different sources at different times: coded interview data, pre-test or post-test data, any observational or qualitative data. In order to deal with all of the data in a systematic way, you need to set up a procedure for logging the information and keeping track of it until you are ready to do a comprehensive data analysis. Different researchers differ in how they prefer to keep track of incoming data.

In most cases, you will want to set up a database that enables you to assess at any time what data is already in and what is still outstanding. You could do this with any standard computerized database programme (e.g., Microsoft Access, Microsoft Excel, Filemaker), although this requires familiarity with such programmes or, you can accomplish this using standard statistical programmes (e.g., SPSS, SAS, STATA, etc.) and running simple descriptive analyses to get reports on data status. It is also critical that the data analyst retain the original data records for a reasonable period of time -- returned surveys, field notes, test protocols, and so on. Most professional researchers will retain such records for at least 5-7 years. For important or expensive studies, the original data might be stored in a data archive. The data analyst should always be able to trace a result from a data analysis back to the original forms on which the data was collected. A database for logging incoming data is a critical component in good research record keeping.

3.7.2 Checking the Data For Accuracy

As soon as data is received you should screen it for accuracy. In some circumstances doing this right away will allow you to go back to the sample to clarify any problems or errors. There are several questions you should ask as part of this initial data screening:

- Are the responses legible/readable?
- Are all the important questions answered?
- Are the responses complete?
- Is all relevant contextual information included (e.g., data, time, place, researcher)?

In most research, quality of measurement is a major issue. Assuring that the data collection process does not contribute inaccuracies will help assure the overall quality of subsequent analyses. Referring back to Workbook 2 Chapter 3 will provide you with additional information on data checking.

3.7.3 Developing a Database Structure

The database structure is the manner in which you intend to store the data for the study so that it can be accessed in subsequent data analyses. For national data the information is collected in a pre-made database – DHIS. For studies that you do you will likely need to make your own. You can refer to Workbook 2 Chapter 2 for more information on pre-made databases.

For your own database you might use the same structure you used for logging in the data or, in large complex studies, you might have one structure for logging data and another for storing it. As mentioned above, there are generally two options for storing data on computer -- database programmes and statistical programmes. Usually database programmes are the more complex of the two to learn and operate, but they allow the analyst greater flexibility in manipulating the data.

In every research project, you should generate a printed codebook that describes the data and indicates where and how it can be accessed. Minimally the codebook should include the following items for each variable:

- variable name,
- variable description,
- variable format (number, data, text),
- instrument/method of collection,
- date collected,
- respondent or group,
- variable location (in database), and
- notes.

The codebook is an indispensable tool for the analysis team. Together with the database, it should provide comprehensive documentation that enables other researchers who might subsequently want to analyze the data to do so without any additional information. See figures 3.7.3.a and 3.7.3.b below for examples of different codebooks.

Figure 3.7.3.a Example Codebook 1

Variable name	Variable description	Variable format	Method of collection	Variable location on questionnaire	Notes
Kids	# of kids	number	questionnaire	14	
Socioecon	socioeconomic status	category	questionnaire	79	
Marital	marital status	category	questionnaire	3	
Partners	# of non-main partners last 3 months	number	questionnaire	29	
…					

Figure 3.7.3b Example Codebook 2

Data Location	Variable Name	Question Code and Label
87-87	Q56	During your life, how many times have you used a needle to inject any illegal drug into your body?
		1 0 times
		2 1 time
		3 2 or more times
		Missing
88-88	Q57	During the past 12 months, has anyone offered, sold, or given you an illegal drug on school property?
		1 Yes
		2 No
		Missing
89-89	Q58	Have you ever had sexual intercourse?
		1 Yes
		2 No
		Missing
90-90	Q59	How old were you when you had sexual intercourse for the first time?
		1 I have never had sexual intercourse
		2 11 years old or younger
		3 12 years old
		4 13 years old
		5 14 years old
		6 15 years old
		7 16 years old
		8 17 years old or older
		Missing

Source: Youth Risk Behaviour Survey, http://www.arkansascsh.org/track-the-results/youth-risk-behavior-survey-yrbs.php

3.7.4 Entering the Data into the Computer

There are a wide variety of ways to enter the data into the computer for analysis. Probably the easiest is to just type the data in directly to the already created database. In order to assure a high level of data accuracy, the analyst should use a procedure called *double entry.* Double entry is when you enter the data once and set up a procedure for a different person to check the data for accuracy. For instance, a supervisor or someone besides the data entry person might spot check records on a random basis. Once the data have been entered, you will use various programmes to summarize the data that allow you to check that all the data are within acceptable limits and boundaries. For instance, using the range summary will enable you to easily spot whether there is a person whose age was entered as 601 or a 7 was entered where you expect a 1-to-5 response. Then you can go back and check these

data against the original hard copies and see if it was a data entry or an error when the interview was completed.

3.7.5 Data Transformations

Once the data have been entered it is almost always necessary to transform the raw data into variables that are usable in the analyses. There are a wide variety of transformations that you might perform. Some of the more common are:

Missing values

Many analysis programmes automatically treat blank values as missing. In others, you need to designate specific values to represent missing values. For instance, you might use a value of -99 to indicate that the item is missing, or not recorded on the original interview. You need to check the specific programme you are using to determine how to handle missing values. And remember, these values are different than opting not to answer or a "No Response" category!

Item reversals

On scales and surveys, we sometimes use reversal items to help reduce the possibility of a response set. When you analyze the data, you want all scores for scale items to be in the same direction where high scores mean the same thing and low scores mean the same thing. In these cases, you have to reverse the ratings for some of the scale items.

For instance, let us say you had a five-point response scale for a self esteem measure where 1 meant strongly disagree and 5 meant strongly agree. One item is "I generally feel good about myself." If the respondent strongly agrees with this item they will put a 5 and this value would be indicative of higher self-esteem. Alternatively, consider an item like "Sometimes I feel like I'm not worth much as a person." Here, if a respondent strongly agrees by rating this a 5, it would indicate low self-esteem. To compare these two items, we would reverse the scores of one of them (probably we would reverse the latter item so that high values will always indicate higher self esteem). We want a transformation where if the original value was 1 it's changed to 5, 2 is changed to 4, 3 remains the same, 4 is changed to 2 and 5 is changed to 1. While you could programme these changes as separate statements in most programmes, it's easier to do this with a simple formula such as:

New Value = (High Value + 1) - Original Value

In our example, the High Value for the scale is 5, so to get the new (transformed) scale value, we simply subtract each Original Value from 6 (i.e., 5 + 1).

Scale totals: Once you have transformed any individual scale items you will often want to add or average across individual items to get a total score for the scale.

Categories

For many variables you will want to collapse them into categories. For instance, you may want to collapse income estimates (in dollar amounts) into income ranges.

Example question:

What was your average income each month? _____Pula/mo.

Now let us say that you have 200 respondents. You do not want to look at each person's average monthly income, but rather want to know where people fall across the categories. So you look at the *range* and the *distribution* of answers. Let us say the answers ranged from 190 pula/mo (minimum) to 3,129 pula/mo (maximum). And the majority of the people had an income of 900-1500 pula/mo. *So you would perhaps want to create categories of the data like the following:*

- *0-999 pula/mo*
- *1000-1499 pula/mo*
- *1500-1999 pula/mo*
- *2000-2499 pula/mo*
- *2500-2999 pula/mo*
- *3000 + pula/mo*

3.7.6 Data Dissemination

After you have processed your data, you may distribute it. Anyone can request your data from government officials to university researchers, but you must understand their intention with the data. What do they intend to do with the data? If they request it and receive it, but do not do anything with the data, then it may not have been in your best interest to send them the data. On the other side, you must ensure certain guidelines to ensure that the data collection process is trustworthy, fully documented, has no confidentiality concerns and remains securely preserved (Harkness 2010). If you can demonstrate these guidelines, then researchers will be interested in using your data for their research or policy making at the local, national, and international level.

Chapter Summary

The objective of this chapter was to provide you with skills to use quantitative methods to allow you to make inferences about a population to be studied. We began with an overview of the relationship between qualitative and quantitative data, outlining in which types of questions are best addressed by quantitative methods.

There are many choices of quantitative methods to be able to answer your study objectives. The benefits and limitation of each method should be reviewed carefully and there should be a clear reason for choosing the between these methods that included structured interviews, observations, and the use of available data among others.

Once the methodology has been established probability sampling is used to choose the population to study and is an essential part of good quantitative research. A sampling frame and sampling units should be clearly defined. We also reviewed the types of sampling that could be used on a population and why you would choose each type of sampling method. Your choice of sample also has to take into account the confidence level you wish to achieve and the amount of error that you are willing to tolerate while still "proving" your outcome.

One common methodology for quantitative data collection is a questionnaire. A good evaluation uses a good data collection tool, in this case a standardized questionnaire, that is brief, unambiguous, and without leading questions. It is in your best interest to use existing questionnaires and use adaptation procedures when appropriate. The design of a survey must show that procedures have been introduced to minimize bias, either from interviewer or respondent. Data quality checks and assurance procedures need to be outlined in advance and pre-tested with the questionnaire. Therefore, training the interviewers is the key to the quality of data your survey will collect. To plan a survey, you must have a fully justified and realistic timetable and budget for activities. Ethical considerations need always to be thought through and addressed in advance of survey implementation stage.

Data management and data entry are very important in any study. If bad data comes in, bad data comes out and your analysis will be compromised. Assuring that you have a well-developed codebook for your data, double entry in your databases, and clear steps for data quality assurance will guarantee that you have clear and high quality data to present.

Self Assessment Quiz

Match the methods listed below to their descriptions:

Descriptions

___ **1.** Sam is using data that has already been collected during the Behavioural Surveillance Survey.

___ **2**. Lesego is talking to a patient. She asks "Can you tell me about your visit today?"

___ **3.** Mothusi is timing how long the lay counsellor waits before reading the HIV test results.

___ **4.** Thusani hands a set of questions about drug stocks to the pharmacist and asks her to fill it out.

___ **5.** As part of an evaluation, Lorato asks a social worker "How many patients did you see today?"

Methods

A. Semi-Structured Interview

B. Open-ended Interview

C. Observation

D. Self-administered questionnaire

E. Secondary data source

For the following research questions determine if you should use qualitative or quantitative data collection methods.

6. Find out how pregnant women like the new ANC services at a particular clinic?

7. Find out how many people who are truck driver population have been tested for HIV?

8. Describe the sexual behaviours of men aged 15-49 and women aged 15-49 in Botswana.

For each of the following scenarios, identify the type of sampling methodology being used.

9. A clinic wants a representative random sample of HIV-positive and HIV-negative patients attending their prenatal clinic. To do this, they look at the ANC records, see the total is 400, 300 of which are HIV negative and 100 of which are HIV positive. Then they sample each of these subpopulations to represent the larger proportion of HV positive/negative women attending their prenatal clinic.

10. A clinic wants to know if a patient education intervention works to help increase adherence in the ART clinic. Each patient medical record is assigned a unique number, and a table of random numbers is generated to select the desired sample size of 150. Bias is avoided because the person drawing the sample does not manipulate the random numbers table to select certain individuals.

11. A clinic wants to know how many pregnant women are declining to use the ANC services the clinic offers and why. The head of the clinic wants to go to each house and ask them if they have a pregnant woman in the household and then talk to each pregnant woman in the catchment area.

12. Match the term to the definition

1. Precision	A. The certainty that the true value is being captured give or take some error
2. Standard Error	B. The difference between the true value in a population and the estimate from the sample
3. Confidence Level	C. The amount of error that is tolerated in a sample

13. Name two advantages to adapting pre-existing questionnaires

14. Match the problem in the phrase to the tip that will correct it.

1. What is your mother's parity?	A. Avoid vague words
2. How many times do you usually go to the store?	B. Avoid biased questions
3. How bad do you think the service is here?	C. Ask one question at a time
4. How many times did you get a prescription and drugs at the clinic?	D. Use simple language

15. Describe the difference between a pre-test and a pilot test of the questionnaire.

16. Name 4 things a code book should include:

Resource 3.1 Existing Questionnaires & Tools

There are a many organizations that have a variety of well-researched and evaluated tools and resources available through their websites. The following table includes a list of tools available either through the Ministry of Health in Botswana or other websites on the Internet. Use this list to find existing questionnaires and tools that you can adapt to fit your needs.

Name	Description	Where can it be found?
Ministry of Health, Government of Botswana		http://www.hiv.gov.bw/hivaids_research.php
Botswana AIDS Impact Survey	HIV and AIDS knowledge, attitudes & behaviour	Department of HIV and AIDS Prevention and Care, Ministry of Health
Botswana (2008): TRAC-M: Multiple Concurrent Partnerships Mass Media Campaign (PSI)	Attitudes and behaviours around multiple concurrent partners	http://www.psi.org/resources/research-metrics/publications/botswana/botswana-2008-trac-m-multiple-concurrent-partnershi
Demographic Health Surveys	HIV and AIDS knowledge, attitudes & behaviour	http://www.measuredhs.com/pubs/Search/search_results.cfm?type=35&srchTp=type&newSrch=1
WHO	Joint WHO-UNAIDS HIV Vaccine Initiative. Includes HIV/AIDS data, statistics, and resources	http://www.who.int/hiv/data/en/
Family Health International	FHI is a leader in Behavioural Surveillance and has a free published guide on how to conceptualize, design and implement BSS. They also have surveillance technical briefs and publications from countries around the world on BSS.	http://www.fhi.org/en/topics/bss.htm
UNAIDS Indicator	Joint United Nations Programme on HIV/AIDS, a partnership of UNICEF,	http://www.unaids.org/en/KnowledgeCentre/Resources/FeatureStories/archive/2009/200

Registry	UNDP, UNFPA, UNDCP, ILO, UNESCO, WHO, World Bank. The UNAIDS Indicator Registry is a central repository of AIDS indicator definitions, including complete information on each indicator.	90424_CRIS_3.asp
University of California San Francisco CAPS	The UCSF CAPS programme has many online resources from prevention toolkits, to programmes for working with a variety of specific populations, to evaluation design manuals, and accepted and widely used indicator lists.	http://www.caps.ucsf.edu/projects/ http://www.caps.ucsf.edu/tools/surveys/ http://www.caps.ucsf.edu/pubs/manuals/
US Census Bureau HIV/AIDS Surveillance	US Census Bureau includes surveillance database and selected developing country profiles.	www.census.gov/ipc/www/hivaidsn.html
U.S. Centers for Disease Control and Prevention (CDC), Center for HIV/AIDS Prevention.	Contains multiple resources on HIV/AIDS facts and research	www.cdc.gov/hiv/dhap.htm
HIV/AIDS Survey Indicators Database	Provides an easily accessible comprehensive source of information on HIV/AIDS indicators derived from sample surveys; allows the user to produce tables for specific countries by selected background characteristics.	http://www.measuredhs.com/hivdata
International AIDS Economic Network	Data, tools, and analysis for a compassionate, cost effective response to the global epidemic.	www.iaen.org

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Self Assessment Quiz Answer Key

Match the methods listed below to their descriptions:

Descriptions

_*E*__ **1.** Sam is using data that has already been collected during the Behavioral Surveillance Survey.

_*B*__ **2**. Lesego is talking to a patient. She asks "Can you tell me about your visit today?"

_*C*__ **3**. Mothusi is timing how long the lay counsellor waits before reading the HIV test results.

Methods

A. Semi-structured Interview

B. Open-ended Interview

C. Observation

D. Self-administered questionnaire

E. Secondary data source

_*D*__ **4.** Thusani hands a set of questions about drug stocks to the pharmacist and asks her to fill it out.

_*A*__ **5.** As part of an evaluation, Lorato asks a social worker "How many patients did you see today?"

For the following research questions determine if you should use qualitative or quantitative data collection methods.

6. Find out how pregnant women like the new ANC services at a particular clinic?

Answer: ***Qualitative data collection methods***

7. Find out how many people who are truck driver population have been tested for HIV?

Answer: ***Quantitative data collection methods***

8. Describe the sexual behaviours of men aged 15-49 and women aged 15-49 in Botswana.

Answer: ***Qualitative data collection methods***

For each of the following scenarios, identify the type of sampling methodology being used.

9. A clinic wants a representative random sample of HIV-positive and HIV-negative patients attending their prenatal clinic. To do this, they look at the ANC records, see the total is 400, 300 of which are HIV negative and 100 of which are HIV positive. Then they sample each of these subpopulations to represent the larger proportion of HV positive/negative women attending their prenatal clinic.

Answer: *Stratified Sampling. Since they want a representative number of HIV negative and HIV infected patients they would need to separate these two groups and then take a sample within them. Taking just a simple random sample may result in a greater percentage of HIV infected to HIV negative patients in the sample then in the clinic.*

10. A clinic wants to know if a patient education intervention works to help increase adherence in the ART clinic. Each patient medical record is assigned a unique number, and a table of random numbers is generated to select the desired sample size of 150. Bias is avoided because the person drawing the sample does not manipulate the random numbers table to select certain individuals.

Answer: *Simple random sample. In this case a simple random sample can be generated because there are no categories that need special consideration. All patient records in the clinic can be randomly assigned a number and then a sample taken.*

11. A clinic wants to know how many pregnant women are declining to use the ANC services the clinic offers and why. The head of the clinic wants to go to each house and ask them if they have a pregnant woman in the household and then talk to each pregnant woman in the catchment area.

Answer: *Census. This clinic is interested in actual numbers and not inference from a sample. In this case a census has to be taken to determine the actual number of pregnant women in the catchment area at the time of the census.*

12. Match the term to the definition

1. Precision	**A. The certainty that the true value is being captured give or take some error**
2. Standard Error	**B. The difference between the true value in a population and the estimate from the sample**
3. Confidence Level	**C. The amount of error that is tolerated in a sample**

Answer: *1= C, 2=B, 3=A*

13. Name two advantages to adapting pre-existing questionnaires

Answer:

1-Saves time in developing questions

2-Questions will have been already pre-tested and may have been assessed for reliability and/or validity

3-Their use will permit comparison between studies and possibly combining data. (e.g. a district survey that may have same questions as DHS so can compare)

4-An easy way of drawing on the expertise of others

14. Match the problem in the phrase to the tip that will correct it.

1. What is your mother's parity?	A. Avoid vague words
2. How many times do you usually go to the store?	B. Avoid biased questions
3. How bad do you think the service is here?	C. Ask one question at a time
4. How many times did you get a prescription and drugs at the clinic?	D. Use simple language

Answer: *1=D, 2=A, 3=B, 4=C*

***15.* Describe the difference between a pre-test and a pilot test of the questionnaire.**

Answer:

The pre-test is done with colleagues, friends, or experts and is the first stage in reviewing y our questionnaire to make sure that it is clear, precise, and accurate. The pilot-test conducted with as much similarity to the actual questionnaire implementation as possible. A few people from the same group that are going to fill out the questionnaire should participate in the pre-test and the method of delivery should be the same as it will be for the questionnaire. This will allow you to correct aspects of the questionnaire but will also allow you to adjust time, delivery and logistics before the actual evaluation begins.

16. Name 4 things a code book should include:

Answer:

variable name

variable description

variable format (number, data, text)

instrument/method of collection

date collected

respondent or group

variable location (in database)

notes

Self-Directed Learning Workbook 3:
Chapter Four
Data Analysis at the District and Facility Level

Data analysis is critical in the development of the district profile

Chapter 4:
Data Analysis at the District or Facility Level

Estimated time needed for completion: 2 hours

Chapter Overview

In workbook 3, you have been reviewing how you can use programme evaluations to make necessary changes to health care programmes and address specific needs of your communities. Chapter 1 covered the strategies of reviewing existing data and determining data gaps, and designing the appropriate evaluation. Chapter 2 focused on strategies of choosing the right type of qualitative tools, data collection methods, and analysis procedures for different qualitative data types. Chapter 3 focused on quantitative data collection methods, sampling strategies, importance of data quality, the process of designing a survey tool, and touched up on how to create data analysis tables.

In this chapter, further strategies of data analysis, including data triangulation and inferential statistics, will be introduced. In data triangulation we will discuss how to join qualitative and quantitative data to check each method and to give more robust answers to your evaluation strategy. We will also elaborate more ways of using statistics to analyse and learn from a given dataset. We will do this by aiming to understand key analysis steps: such as hypotheses testing, and use of significance tests. Some of the significance tests we will discuss include t-test and chi-square test.

Also, basic quantitative data analysis tips from Chapter 4 of workbook 2 will be reviewed. We will first review descriptive statistics tips, then cover how to use the findings from a given sample to make recommendations, and finally discuss possible applications for other groups. We do not aim, with this chapter, to teach you all of the ways to conduct statistical tests, rather we want you to understand why, when, and how these tests are done and seek focused guidance in your quantitative data analysis.

Finally we will cover the importance and usefulness of data triangulation. We will show you how the use of both qualitative and quantitative data in data analysis can lead to more robust and persuasive results.

Learning Objectives

At the end of this chapter, you will be able to:

- describe the added value of inferential statistics,
- calculating and comparing events using probability: risk and odds,
- using interval estimates to describe a single population,
- describe the process of hypotheses testing,
- estimating differences between two populations using significance tests, and
- describe the benefits of data triangulation.

4.1 Review of Basic Data Analysis Tips

You may recall discussing data analysis tips in Chapter 4 of workbook 2. Some of the basic techniques covered focused on descriptive statistics - defining and distinguishing between four data types; summarizing the location, spread, and shape of datasets; and using Excel to prepare graphical summaries that show relationships between two variables. We will first review those descriptive statistics tips, and follow up on how to use the findings from a given samples to make recommendations and discuss possible applications on other groups.

4.1.1 Four Data Types

One of the first concepts you covered in Chapter 4 of Workbook 2 was that there are four data types. Two of these data types are called *nominal* and *ordinal.* Both of them can be referred to as categorical data since they can be assigned into a category. Nominal and ordinal data can be differentiated on whether they can be put in a particular hierarchical order or not. Ordinal data can be put in order while nominal data cannot.

The two other data types are called *discrete* and *continuous. Discrete* and *continuous* data can be referred to as numeric data because both can be described with numbers. This is different from the use of numbers as labels as in the case of nominal data. Discrete and continuous data can be differentiated by how the numbers are treated. In the case of discrete data, numbers are used to count distinct and separate data; while in the case of continuous data, numbers are used to measure values that are not distinct and may have continuity until negative or positive infinity.

Remember that we can transform continuous data into categorical data by creating categories. A good example of this transformation was age. Age by itself is a continuous data, but can be presented as groups (or categories) of 0-14, 15 – 49, and 50+. (For additional information, please review Chapter 4 of Workbook 2.)

We can describe data by its location, spread, or shape. To describe data by its location, we use mean, mode, or median. *Mean* describes the average. *Mode* describes the most

frequently occurring number. *Median* describes the middle number. To describe data by its spread, we use range, variance, or standard deviation. *Range* describes the difference between the smallest and the largest values. *Variance* is the average squared distance from the mean. *Standard deviation* is a square root of the variance. To describe date by its shape, we can describe its skewness, or deviation from a normal distribution without large outliers.

For Review:

Mean or average-- Just add up all the numbers and divide by the total number of data points.

Median—also known as the "middle" number. This can be useful if you have a few data points that are outliers (much less than or greater than the other numbers). To find the median, sort the data in rank order (smallest to largest), then count in from one end until you find the middle. (If the sample size is an even number, take the average of the two middle numbers.)

Mode—the most frequent number in a data set. While it is easy to calculate, no one ever reports this value, so do not bother unless you have a really good reason to calculate the mode.

Range— give an idea of spread, variation of the numbers. It is easy to calculate and easy to understand. However, it can be highly affected by outliers, so if some of your numbers are really high or really low, the range may be a little misleading. In this case it might be better to use the standard deviation.

Standard deviation (SD)—a slightly more sophisticated way to provide an indication of the spread or variation in the data.

As we discussed in Chapter 4 of Workbook 2, few of the ways of summarizing datasets include:

- using frequency tables,
- using bar graphs,
- using cumulative or relative frequencies,
- using line graphs, and
- using time series charts.

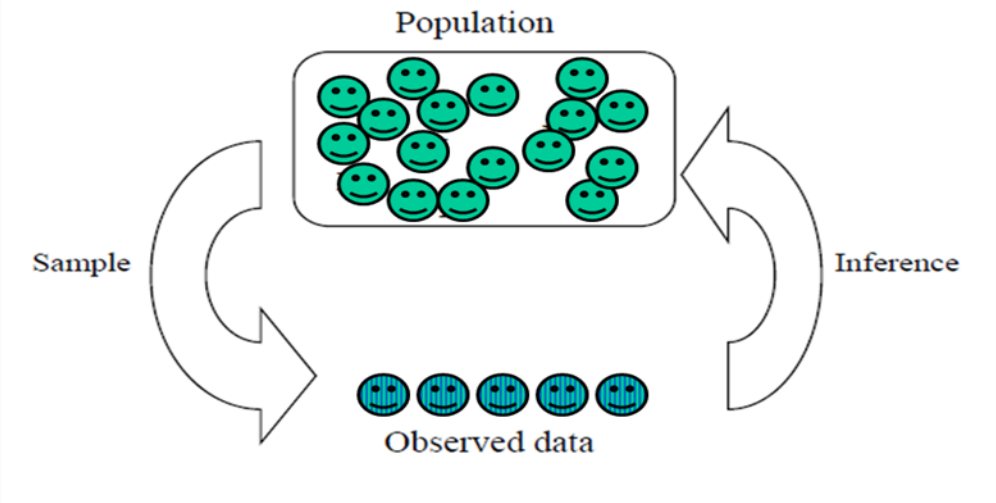
4.2 Descriptive Versus Inferential Statistics

Remember that facility or district level data usually represent a subpopulation that is dealing with a problem. When dealing with subpopulations, do not forget to be cautious about making generalizations. There is always a chance that the sample may not be a good representation of the larger population or similar to the other sample that it is being compared to. Before making comparisons, you would first begin with describing the sample population appropriately using descriptive statistics. You can then go one step further by carefully drawing out information that can be used in a larger sample or another sample using inferential statistics. For example, in Gonogotsi, we would start by describing how the women we sampled for a study have the same distributions of important factors as women in the whole population; age, distance to the facility, number of children etc.

Table 4.2: Comparison of Sample and Population Characteristics

Sample of Gonogosti Women	**Census data for Women of Child-bearing age in Gonogotsi**
Age: Mean-28, range 14-41	Age: Mean-29, range 13-40
Mean distance to health facility: 8km	Mean distance to health facility: 8km
Number of Children, Mean-3, range 0-8	Number of Children, Mean-3.2, range 0-14

Figure 4.2 Illustration of a sample being drawn out of a population; inference is used to apply lessons learned from the sample and assess its applicability in the larger population.



The process of generalizing from a sample to a larger population is called statistical inference or inferential statistics. Inferential thinking involves deriving conclusions by reasoning. The reasoning we use to come to a conclusion needs to be well described. These descriptions help estimate how typical our given sample is when compared to a larger or different population. Inferential statistics considers whether what you are seeing has occurred simply by chance, or whether it is most probably a unique phenomenon or due to an intervention or programme.

4.3 Probability, Risk, and Odds

One of the ways of drawing out information from a given sample is by describing the events of the given data set. We can describe the chance events happening in terms of probability, risk, and odds.

4.3.1 Probability

Probability is the measure of the chance of getting some outcome of interest from some event. For example, in the event of rolling a dice, there are six possible outcomes. The probability of getting the number 1 in the first roll is 1/6 or 0.17.

Note that:

While the probability of 1/6 tells you that you have a small probability of rolling a 1 (any one of the other 5 numbers) at your first throw. However, it does not indicate how many throws you will need to make to throw the number 1. Every time you roll a dice you have 1/6 probability of rolling a 1.

The probability of an event always lies between zero and one.

Given probability is labeled as p, the probability of an event happening is p, while the probability of an event not happening is 1 – p.

For example, if you know from your routine data that for every 10 women who register their pregnancies, 4 register before 20 weeks and 6 register after 20 weeks. The odds of any individual woman registering before 20 weeks (the event) would be 4/10 or 0.4, the probability of a woman registering after 20 would then be 1-p (1-0.4)= 0.6.

4.3.2 Risk

Risk is the same as odds but is used to describe the probability of undesirable outcomes such as death, disease, or side effects.

For example, you can use risk to dying from an HIV infection in a given cohort. If you followed a cohort of 100 HIV+/TB+ and 100 HIV+/TB- individuals and notice 15 deaths in the HIV+/TB+ group 25 deaths in the HIV+/TB+ group after a one year follow up. You can state that the risk of dying if only infected with HIV is 15%, but the risk can increase to 25% if co-infected with TB.

Note: both risk and probability describe the same concept in statistics.

4.3.3 Odds

The odds of an event occurring is closely related to probability, but describes a different concept. While probability and risk use the total number of possible events as their denominator, risk uses the probability of an event not happening as its denominator. Therefore odds can best be described as a probability of an event occurring divided by the probability of an event *not* occurring.

$$\text{Odds} = \frac{p(\text{an event happening})}{p(\text{an event not happening})}$$

$$= p/(1 - p)$$

Given that probability is labelled as p, the odds of an event happening is p/ (1 – p). The value of the odds for an outcome can vary from zero to infinity. Odds that are >1 one describe events that are more likely to occur than not, while odds that are <1 describe events that are more likely to not occur.

So, given the risk/probability of dying from HIV infection alone is 15%, you can calculate that the odds are 15% divided by 85% which equals to 0.18.

Learning Activity 4.3.3

Calculating Events

Instructions: Using the tools you just learned about answer these two questions about risks. Note that each question has multiple parts.

1. Recall a two way table we looked at when analyzing data in Chapter 4 of Workbook 2. The following two way table shows the relationship of pulmonary tuberculosis (PTB) test results and HIV test results.

	PTB status		
HIV status	Positive	Negative	Total
Positive	875 (57.8%)	639 (42.2%)	1514 (100.0%)
Negative	57 (8.9%)	594 (91.1%)	651 (100.0%)
Total	932 (43.0%)	1233 (57.0%)	2165 (100.0%)

Calculate the following events:

1.a The risk of testing PTB+ when a patient is HIV+.

1.b The risk of testing PTB+ when a patient is HIV-.

1.c The odds of testing PTB+ when a patient is HIV+.

1.d The odds of testing PTB+ when a patient is HIV-.

2. In our pregnancy registration example you find that 1 out of 100 babies of HIV infected women who register before 20 weeks become HIV infected. However for the women who register after 20 weeks, 5 out of 100 of their babies become infected.

2.a Calculate the risk/probability of a woman's baby becoming infected if she registered before 20 weeks

2.b Calculate the risk/probability of a woman's baby becoming infected if she registered after 20 weeks.

Discussion 4.3.3

Calculating Events

1. ANSWER

Let us insert letters in the two way table, for easier understanding.

	PTB status		
HIV status	Positive	Negative	Total
Positive	a	b	a+b
Negative	c	d	c+d
Total	a+c	b+d	a+b+c+d

'a' is the number of people testing positive for PTB and HIV

'b' is the number of people testing negative for PTB and positive for HIV

'c' is the number of people testing positive for PTB and negative for HIV

'd' is the number of people testing negative for both PTB and HIV

1.a The risk of testing PTB+ when a patient is HIV+.

The probability (or risk) of testing PTB+ given you are HIV+ can be denoted asp(PTB+|HIV+). Note that | denotes 'given'. This probability is calculated by dividing the number of people who test both PTB and HIV positive (a) by the total number who test HIV positive (a+b):

p(PTB+|HIV+) = a/(a+b)

1. b The risk of testing PTB+ when a patient is HIV-.

The probability (or risk) of testing PTB+ given you are HIV- can be denoted asp(PTB+|HIV-). This probability is calculated by dividing the number of people who

test PTB negative (c) by the total number who test HIV negative (c+d):

p(PTB+|HIV-) = c/(c+d)

Substituting the numbers for letters:

the risk of (PTB+|HIV+) equals to a/(a+b)=875/1514 = 0.58

the risk of (PTB+|HIV-) equals to c/(c+d)=57/651 = 0.09

What are the implications of this risk?

1. c The odds of testing PTB+ when a patient is HIV+.

Divide the number of people who are both HIV and PTB positive by the number who are PTB negative but HIV+:

the odds of (PTB+|HIV+) is a/b=875/639 = 1.37

The odds of testing PTB+ when a patient is HIV-.

the odds of (PTB+|HIV-) is c/d=57/594 = 0.10

1.d What are the implications of these odds?

For every 10 individuals who are HIV-, we expect 1 of them to be PTB+ while 9 of them are PTB-.

2. ANSWER

2.a the risk/probability of a woman's baby becoming infected if she registered before 20 weeks is 1/100 (or 1%), and

2.b the risk/probability of a woman's baby becoming infected if she registered after 20 weeks is increased to 5/100 (or 5%).

4.3.4 Comparing odds and risk

If you pay close attention to formula of odds and risk, you will note that you can derive risk from odds, or vice versa.

Risk = odds / (1 + odds)

Odds = probability / (1 – probability)

Therefore, if you already have analyzed data that only provides you with odds of an event and your audience is only well acquainted with the concept of risk, you can covert that information on odds into risk when presenting the findings.

Note: Both risk and odds can only be positive in value. They cannot take a negative value.

Comparing Risks and Odds

Sometimes you may need to compare the odds or risks of two separate events. For example, the odds or risks of two separate events occurring can be presented as ratios.

Given:

p = the probability of event P

q = the probability of a separate event Q

Risk ratio, also known as *relative risk*, is the ratio of the probability of event P occurring compared to the probability of event Q occurring. It is describes as p/q.

The *odds ratio* compares the odds of an event occurring to two different groups, or the odds of different events occurring in the same group. It can be described with the following formula:

$\frac{p/(1-p)}{q//(1-q)}$

Learning Activity 4.3.4

Calculating Events

Instructions: Using the tools you just learned about and answer the two questions below.

1. Recall again the two way table discussed in Exercise **4.2.1a**.

	PTB status		
HIV status	Positive	Negative	Total
Positive	875 (57.8%)	639 (42.2%)	1514 (100.0%)
Negative	57 (8.9%)	594 (91.1%)	651 (100.0%)
Total	932 (43.0%)	1233 (57.0%)	2165 (100.0%)

Calculate the following events:

1. a The relative risk of testing PTB+ when a patient is HIV+ when compared to when a patient is HIV-.

1.b The odds of testing PTB+ when a patient is HIV+ when compared to when a patient is HIV-.

1.c. Odds of having an HIV positive child for woman who registers her pregnancy before or at 20 weeks and after 21 weeks.

2. Calculate the following events:

	HIV status of the Child		
Registration week of pregnancy	Positive	Negative	Total
>20 weeks	10 (2.4%)	408 (97.6%)	418 (100.0%)
≤20 weeks	32 (13.1%)	212 (86.9%)	244 (100.0%)
Total	42 (6.3%)	620 (93.7%)	662 (100.0%)

2.a The relative risk of the child testing positive when a woman registers at ≤20 weeks compared to a woman who registers after 20 weeks.

2.b The odds of a child testing negative when a woman registers after 20 weeks compared to a woman who registers before 20 weeks.

Discussion 4.3.4

Calculating Events

1. ANSWER

Using the following template two way table:

	PTB status		
HIV status	Positive	Negative	Total
Positive	a	b	a+b
Negative	c	d	c+d
Total	a+c	b+d	a+b+c+d

1.a The risk ratio (or relative risk, RR) of testing positive for PTB when a patient is HIV+ when compared to when a patient is HIV- is:

$$RR = \frac{a/(a+b)}{c/(c+d)}$$

Therefore,

RR = (875/1514)/(57/651) = 6.60

1.b Similarly, the odds ratio (OR) of testing PTB+ is:

$$OR = \frac{a/b}{c/d} = \frac{a*d}{b*c}$$

1. c Therefore,

OR = (875/639)/ (57/594) = (875*594)/(639*57) = 14.27

2. ANSWER

We can use similar approach in the second example:

2.a The risk of the child testing positive when a woman registers at ≤20 weeks is 32/144, while the risk of a child testing positive when a woman registers after 20 weeks is 10/418. Therefore, the relative risk (RR) a child testing positive when a woman registers at <20 weeks compared to a woman who registers after 20 weeks is:

RR=(32/244)/(10/418) = 5.482

2.b On the other hand, the odds of a child testing negative when a woman registers after 20 weeks compared to before 20 weeks is:

RR=(32/212)/(10/408) = 6.158

4.4 Confidence Interval: Estimating Intervals in a Single Population

A measurable characteristic of a population is also known as a population parameter. Population parameters include things like the average height of males, how many people ate meat this week, the average number of cooking pots per household. Non-population parameters can be used for the estimates; the number of beds in a health facility, the condoms distributed in a month etc. Parameters can be described with point estimates and/or interval estimates. In the previous chapters (Chapter 4 of Workbook 2) we looked at point estimates of a population parameter. Point estimates are described in a single statistical value, such as mean, mode, median, range, variance, and standard deviation. With population parameters any point estimate is usually just that, an estimate. It is very difficult to know the exact height of everyone in the population to be able to find a real mean. In this case, sometimes interval estimates are used. An interval estimate gives us a range of values that a point estimate, for example a mean, might take. For example, the average height of a man in a given population could be 168.3cm to 171.7cm. Any number within this range is considered to be a fair estimate of the true value of the point estimate within set limits as explained below.

Interval estimates are described by two numbers. One of the interval estimates used in statistics is confidence interval.

Confidence interval is used to describe the precision and uncertainty associated with a point parameter. A confidence interval consists of three parts: 1) confidence level, 2) an estimated statistical value, and 3) margin of error.

Confidence level is the the probability part of a confidence interval. It describes how confident we are about a given interval containing the true population parameter, for example, the mean. You will see this written as 90, 95, and 99% confidence level.

99% confidence level means that 99% of the values in a given interval contain the true population parameter (in our example the mean);

95% confidence level means that 95% of the values in a given interval contain the true population parameter;

90% confidence level means that 90% of the values in a given interval contain the true population parameter;

The more precise we want to be, the higher the confidence level we choose.

Margin of Error describes the range of values above and below a given point estimate that may contain the true population parameter. A 0.01 margin of error means that the true value could be below our estimate by 1% or above our estimate by 1%.

For example: Given a mean value of height of 170cm and a confidence level of 99%, a margin of error of +1% indicates that we are 99% confident that point estimate is between 170+(170*1%) and 166 - (170*1%) which puts us in the range of 171.7cm and 168.3cm.

When compared to point estimates, confidence intervals are preferred because they provide more objective information by indicating the precision level of an estimate and how uncertain we are of the estimate, given the precision level we aimed to achieve. For example, we can say with 99% certainty that the average height of men in the population is between 168.3 and 171.7cm. If we had just stated that the average height was 170 we may not know how confidence we could be in this estimate.

Learning Activity 4.4

Calculating Interval Estimates

Instructions: Using the information you just learned, calculate the interval estimates for the questions below:

1. We estimate that an average health facility receives 120 visitors a month. However, we are only 95% sure.

1.a What is our margin of error?

1.b What are the interval estimates of this parameter given this margin of error?

2. If we have an interval estimate of the average temperature in Kang during summer as 39.9 to 44.1.

2.a What is the margin of error if the true value of the parameter if it is exactly in the middle of these two values?

2.b What is the confidence level?

Discussion 4.4

Calculating Interval Estimates

1. ANSWER

We estimate that an average health facility receives 120 visitors a month. However, we are only 95% sure.

1.a What is our margin of error?

ANSWER: 0.05 which corresponds to a 95% confidence level.

1.b What are the interval estimates of this parameter given this margin of error?

ANSWER: 114-126 (120*.05= 6 interval is 120-6=114 and 120+6=126)

2. ANSWER

If we have an interval estimate of the average temperature in Kang during summer as 39.9 to 44.1.

2.a What is the margin of error if the true value of the parameter if it is exactly in the middle of these two values?

ANSWER: 0.05 (44.1-39.9=4.2, 4.2/2=2.1, 2.1/44.1=0.05)

2.b What is the confidence level?

ANSWER: A confidence level for a margin of error of 0.05 is 95%.

4.5 Estimating Differences: Between Two Population Parameters

So far, we have looked at how we can describe one sample and different events within a sample by probabilities and odds. As we start to compare parameters of different samples, you will start to wonder how you can measure differences in estimates of two population parameters. How can we tell two values (or two samples) are the same (or different)? And how can we determine if this difference is just by chance or is a real difference? If you saw 40% of women registering their pregnancy before 20 weeks in one facility and 44% of women registering their pregnancy before 20 weeks in another facility, how can we tell that this is a real difference and not just chance?

4.5.1 Interpreting Values Using Significant Difference

These important questions can be answered in statistics by measuring the significance of the differences. Small significant differences would mean the two values are similar and the difference was just due to chance; while high significance difference means that the two values we are comparing are significantly different and something other than chance is creating the difference, like the presence of an intervention in one facility.

Example:

If we take the ages from 12 patients.

Patient #	Age
1	35
2	45
3	48
4	30
5	31
6	44
7	29
8	16
9	20
10	22
11	34
12	55
Sum=	409
Mean =	409/12 = 34.1

Let us say this above example was a group of patients that tested HIV negative at a voluntary counseling and testing (VCT) centre. Let us say you are also provided with the following ages of 10 individuals that tested HIV positive from the sample facility:

Patient #	Age
1	20
2	25
3	28
4	31
5	34
6	35
7	45
8	45
9	46
10	48
Sum=	309
Mean =	309/10 = 30.9

You might be leaning to conclude that patients who test positive are younger than those who test negative at this VCT clinic.

Here are some questions to think about:

What is your basis to concluding a mean age of 30.9 is younger than a mean age of 34.1?

Would you have come to the same conclusion if the mean age for those who test positive was 40? What if the mean age was 32?

What is considered is different? Significance tests are used to quantify how different a difference is.

4.6 The Hypothesis Testing Process

A *statistical hypothesis* is a statement about a parameter or distribution of a population being sampled. In our PTB and HIV example, you may be interested in the question of whether HIV+ persons in a given facility are likely to develop PTB. To assess this suspicion, you have to transform your question into a testable hypothesis called the *null hypothesis*, conventionally labeled H_0. H_0 is pronounced H-naught and is the standard notation used to denote "null hypothesis". H_0 usually takes the following forms:

H_0: There is no difference in PTB positivity rates between HIV+ and HIV- persons.

H_0: HIV positivity is NOT a risk factor for PTB positivity.

Notice that both of the above null hypotheses reflect the conservative position of no difference, no risk, no effect, etc. That is why the hypothesis is called 'null'.

The *alternative hypothesis*, on the other hand, will test the exact opposite of H_0. It usually is denoted with H_1 or H_A. An alternative hypothesis is stated in such a way that it is mutually exclusive from the H_0. An alternative hypothesis for the null hypothesis above would look like this:

H_1: There is a difference in PTB positivity rates of HIV+ and HIV- persons.

H_1: HIV positivity is a risk factor for PTB positivity.

Note that if H_0 is true, H_1 will be false; and vice versa.

To test the null hypothesis, you can use your sample data and measure outcomes, and decide whether the data from the sample provides strong enough evidence to be able to reject the null hypothesis or not. If evidence against the null hypothesis is strong enough, you can reject the null hypothesis. Failing to reject a null hypothesis, however, does not mean that the alternative is true. It only means that it is probably true.

For example, in the ages we have provided above, if we find that we cannot reject H_0 (meaning that we cannot show that 30.9 and 34.1 was a significant difference) we can say that there probably is no difference and therefore no association between your age and your chance of testing positive. If however, we find that there was a difference detected, H_0 can be rejected and we can say that age is associated with testing positive.

4.7 Assessing the Strength of Hypothesis Tests: P-Value, Decision Error, and Power

4.7.1 P-Value

One aid in deciding a cut of point for rejecting a null hypothesis is the p-value of a test.

> A p-value is the probability that the test statistic would have a value as extreme or more extreme than the value actually observed, assuming the null hypothesis to be true.

The p value refers to the probability distribution of the test statistic under the null hypothesis. The smaller the p value the stronger the evidence against the null hypothesis.

CAUTION:

It is **important** to note that the p-value does not tell us the probability that H_0 (or H_1) being true. P-value is only a measure of the strength of the evidence against the null hypothesis.

The p-value might look like this: 4.05421E-7. Note that this is a scientific notation used to denote 4.05 X 10 $^{-7}$, or 0.000000405. In order to use the p-values to accept or reject a given difference at different, you will need to decide on what that critical cut-off point is at your study design stage. The most commonly used cut off or critical p-value is 0.05 (or 5%). Note that the critical value, usually 0.05 (5%) or 0.01 (1%), is called the significance level of the hypothesis test and denoted **α** pronounced **alpha**.

Once you have decided on the significance level you would like to use, you can use the following decision rule:

Determine the p-value for the parameters you have obtained.

Compare it with the critical value, usually 0.05.

If the p-value is less than the critical value, reject the null hypothesis.

Here are some p-value conventions you can use:

P<0.001	reject H_0 at the 0.1% significance level; very strong evidence against H_0
P<0.01	reject H_0 at the 1% significance level; strong evidence against H_0
P<0.05	reject H_0 at the 5% significance level; sufficient evidence against H_0
P>0.05	cannot reject H_0 at the 5% significance level; insufficient evidence against H_0

Recall:

If the critical cut-off point you chose was 0.05 for your p-values for the difference in the mean age of people who test HIV positive and negative, a p-value of 0.07 would demonstrate the different between the two values that are being compared is not significantly different. If the p-value was 0.007, then you would find the difference between the means to be significantly different.

Interpretation of p-values: A common misuse of the p-value stems from incorrect interpretation of a non significant result. If the value is below the significance threshold then the result is said to be statistically significant and the null hypothesis is rejected in favor of the alternative. However, if the p-value is greater than the significance threshold then it is incorrect to state that the null hypothesis is accepted or that there is no difference between groups. It may be that there is a difference which the trial was not able to detect. The correct interpretation is that there was insufficient evidence to reject the null hypothesis-or that we failed to reject the null hypothesis. Note that this is not the same as saying it is accepted.

NOTE:

Even when results seem inconsistent with the null hypothesis it is still possible that the null hypothesis is in fact true and the results we have observed have occurred by chance alone. Therefore, it is important to remember there is still a probability of 0.05 that your decision might not be correct when you reject a null hypothesis. By rejecting the null hypothesis, you are taking a 95% chance that it is correct, and leaving a 5% possibility of creating an error.

4.7.2 Decision Errors

Whenever you are using evidence from a sample to decide whether to reject or fail to reject a null hypothesis, there is a probability that you could be making a mistake. This may be because your test is not powerful enough to detect the effect you are looking for, given that there is an effect. You can also be doing the reverse.

There are two possible errors you could be making:

Type I error: occurs when you are rejecting a null hypothesis when it is true (also known as a *false positive*). In other words, concluding there is an effect when there is not. The probability of committing a type I error is denoted **α** (alpha), and is the same alpha as the significance level of a test. For example, you could run a test to see whether age was associated with someone testing positive or negative on an HIV test. If you thought there was an effect and that 30.1 was very different from 34.9 when in fact there was no difference, this would be a false positive.

Type II error: occurs when you are not rejecting a null hypothesis when it is false (also known as a *false negative*). This happens when you conclude there is no effect when in fact there is one. The probability of committing a type II error is denoted **β** (beta). For example, if you said that you could not reject the null hypothesis and said that there probably was no association when there really was one you would get a false negative.

		Finding/Decision from our test	
		H_0 is true	H_0 is false
Actual Truth	H_0 is true	**Correct decision** **True negative** **(Probability 1 – α)**	Type I error False positive (Probability **α)**
	H_0 is false	Type II error False Negative (Probability **β)**	**Correct decision** **True positive** **(Probability 1 – β)**

While in the examples that we have used, with programme information, all errors would be unfortunate but not deadly; in clinical settings, your goal should include a test procedure that has minimized the probability of a type I error. In such settings, a type I error of detecting disease or an association when there is none) can potentially be serious. This is why significance level of $\alpha = 0.05$ is most frequently used in significance tests. This sets the probability of a type I error to be no more than 0.05 (or 5%). If you find a 5% chance to still pose a greater risk, you might want to choose a 0.01 chance.

However, keep in mind that α and β are linked for a given sample size. You cannot make β smaller without making α larger, and vice versa. When you decide a value for α, you are also inevitably fixing the value of β. If you have a small sample size, you would need to set a balance between α and β depending on the types of errors you would like to prioritize and minimize. The other way you can reduce both α and β simultaneously is to increase the sample size, the more people, or data points that you have in your sample, the greater the power of a test.

4.7.3 The Power of a Test

The probability of not committing a Type II error is called the *Power* of the test. It is defined to be $(1 - \beta)$. The power denotes a test's capacity to reject the null hypothesis when it is false - or, to detect an effect (or relationship) if there is one. The more power you have the better you can minimize your errors.

In most studies, β is typically set at 0.2 or 0.1, thereby setting the power of the tests to 0.80 (or 80%), and 0.90 (or 90%), respectively. When doing this, the probability of a test detecting an effect of relationship is set at 80% or 90%. This means that you have an 80% or a 90% ability to make a true judgment and not commit an error. The higher your sample size the higher the power will be.

Learning Activity 4.7.3

The Importance of Power

Instructions: Using the information from this paragraph, answer the questions below.

Mula and a Nankie decide to test the hypothesis that, in Gaborone, there are more people that were born in Maun than were born in Francistown. The null hypothesis they decided on was that there was no difference in the number of people in Gaborone who were born in Maun versus Francistown. So they go to main mall and begin to ask people where they were born and record each answer. Mula had a good breakfast and a good sleep and started the day with lots of energy. He asked every 3rd person he met where they were born and ended up with 58 people who were born in Maun and 25 people born in Francistown, concluding that the null hypothesis could be rejected; there was a difference in where people were born. Nankie, however, did not get good sleep and slept past breakfast. She also asked every third person she saw but sat in a part of the main mall that did not have many people. She ended up with 5 people born in Maun and 5 people born in Francistown and decided that she could not reject the null hypothesis and that there probably was no difference in where people were born.

Please answer the following questions:

1. Which do you think had more power to actually make a judgment?

2. Would you reject or support the null hypothesis with this data?

Discussion 4.7.3

The Importance of Power

Answer: Mula had more power to make an actual judgment; with 83 people surveyed it is less likely that the difference he detected was by chance. Nankie, with just ten people in her sample, could have easily by chance met a greater number percentage of people who were born in Francistown. Therefore, the smart bet would be on Mula's judgment. He had more people in his sample and therefore more power.

4.8 Using Tests to Measure Significant Difference

While it was easy to see significant difference versus chance in the exercise above; how can you measure significant difference in your data? You can do this using various tests, including chi-squared test, t-tests, and ANOVAs. There are other, more sophisticated tests you can use for skewed data, paired data, or data with a small sample size (including the Mann-Whitney, Fisher's exact test, and Wilcoxon test) and we encourage you to look these up or ask someone who knows more about them. In this chapter we will cover only the chi-squared test, t-tests, and ANOVAs, which are the most common tests.

Your choice on what type of significance test to use will need to depend on the following key factors:

1. type of data: categorical or continuous
2. number of samples being compared
3. observations (if they are independent or matched by a particular criteria)

Figure 4.8 summarizes the appropriate types of significance tests by data type and by sample types.

Figure 4.8 Significance Tests Covered in Workbook 3 Based on Data Type

TYPE OF SAMPLES	TYPE OF VARIABLE		
	CATEGORICAL	CONTINOUS (two variables)	CONTINOUS (3 or more variables)
Independent samples	Chi-squared test	Students' T-test	One-way ANOVA
Paired samples		Paired t-test	Two-way ANOVA

As you can see from Figure 4.8, the tests of significance depend on what type of variable is under study (remember categorical are categories like man/woman or child/adult) or is it continuous (remember that this is a number like score on an exam, or weight). They also depend on whether the samples are paired or independent.

Paired samples:

Paired samples are samples in which the same person or thing is measured at least twice. For example, if you take a pre-test before a training and then a post-test after a training, your scores on each test would be paired. The significance of what you got on the post-test is related to what you got on the pre-test. One way to understand this is to imagine that Mula and Nankie have just taken a post-test on a training in statistics. Mula scored 75% and Nankie scored 75%. At first they look like they learned equally, they both scored 75%. However, if we look at their pre-test we find that Mula scored 74% and that Nankie had scored 45%. If we look at them together we can say that Nankie learned more than Mula during the training. These measurements are paired and dependent upon each other and therefore they need a different analysis.

Independent samples:

Independent samples are samples in which the measurements are not made on the same person or thing. For example, if we had a statistics training in Maun in February and a training in Francistown in April and compared their post-test scores we would have to perform a test of independent samples. The test scores of those in Francistown were independent of those in Maun, it did not affect them.

4.8.1 Chi-squared Test

Chi-squared test ($\chi 2$) is used to test whether there is a *relationship between two or more categorical variables*. The null hypothesis is that there is no relationship between the two variables. Therefore, the Chi-squares test is a test to see if it is possible to reject the null hypothesis by proving a relationship between the variables. For example, if we were looking at the relationship between age category (<19 years and≥20 years) and week of pregnancy registration (≤20 weeks and >20 weeks) we would assume that there was no relationship and that the counts of women who registered early and were young would be the same as the counts of women who registered early and were older. Chi-squares compare the actual (or observed) counts in the sample data with counts that we would expect if there was no relationship (i.e. if the null hypothesis was true).

We can use test scores as another example. In this example we are trying to determine if there was any relationship between sex and passing a certain test. We have equal number of men and women in our sample. Our data look like this:

		B	C	D
		Gender		☐
		Male (N)	Female (N)	Total Observed
4	Passed the test	10	70	80
5	Did not pass the test	90	30	120
6	Total Observed	100	100	200

If there was no relationship between sex and passing the test, then you would expect to see about 50 people in each cell (box). However, there are only 10 men who passed the test in comparison to 70 women. Therefore, it looks women were more likely to pass the test. Our null hypothesis, that there was no difference between men and women could probably be rejected, however we would need the p-value to make a judgment about the strength of this significance. We will discuss below how to use Excel to get p-values for all Chi-squares, T-tests and ANOVAs but we will first discuss the difference between them.

NOTE

A chi-squared is not valid if there are less than 5 people in any of the cells. In this case you should consult someone about the Fisher's Exact Test.

Learning Activity 4.8.1

Constructing Chi-squares

Instructions: Using the example from the test above, use the information presented to create chi-squares.

1. Make a chi-square that looks like our figure above out of the following data :

   In one clinic the 100 women registered their pregnancy early (≤20 weeks). Out of these women 10 had 0 previous children, 30 had 1 previous child, and 60 had more than one previous child.

   In the same clinic 100 women registered their pregnancy late (>20 weeks). Out of these women, 65 had 0 previous children, 35 had 1 previous child, and there were no women in this category that had more than one previous child.

2. Make another chi-square out of the following information:

   In the same sample of women in the clinic above, out of the 100 women who registered early (≤20 weeks), 5 of them were ≤16 years old, 20 of them were 17-21 years old and 75 were >22 years old.

   The 100 women who registered late (>20 weeks), 8 of them were ≤16, 22 of them were 17-21 years old and 70 were >22 years old.

Discussion 4.8.1

Constructing Chi-squares

Answer:

1.

Previous children	Registration ≤20 weeks	Registration >20 weeks	Total Observed
Zero	10	65	75
1	30	35	65
>1	60	0	60
Total Observed	100	100	200

We can observe, before running a test for significance (p-value), that there seems to be a relationship between early registration and parity (the number of previous children).

2.

Woman's age	Registration ≤20 weeks	Registration >20 weeks	Total Observed
≤16 years	5	8	13
17-21 years	20	22	44
>22 years	75	70	145
Total Observed	100	100	200

We can observe, before running a test for significance (p-values) that there is a slight difference between the ages of women who register early and late. However, without a test for significance it would be hard to say if this difference was due to chance or really was significant.

4.8.2 T-Tests

T-test differs from Chi-squared tests in that they are used to see a *relationship between a continuous and a categorical variable.* There are different types of t-tests. Two common ones are:

A Paired Samples T-Test

This test is used to test the relationship between one categorical and one continuous variable in the *same* group of people. This is done, for example, when you want to compare the results for a group at one point in time with the *same* group at a different point in time. It tells you if the mean changed significantly over time.

Examples of when you would do this.

To compare pretest scores and post-test scores for the *same* participants. Below is an example of what this might look like in a table.

	Pretest	Posttest
1	60	75
2	50	75
3	55	85
4	45	90
5	60	85
6	75	75
μ	57.5	80.8

It seems as though there was a significant difference between these test scores, even though we are just looking at the means (μ).

However, what if our table looked like this:

	Pretest	Posttest
1	65	70
2	55	75
3	70	85
4	85	90
5	85	85
6	80	75
μ	73.3	80

You can also use this to do thing like compare the CD4 counts (test of HIV anti-bodies) at the start of treatment and 6-months post treatment. We will work through this example in the exercise below.

Learning Activity 4.8.2.a

Constructing T-tests

Instructions: Using the example from the test above, use the information presented to create chi-squares.

Make a table with the following information: 8 HIV positive patients were given drug regimen A, they had the following CD4 counts when they began the regimen (Patient 1-120, Patient 2-230, Patient 3-240, Patient 4-400, Patient 5-210, Patient 6-178, Patient 7-55, Patient 8-320). After six-months on drug regimen A the patients CD4 are as follows (Patient 1-345, Patient 2-450, Patient 3-243, Patient 4-350, Patient 5-555, Patient 6-200, Patient 7-240, Patient 8-320).

Discussion 4.8.2.a

Constructing T-tests

ANSWER:

Patient Number	Start of Drug Regimen A	6-months later
1	120	345
2	230	450
3	240	243
4	400	350
5	210	555
6	178	200
7	55	240
8	320	320
μ	219.1	337.9

In this example you would need to conduct a paired t-test to find out the p-value and the statistical significance of this result. It looks as though this would be significant but we should find out by running a test in Excel or some other software.

A Students T-test

Also known as an *unpaired t-test*, this test is used to test the relationship between one categorical and one continuous variable in two *different* groups. It tells you if the mean value is statistically different between the two groups. Examples of when you would do this include; comparing scores for the second group of training participants with the first group of participants; comparing results from one set of patients with another set of patients.

Learning Activity 4.8.2.b

Constructing T-tests

Instructions: Using the example from the test above, use the information presented to create t-tests.

1. Make a table with the following information:

   There are two different drug regimens that are being tested in two different groups of HIV positive patients. The criterion for starting the drug was that the patients CD4 count on initiation was between 200 and 250. Six months after taking the initial drug the patients on Drug regimen A had CD4 counts as follows (250, 500, 650, 340, 800, 350) and the patients on drug regimen B had CD4 counts as follows (300, 275, 350, 655, 800, 575).

2. Make a table with the following information:

   There are two facilities who offer registration for pregnant mothers. Facility A had implemented an intervention designed to make waiting for registration quicker and more private. Facility B had no such intervention. The week of pregnancy in which the women were registering was recorded for six patients at each facility. Facility A (21, 20, 32, 12, 6, 18) and Facility B (33, 35, 28, 27, 24, 29).

Discussion 4.8.2.b

Constructing T-tests

1. ANSWER:

Patient Number	CD4 counts with Drug Regimen A	CD4 counts with Drug Regimen A
1	250	300
2	500	275
3	650	350
4	340	655
5	800	800
6	350	575
μ	481.7	492.5.9

2. ANSWER:

Patient Number	Facility A	Facility B
1	21	33
2	20	35
3	32	28
4	12	27
5	6	24
6	18	29
μ	18.2	29.3

Ideally if this was an actual outcome evaluation that we were conducting we would want to have measures over a couple of months and with a larger sample size (for more power). However, it looks as though there was a difference between these two facilities based on this data.

4.8.4 ANOVA

ANOVA stands for Analysis of Variance. It is another way to determine if the variation in the measurements you are taking are by chance or are significantly different. The difference between an ANOVA and a t-test rests in the number of groups that you are analyzing. While t-test measure associations between two groups, ANOVAs measure associations between more than two groups. There are two different types of ANOVAs we will discuss in this chapter: *one-way ANOVAs* and *repeated measure ANOVAs*.

One-way ANOVAs are measures of independent groups. For example, instead of only measuring the difference between Facility A and Facility B with a t-test, you can measure the differences between Facilities A,B,C,D etc. The groups in the facilities are independent of each other, meaning that the result of one facility will not influence the result of the other facility. A table with this information would look like the following.

Patient Number	Facility A	Facility B	Facility6 C	Facility D
1	21	22	18	19
2	20	24	30	17
3	32	27	12	23
4	12	31	32	33
5	6	20	28	33
6	18	18	24	13
μ	18.2	23.7	24.0	23.0

In this table you can see that there are differences in the mean (μ) for each facility but it is difficult to tell if 18.2 is significantly different from 24.0 or if 23.7 is significantly different from 23.0 without running an ANOVA. Without this information you cannot reject the null hypothesis (H_0) that there was no difference between facilities.

Repeated measure ANOVAs are used to analyze multiple measurements from the same group. If for instance, you were to measure CD4 count for individuals at registration in a treatment programme, 6-months after registration and 1-year after registration, you would use an ANOVA to analyze this information. This is similar to the paired t-test but it is used when there are more than two measures for each person.

Patient Number	Start of Drug Regimen A	6-months later	1-year after start
1	120	345	400
2	230	450	450
3	240	243	700
4	400	350	689
5	210	555	750
6	178	200	400
7	55	240	450
8	320	320	334
μ	219.1	337.9	521.6

In this table you can see that the same patients were measured three times, once at the start of a new drug regimen, 6-months after the start and 1-year after the start. The means are very different in this example but it is important to conduct a test to determine the strength of this difference. In this case you would be testing the null hypothesis (H_0) that there was no difference in CD4 counts at the beginning of this regimen and 6 and 12 months later.

In the next section we will be showing you how to do these tests in Excel. Significance tests will give you a p-value. The p-value, as we discussed previously, is a measure of the strength of the significance between the values you are comparing. P-values are stronger the smaller they are. A p-value of 0.001 is very significant while a p-value of 0.07 is outside the range of acceptable significant difference. This p-value is then used to accept or reject the null hypothesis (H_0), which usually signifies no difference.

4.9 Using Excel to do Significance Tests

While you can certainly use more sophisticated statistics programmes such as SAS, SPSS, STATA, and R to calculate significance of differences, you can also use Excel for simpler tests. In this chapter we will look closely how you can use Excel to do four of the tests discussed above: chi-squared tests, paired t-tests, student t-test, and one-way and repeated measures ANOVA.

4.9.1 Using Excel to do Chi-squared ($\chi 2$)test

Chi-squared ($\chi 2$) tests can be used to answer questions such as the following:

Is there a gender difference on those testing HIV positive

Is there a difference in parity between the age groups we are considering?

You can use the following example for looking at gender differences:

		B	C	D
		Gender		
		Male (N)	Female (N)	Total Observed
4	HIV+	10	70	80
5	HIV-	90	30	120
6	Total Observed	100	100	200

- If there was no relationship between sex and testing positive, then you would expect to see about 50 people in each cell (box).
- It looks women were more likely to test positive.

Note: A chi-squared test is not valid if there are less than 5 people in any of the cells.

The easiest way to do a chi-squared test is to use a statistical software programme such as EpiInfo, SPSS, SAS, etc. However, there is a longer way of doing this in Excel if that is the only resource you have available. This approach requires a couple of steps in which you first have to use Excel to calculate the expected frequency in each cell before having it use the chi-squared formula.

	Actual	**B**	**C**	**D**
		Gender		
		Male (N)	Female (N)	Total Observed
4	HIV+	10	70	80
5	HIV-	90	30	120
6	Total Observed	100	100	200

	Expected	**B**	**C**	**D**
		Gender		
		Male (N)	Female (N)	Total Observed
10	HIV+	=B6*D4/D6	=C6*D4/D6	80
11	HIV-	=B6*D5/D6	=C6*D5/D6	120
12	Total Observed	100	100	200

Once you have calculated the expected results using these formulas you are ready to calculate you p-value for a chi-squared. Click on any empty cell in Excel, and type in the formula below. Remember that actual_range are white cells in the actual table and the expect_range are the white cells in the expected table.

Formula	*Example*	Result	Interpretation
=Chitest(actual_range, expected_range) • Actual_range is the set of values from your data • Expected_range is what you calculate as the expected values for the dataset if there is no difference.	=Chitest(B4:C5, B10:C11) Remember: A chi-squared test is not valid if there are less than 5 people in any of the cells.	This formula calculates the probability that the two genders are significantly different for the designated variable. In this example the p-value = 0.000.	Since the p-value is less than 0.05, then there is a statistical difference between males and females in their rates of testing positive for HIV.

To further understand what Excel is doing to calculate the chi-squared test you, you go to help, type 'chitest', and read the remarks.

4.9.2 Using Excel to do Paired T-test

You can try Excel to compare the following baseline and 6th month CD4 counts of five patients:

	A	B
	Baseline CD4 count	6th month CD4 count
1	50	75
2	55	85
3	45	90
4	60	85
5	40	80

After you have the information in Excel, you find an empty cell and calculate the p-value according to the formula below. Remember that the "data set" is the first row of numbers starting with A1 and ending with A5. The second "data set" is the second row of numbers starting with B1 and ending with B5. You do not select the column or row headers when entering your formula.

Formula	Example	Result	Interpretation
=TTEST(array1,array2,tails,type) • Array1 is the first data set. • Array2 is the second data set. • Tails is the number of distribution tails. Tails = 1 for a one-tailed distribution. Tails = 2, for a two-tailed distribution. (For this example choose 2 because the scores could have increased or	=TTEST(A2:A5,B2:B5,2,1) Note: you need to have scores for all participants at pre and post test.	This formula calculates the probability that the means from the two time points are different. (p-value = 0.007)	Since the p-value is less than 0.05, there is a statistical difference in the two values. Therefore, we can reject the null

decreased). • Type is the kind of t-test to perform. Type = **1** for a paired t-test.			hypothesis that there was no increase in CD4 counts.

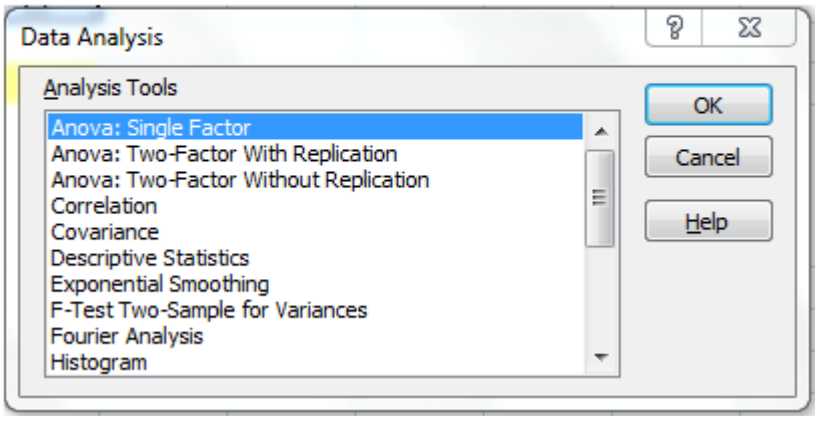
4.9.3 Using Excel to do Students' Sample T-test

If you choose to do this in Excel, just use the same formula as the paired samples t-test above; but the "type" is "**2**" for an unpaired test.

4.9.4 Using Excel to do a one-way ANOVA

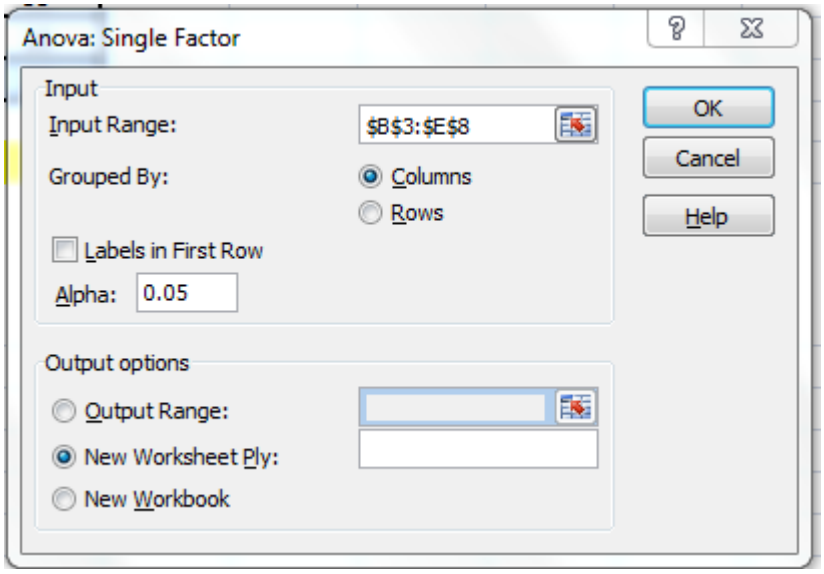
Using the first example in the ANOVA section; we had a table of facilities and weeks of pregnancy registration. Patient Number	Facility A	Facility B	Facility6 C	Facility D
1	21	22	18	19
2	20	24	30	17
3	32	27	12	23
4	12	31	32	33
5	6	20	28	33
6	18	18	24	13

To run a test on this table you must first enter the information into Excel. From there you can select your data tab. All the way to the right will be a data analysis tab. Select this tab. The box will look like this:



You will select the ANOVA: single factor which is the one-way ANOVA. Click OK.

Next you will see this screen:



The "input range" is the cells in your table (excluding the labels and means). You can either type this in a formula or select the cells. The "Alpha" is your acceptable margin of error. In this example it is set at 0.05. Remember that this is the amount of acceptable error and is related to the confidence level. The confidence level for this would then be 95%. You could choose an alternative value of 0.01 if you really wanted to be certain but remember that you will need lots of power (a large sample size) to detect a small

difference. Once you have put in the input range and the Alpha you can click OK. The programme will then show you a calculation that looks like this:

A1 | Anova: Single Factor

	A	B	C	D	E	F	G
1	Anova: Single Factor						
2							
3	SUMMARY						
4	*Groups*	*Count*	*Sum*	*Average*	*Variance*		
5	Column 1	6	109	18.16667	77.76667		
6	Column 2	6	142	23.66667	22.66667		
7	Column 3	6	144	24	59.2		
8	Column 4	6	138	23	70.4		
9							
10							
11	ANOVA						
12	*Source of Variation*	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
13	Between Groups	133.7917	3	44.59722	0.775491	0.521349	3.098391
14	Within Groups	1150.167	20	57.50833			
15							
16	Total	1283.958	23				

The "Summary" part of this analysis shows you the average (means) and variance of each group. These are our descriptive statistics but this information is unable to tell us if the differences in means are due to chance or if there is a significant difference.

The ANOVA part of this analysis shows us the p-value. This is the critical value to determine if there are significant differences between the two groups. In this case the p-value is 0.5. This is greater than 0.05 (our margin of error) therefore we CANNOT reject the null hypothesis and say that these values are any different that would happen by chance.

To perform a repeated measures ANOVA you need to convert your data in a way that will be accepted by Excel. This is beyond the scope of the chapter but you can find many tutorials on the internet by typing in the search term "two-factor ANOVA with replication in Excel".

Learning Activity 4.9.4.a

Calculating Chi-square p-values in Excel

Instructions: Using the direction for chi-squares in Excel to find p-values for the following chi-squares.

Enter this information into Excel and using the α of 0.05 and calculate the p-values.

1.

Previous children	Registration ≤20 weeks	Registration >20 weeks	Total Observed
Zero	10	65	75
1	30	35	65
>1	60	0	60
Total Observed	100	100	200

2.

Previous children	Registration ≤20 weeks	Registration >20 weeks	Total Observed
Zero	10	65	75
1	30	35	65
>1	60	0	60
Total Observed	100	100	200

Discussion 4.9.4.a

Calculating Chi-square p-values in Excel

These are what the tables of Actual and Expected frequencies should look like:

Actual A

Previous children	Registration ≤20 weeks	Registration >20 weeks	Total Observed
Zero	10	65	75
1	30	35	65
>1	60	0	60
Total Observed	100	100	200

Expected A

Previous children	Registration ≤20 weeks	Registration >20 weeks	Total Observed
Zero	37.5	37.5	75
1	32.5	32.5	65
>1	30	30	60
Total	100	100	200

Entering the formula using these ranges give you a p-value of 1.34702E-22. Remember that this is a scientific notation used to denote 1.35 X 10 $^{-22}$, or 0.0000000000000000000000135. This p-value is much less than 0.05 and therefore we can reject the null hypothesis with confidence.

2. The tables for the second exercise example for Chi squares would have Actual and Expected tables that look like the following.

Actual B			
Woman's age	Registration ≤20 weeks	Registration >20 weeks	Total Observed
≤16 years	5	8	13
17-21 years	20	22	44
>22 years	75	70	145
Total Observed	100	100	200

Expected B			
Woman's age	Registration ≤20 weeks	Registration >20 weeks	Total Observed
≤16 years	6.5	6.5	13
17-21 years	22	22	44
>22 years	72.5	72.5	145
Total Observed	100	100	200

Then, once the Chitest formula is entered into an empty cell it returns a p-value of 0.592579745. This p-value is much larger than our margin of error (α) of 0.05. Therefore we cannot reject the null hypothesis and cannot say that the differences in registration time by age group were due to anything but chance.

Learning Activity 4.9.4.b

Constructing T-tests

Instructions: Using the example directions for t-test in Excel above, calculate the p-values for this paired t-test and Students' t-test.

Use the data that we discussed in the Exercise for Paired t-test to calculate a p-value for this data using Excel. The data was as follows:

Paired T-test		
Patient Number	Start of Drug Regimen A	6-months later
1	120	345
2	230	450
3	240	243
4	400	350
5	210	555
6	178	200
7	55	240
8	320	320

In the exercise for the Students' t-test we used data from two facilities (A and B) and looked at the weeks of pregnancy registration at these facilities. Here is the table from the exercise:

Students' T-test		
Patient Number	Facility A	Facility B
1	21	33
2	20	35
3	32	28
4	12	27
5	6	24
6	18	29
μ	18.2	29.3

Discussion 4.9.4.b

Constructing T-tests

Paired T-test

ANSWER: Using the formula for T-test in a blank cell, Excel returns the p-value of 0.050755. This is just above the threshold of 0.05 to sufficiently reject the null hypothesis. Therefore we CANNOT reject the null hypothesis that there was no difference (but chance) between the CD4 counts. However, this p-value is almost equal to our null hypothesis and therefore conducting more measurements on a larger sample would be justified.

Students' T-test

ANSWER: Once this table is put into Excel and the formula is placed into an empty cell; Excel returns the p-value of 0.018. This p-value is lower than 0.05 therefore we can reject null hypothesis and say that there is a difference in the mean registration week between these two facilities.

Learning Activity 4.9.4.c
Constructing Chi-squares

Instructions: Using the example from the test above, use the information presented to create chi-squares.

In the exercise above we calculated a p-value for one data set versus another data set. An ANOVA can allow us to calculate a p-value for more than one data set. The table below shows the weight of 5-year olds in four villages. Enter this information into Excel and determine if there is a significant difference (0.05) in weight among these villages.

ANOVA (one-way)				
Patient Number	***Village A***	***Village B***	***Village C***	***Village D***
1	***21***	***22***	***18***	***10***
2	***10***	***20***	***20***	***12***
3	***12***	***18***	***12***	***9***
4	***11***	***10***	***12***	***10***
5	***20***	***11***	***18***	***11***
6	***18***	***18***	***24***	***10***

Discussion 4.9.4.c
Constructing Chi-squares

ANSWER: Once this information is put into Excel and an ANOVA test is run the results are as follows:

The first table, as we discussed, give the descriptive statistics for the groups, including averages (means) and variance. The second table gives the p-value as 0.0398. This p-value is less than 0.05 therefore we can reject the null hypothesis and say that there are significant differences in weights of 5-year old across these villages.

A1 | Anova: Single Factor

	A	B	C	D	E	F	G
1	Anova: Single Factor						
2							
3	SUMMARY						
4	*Groups*	*Count*	*Sum*	*Average*	*Variance*		
5	Column 1	6	92	15.33333	23.86667		
6	Column 2	6	99	16.5	23.9		
7	Column 3	6	104	17.33333	21.86667		
8	Column 4	6	62	10.33333	1.066667		
9							
10							
11	ANOVA						
12	*ce of Varic*	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
13	Between	177.125	3	59.04167	3.340405	0.039921	3.098391
14	Within Gr	353.5	20	17.675			
15							
16	Total	530.625	23				

4.10 Data Triangulation

Now that we have discussed qualitative data analysis and quantitative data analysis we will now talk about the benefits of data triangulation. Data triangulation is the process of using more than one data source, method, or observers to verify your analysis assumptions. Data triangulation has been discussed for qualitative data. This triangulation involves using multiple methods within qualitative analysis to verify your findings. For example, you can use data from observations to check theories developed from focus groups. Data triangulation in quantitative data can be achieved by using multiple measures or multiple data sources (such as routine data vs. collected data). Verification within these methodology areas is important and makes for stronger data.

Data triangulation with mixed methods (using both qualitative and quantitative data) is a way to not only check your data but also provide richness and completeness to your data. Often an analysis that uses both methodologies will be stronger and more persuasive. There will be more confidence in your findings if different methods lead to the same result or show different parts of the same problem.

Mixed methods are commonly used in outcome evaluations to use quantitative methods to explain results from quantitative methods; or visa versa. For instance; an intervention was conducted to increase facility births by women, and an analysis showed a mean increase in the frequency of facility births of 0.23 (23%) that corresponded to a p-value of 0.00002 (α=0.05). However, we still do not know how the intervention achieved such a success. By combining this quantitative analysis with qualitative analysis that includes focus groups with women, interviews with health care providers, and observations, we could provide a detailed and strong picture, not only of the fact that the intervention worked, but also how it worked.

Alternatively you could get a p-value of 0.083 (α=0.05) for the intervention of early pregnancy registration. Just looking at this p-value you would assume that it has not worked and that the intervention failed. However, looking at the qualitative data can give you an indication of why you might find a negative result. In focus groups and interviews you may find that, woman where more satisfied with their care, more willing to come into register, and more comfortable waiting in the queue. Interviews with nurses reveal that women are more willing to undergo testing and return for follow-up visits. You further learn that, while the intervention improved many things, the clinic hours were the limiting factor. The qualitative information revealed that

women were in their fields all day and once they returned, the clinic was closed for the day. This led to a delay on the part of the women.

Another example could be a qualitative study about the practices and attitudes around childhood diarrhea. You find, in detailed observations, focus groups, and interviews that women in one particular village are not willing to take their children to the nearest facility to treat their diarrhea but rather take them to the facility in the next village, for fear that the children would contract some other disease at their village facility. You then employ an observation check list as the facility and find a statistically significant difference in the hygiene practices between the tool facilities. This difference, along with the qualitative information, leads you to the conclusion that the poor hygienic practices of the village facility have lead to cross-over infections among children and the women's distrust built from these infections.

NOTE: Another form of triangulation is called "within" method triangulation. This method uses different scales or questions in the same tool or guide to verify or check information in another part. For example, you may have a question in a questionnaire asking the participant "How many sexual partners do men usually have in this village?". Later in the questionnaire you may ask "Circle your answer: Men generally have (1-2, 2-3, 3-4, 4+) sexual partners". For qualitative information you can repeat a question or topic later in the interview or focus group.

CHAPTER SUMMARY

In this chapter we have discussed quantitative data analysis and the importance and usefulness of data triangulation.

In data analysis we began by reviewing descriptive statistics including how to determine point parameters like the mean, mode, and median, and then how to describe distributions as normal or skewed. This included a review of the four types of data discussed in workbook 2.

After reviewing this data we detailed the way in which you could calculate the probability/risk or odds of an event happening. This led to a discussion of confidence and the confidence with which we could make an assumption of the odds or risk. This included a discussion of the margin of error and its direct link to the confidence interval.

Once we had established confidence intervals you learned hypothesis testing and how to set up a null hypothesis to be able to disprove that any difference you see in values is not just due to chance. We also learned about p-values or the measurement of probability that the events you are seeing (the comparison between data) are due or not due to random chance. The joining of the information on confidence intervals and margins of error, which give you a basis from which to test the null hypothesis, led us to a discussion of statistical test that can be used with various forms of data to get appropriate p-values.

The tests that we reviewed included Chi-square tests for categorical data, t-test for categorical and continuous data, and ANOVAs for categorical and continuous data with more than one measurement point.

We ended the chapter with a discussion of the importance of data triangulation and how to use your qualitative data and quantitative data jointly to make a stronger argument about the results of the phenomenon under study.

Self Assessment Quiz

1. How is inferential statistics different from descriptive statistics?

2. What is the difference between risk and odds?

3. Under which two circumstances can an odds ratio be used to describe events?

4. If the average systolic blood pressure for women over 50 in District X is 139 but we know that there is a margin of error of 0.03. What is the range of blood pressures that are likely to be the true average for this population?

5. Change this statement into a null hypothesis: we want to measure if women who are between 40-50 years old have a lower systolic blood pressure than woman between 51-60 years old.

6. Please write out in decimal form the scientific notation for a p-value that is 2.2E-.

7. In one evaluation multiple hypothesis were tested with a critical p-value of 0.05. Below are the hypotheses a, b, and c and the p-values that were obtained for these null hypotheses. Please indicate whether you would reject the null hypothesis and at what level (sufficient or strongly).
   a. 0.0002
   b. 0.049
   c. 0.052

8. For the relationships below please determine that type of data and then determine the type of test that you would use to analyze the relationships.

   a. Comparison of the difference in mean pre-post test scores between men and woman.

   b. The relationship between an infant, born to an HIV positive mother, being infected with HIV in two different districts.

c. The blood pressure for women 30-40 years old compared to those who are 41-50 and 51-60.

d. The rate men registering for adult circumcision at routine out-patient visits compared to the rate of men registering for adult male circumcision after testing negative at an HIV counseling and testing visit.

9. Name two benefits to data triangulation.

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Self Assessment Quiz Answer Key

1. How is inferential statistics different from descriptive statistics?

ANSWER: *In descriptive statistics the goal is to describe the population that you are evaluating and other evaluation characteristics. In inferential statistics the goal is to infer from your sample evaluation population to a larger population. In inferential statistics you analyze the probability that the characteristics of the evaluation population are the same or different than the general population, or characteristics that would occur by chance.*

2. What is the difference between risk and odds?

ANSWER: *There is no fundamental difference between risk and odds, rather it is a judgment about whether the chance of an event happening is unfavorable (a risk). For instance, the chance of developing diabetes would be a risk, while the chance of living until your 90 would be a probability.*

3. Under which two circumstances can an odds ratio be used to describe events?

ANSWER: *An odds ration can describe two of the same events happening in two different groups or two different events happening in the same group.*

4. If the average systolic blood pressure for women over 50 in District X is 139 but we know that there is a margin of error of 0.03. What is the range of blood pressures that are likely to be the true average for this population?

ANSWER: *0.03 is a 3% margin of error. Therefore ± 3% would give us a range of 134.83-143.17.*

5. Change this statement into a null hypothesis: we want to measure if women who are between 40-50 years old have a lower systolic blood pressure than woman between 51-60 years old.

ANSWER: *H_0: The mean systolic blood pressure for women aged 40-50 is not significantly different than the mean systolic blood pressure for women aged 51-60.*

6. Please write out in decimal form the scientific notation for a p-value that is 2.2E-7

ANSWER: *This would correspond to a p-value of 0.00000022.*

7. In one evaluation multiple hypothesis were tested with a critical p-value of 0.05. Below are the hypotheses a,b, and c and the p-values that were obtained for these null hypotheses. Please indicate whether you would reject the null hypothesis and at what level (sufficient or strongly).

- 0.0002
- 0.049
- 0.052

ANSWER:

a. *0.0002 is much less than 0.05, therefore the null hypothesis can be strongly rejected.*

b. *0.049 is less than 0.05 but very close. The null hypothesis can be rejected with sufficient evidence.*

c. *0.052 is close to 0.05 but is above our critical p-value therefore the null hypothesis cannot be rejected.*

8. For the relationships below please determine that type of data and then determine the type of test that you would use to analyze the relationships.

a. Comparison of the difference in mean pre-post test scores between men and woman.

b. The relationship between an infant, born to an HIV positive mother, being infected with HIV in two different districts.

c. The blood pressure for women 30-40 years old compared to those who are 41-50 and 51-60.

d. The rate men registering for adult circumcision at routine out-patient visits compared to the rate of men registering for adult male circumcision after testing negative at an HIV counseling and testing visit.

ANSWER:

a. Test scores are continuous variables and men in women are two categorical variables. Two test scores were measured for each category (men and women) therefore you would use a paired t-test.

b. HIV positive and negative infants are categorical variables. The districts in which women live are also categorical. Therefore a chi-squared test could be used on this data.

c. Blood pressure is a continuous variable and the age of women has been put into categories therefore age, in this example is a categorical variable. There are three categories to be compared and they have no influence on each other therefore you would use a one-way ANOVA.

d. If men register or do not register for circumcision would be considered categorical variables, rates of those who register and those who don't are continuous variables. The different register locations (out-patient visit vs. HIV counseling and testing visit) form a categorical variable. Therefore a student's t-test can be used.

9. Name two benefits to data triangulation

ANSWER:

Verification of positive data by multiple sources;

Add richness and completeness to the data;

Explain quantitative results from qualitative results or vice versa.

Self-Directed Learning Workbook 3:
Chapter Five
Report Writing

Report writing is a skill that needs to be refined to ensure data quality

Chapter 5:
Evaluation Report Writing

Estimated time needed for completion: 2 hours

Chapter Overview

Thus far in Workbook 3, we have been discussing the activities involved in conducting the "E" in monitoring and evaluation (M&E). In this chapter, we will move beyond "how to conduct evaluation projects" to learn more about how to share the findings of your evaluation projects in a technical report.

As a district level M&E officer, you may be expected to present a written report at forums such as District Multi-Sectoral AIDS Committee (DMSAC) and District Health Management Team (DHMT) meetings. This chapter will define the purpose of writing a technical report and will describe specific sections of technical reports that are considered standard. This chapter will also present some basic formatting and referencing guidelines that can assist you in preparing a thorough and professional report to share the findings from evaluation activities in your district.

Learning Objectives

At the end of this chapter, participants will be able to:

- write a succinct executive summary for a sample technical report,
- list and describe the key sections of a technical report,
- describe correct formatting styles for a technical report, and
- cite a reference in a technical report.

5.1. Essentials of Report Writing

5.1.1 Protocol vs. Report

As discussed in Chapter 1 of Workbook 3, a *protocol* is a document that details a plan to answer a specific evaluation question, or in some cases a research question. A protocol is written before conducting an evaluation for the purpose of getting Health Research Unit (HRU) approval, securing funding, or gaining support for the evaluation from various stakeholders and institutions. A protocol is also a very practical tool for helping to closely consider the purpose of an evaluation and the feasibility of implementing the evaluation in the field.

A *report,* on the other hand, is a compilation of the findings that are the result of conducting the evaluation outlined in the protocol. A report contains many of the same sections as a protocol; however, the report is focussed on presenting results, discussion, and implications of findings. A district level M&E officer may have many reasons for writing a report. Possible reasons include:

- Making data available for decision-making processes: Conducting an evaluation and documenting the findings are necessary for evidence-based planning and for completing a district profile.

- Sharing achievements, experiences, and lessons learnt with stakeholders: Through a report you are able to tell others, such as members of DMSAC, programme officers, and other M&E officers, what was achieved at the time your district implemented evaluation activities as well as what challenges the district faced during this process and how you solved/surmounted those challenges.

- Accounting for funds and leverage for additional funding: A report is a concise and comprehensive mechanism to account for funding. A report can document how funds already received were spent. It can also document a need for additional funding, especially when a report includes important health outcomes or health services findings that are dependent on additional funding. M&E

officers play a critical role in documenting these findings through evaluation activities and by effectively disseminating the findings in a professional report.

Reflection	*Take a moment and consider the following questions:* • What reports did you write as a student at the University? • Look through any reference materials you have received since becoming an M&E officer. Do you have any reports such as a *Botswana AIDS Impact Survey (BAIS)* report? *A Sentinel Surveillance* report? A report from the Health Statistics Unit? • What reports have your read since starting work as an M&E officer?

5.1.2 Planning

Planning ahead is the first step in writing a technical report. Writing a report can be a time-consuming task. It is advisable to first break down the tasks of writing the report into manageable steps. Next, assign each step a timeline, setting a deadline for each step and task. If you need to assign a section to someone else, be sure and note who that person is. By breaking down the steps into a timeline with deadlines and persons responsible for each step, you will have created a work plan for successfully finishing the evaluation report. This work plan will help ensure that you meet your required deadline.

5.2. Sections of a Report

5.2.1 Title Page

The title page should include the following:

- the report title;
- the name of the person, organisation, or company for whom the report has been prepared;
- the name of the person, organisation, or company who authored the report;
- the date the report was completed; an
- often the title page also includes logos of various stakeholders who contributed to or funded the report.

Summary of the Sections of a Report:

- Title Page
- Acknowledgements
- Table of Contents
- Executive Summary
- Indices of Tables, Figures and Abbreviations
- Introduction
- Background
- Methodology
- Findings
- Discussion
- Conclusion
- Recommendations
- References
- Appendices

NB: More able writers may collapse or interchange sections depending on who the intended readers are

5.2.2 Acknowledgements

Data collection and analysis are rarely the work of one person alone. The acknowledgement section of the attached Botswana National Tuberculosis Programme (BNTP) report illustrates how you can acknowledge contributions. In the acknowledgements section of the report, recognition is given to any individuals that assisted in any step of the process, including data collection and analysis. Also acknowledge individuals, teams, Governmental units or facilities that allowed data collection activities to occur. This section should be dedicated to all who have made a significant contribution and may include librarians, technicians, colleagues, and supervisors. The most important contributors are your participants/respondents. You can acknowledge them as a collective group, for example, "for all the participants who were so generous with their time and knowledge to bring this work to fruition."

5.2.3 Table of Contents

The Table of Contents is where all the sections of the report are listed sequentially with the page numbers they begin on. The title page and acknowledgments page appear before the table of contents, and thus, are not indexed in the table of contents. In addition, a full list of appendices should be indexed under a heading entitled 'Appendices' (these are explained later in this chapter). While you can begin the Table of Contents early in the report writing process, it is necessary and may be more efficient to ensure that all sections are indexed and page numbers are correct only after the report narrative has been written and all tables and graphs are completed. If you are using Microsoft Office Word software, then you can use the references tab to index and generate a Table of Contents (TOC).

5.2.4 Executive Summary

An executive summary is a synopsis of a report that may be read in lieu of reading the entire report and is generally two to four single-spaced pages long.

It is a concise, but detailed, summary of the findings, which previews the main points of an in-depth report. In your executive summary, include enough information so that whoever reads it will be familiarised with what is in the report without having to read the entire document.

Learning Activity 5.2.4

Example of an Executive Summary

Directions: Read the example of an Executive Summary in Supplementary Material 5.2.4

5.2.5 Indices of Tables, Figures and List of Abbreviations

All figures and graphics in a report should be titled and numbered. Be consistent when labelling tables and charts. Once the report is written, go back and double-check that all tables and figures are in their relevant places in the document. Label tables and charts so that the caption names exactly the statistics presented in the table and the variables that were studied. For example, Table 1 - Number and Percentage of Participants by Gender and HIV Status or Table 4 - Analysis of Variance for Health Care Worker Competency Scores.

There should also be a comprehensive list of abbreviations. This list should include all abbreviations used in the report, even if you think your reader will know them. It

can be helpful to start creating this list separately as you begin writing the various sections. This way, you can be certain you do not accidently omit any abbreviations. And, although you include a list of abbreviations, it is still necessary to use the standard method of introducing an abbreviation. Namely, the first time the abbreviated words appear in the report all the words are spelled out. The abbreviation should then be placed in parentheses. From that point forward in the report it is acceptable to use only the abbreviation. It is good practice to conduct a final review of the abbreviations list in comparison to the text prior to publishing your report to make sure all abbreviations are accounted for.

5.2.6 Introduction

The introduction to your report is the gateway to your findings. It conveys information about the problem initially identified, and the reason for understanding or trying to solve this problem. You should indicate the manner by which the report is organized (that is, what it will and will not cover). The introduction should include:

- Statement of the problem: Start the introduction by describing the problem area and explain the importance of your evaluation based on the problem.
- Aims and Objectives of the evaluation: Gradually shift the problem statement to a presentation of a testable hypothesis that is clear and specific, and includes evaluation questions. If it is a qualitative study, then you should present a clear and specific aim of studying the issue/problem. Define the objectives or purpose of the evaluation project. This is where you state what you specifically hope to achieve.
- Significance of the evaluation: End the introduction with an explanation of the broader importance of your evaluation project based on the problem. Articulate how your evaluation project will lead to a better understanding of the subject.

The purpose of an introduction in a technical report is to introduce the problem area, establish its importance, and indicate the author's perspectives on the problem. It should start with a broad topic and then gradually become more specific, with the aims and objectives of the evaluation in the middle of the report, and ending with the overall intended contribution of the evaluation to either understanding or resolving a problem.

Learning Activity 5.2.6

Example of an Introduction

Directions: Refer to the Botswana Report of the Review of the Botswana National Tuberculosis Programme in Appendix A of this chapter. Read pages 15-20 for an example of how write the Introduction section of a technical report.

5.2.7 Literature Review

The literature review should be a concise, relevant, up-to-date, and orderly review of the current knowledge concerning the problem being investigated. It should:

- critically appraise existing information about the problem in credible sources such as scientific journals and research articles;
- describe the weaknesses, controversies, common and unique findings, inconsistencies or gaps in information provided by previous studies;
- highlight conflicting findings or methodological flaws (if any); and
- identify why an evaluation is required (your study).

The conclusion of the literature review should be a synthesis and summary of previous studies related to your evaluation problem. An effective literature review helps a reader to understand how individual studies relate to one another and what trends you observe in the published literature on the topic you are investigating. The literature review should emphasize different findings in published literature and not just differences in evaluation methodologies and on the variables used. It is useful to construct a 'topic outline' as you conduct your literature review so as not to stray from the subject of your evaluation project.

You must acknowledge the original authors of the ideas in your literature review even if you summarize the findings in your own words. When using someone else's original words, diagrams, graphs etc., you must provide the correct citation to avoid being accused of plagiarism. This is further explained in the section on referencing.

Examples of how to cite authors in your text:

Example 1:

The goal of the BNTP is to eliminate tuberculosis and to adopt the DOTS Strategy in line with the STOP TB Strategy. Tuberculosis is a major public health problem in Botswana. The 2006 and 2007 data also shows that in Botswana there is a 60% - 86% TB/HIV co-infection (Custom-Writing.org 2010).

Example 2:

The goal of the BNTP is to eliminate tuberculosis and to adopt the DOTS Strategy in line with the STOP TB Strategy. Tuberculosis is a major public health problem in Botswana. The 2006 and 2007 data also shows that in Botswana there is a 60% - 86% TB/HIV co-infection (MOH 2009).

Learning Activity 5.2.7

Example of Literature Review

Directions: Refer to the Botswana Report of the Review of the Botswana National Tuberculosis Programme in Appendix A of this chapter. Read pages 21-27 for an example of how to write a Literature Review section of a technical report

5.2.8 Methodology

The methodology section (sometimes called the Materials and Methods Section) is a clear, concise, accurate, and sequential description of all procedures conducted as part of the evaluation project. It consists of comprehensive documentation of methods that were used for data collection. It should be sufficiently detailed so that whoever reads the report will be able to replicate the evaluation project without having to consult you. The following should be included in this section:

- ***Evaluation design***
  - Provide a brief introduction to the overall design of your evaluation project.
  - Describe the design with justification (advantages/strengths), including practical (for example, time and money) or ethical reasons (for example, did not include children under 18 because of sensitive topic matter), and why alternate designs were not possible.

- ***Settings and Sample***
  - State where the evaluation was conducted.
  - Where appropriate, indicate the reference population, source population, and the participants included in the evaluation.
  - Explain the inclusion/exclusion criteria if applicable.

- ***Sample size***

- State how many participants, records, sites, etc were included in the evaluation.
- Identify if the sample came from a single population (example pregnant women), or two or more populations (example pregnant women with HIV and pregnant women without HIV infection).

- ***Ethical considerations***
  - Issues of ethics and confidentiality must be addressed.
  - State whether HRU approval was sought.
  - If an informed consent form was used, it should be included as an appendix.

- ***Data collection***
  - Describe what data was collected. Data collection tools used should be included under Appendices.
  - Describe exactly how participants were recruited and under what circumstances, time of day, level of privacy etc. so readers know exactly how the data collection activities were organized and executed in the field. This section should also include all logistical issues. Language translation methods used should be stated, including in tool development (e.g., were the tools translated? were they back-translated?) and language issues in data collection, esp. qualitative interviews (e.g., was a translator used?)
  - Describe how tools were administered (e.g., mailed, self-administered, interviewer administered etc.).
  - If there was no direct contact with participants, describe fully how patient charts were extracted or how other data were captured for your evaluation study.
  - Describe in detail the variables that were measured and how the measurement occurred (e.g., continuous, categorical, scale, score) and any validity or reliability data that are available.

- ***Statistical analysis***
  - Describe methods of data analysis.
  - Identify the statistical software that was used to conduct the analysis.
  - Summarize the independent and dependent variables, and describe univariate, bivariate, and multivariate statistical procedures.
  - Appropriate statistical tests for different types of data should be described and methods for correcting non-normative data or missing data.
  - Methods for qualitative data analysis need to be described.

Guidelines for including charts and tables:

- Label all diagrams
- Write clear and precise titles
- Clearly link the diagrams and the text
- Produce tables that can be quickly and easily interpreted
- Abide by the copyright laws when including illustrations and tables from other sources

Learning Activity 5.2.8

Example of a Methodology Section

Directions: Refer to the Botswana Report of the Review of the Botswana National Tuberculosis Programme in Appendix A of this chapter. Read pages 28-30 for an example of how to write a Methodology section of a technical report.

5.2.9 Findings

Findings should be presented as factual statements of the observations and measurements made. It is important to note that interpretations and discussion of findings does not occur in this section. To facilitate comprehension, it is advisable to divide the findings into subsections. For each subsection, a short summary should be provided at the beginning.

Findings may best be presented in both a narrative and graphic form. Potential graphics include:

- tables,
- graphs,
- pie Charts,
- bar Charts, and
- diagrams.

(Refer to Workbook 2, Chapter 4 for a detailed discussion of when and how to use graphics).

It is useful to organize the analysis and findings section around the hypotheses, purposes, or questions stated in the introduction. Generally the findings should start with descriptive statistics that describe the sample or differences between two groups. When describing the statistics presented in a table, point out highlights for

the reader. Because the values of the statistics are presented in a table, it is not necessary to repeat each value in your discussion of findings. Remember that statistical symbols (i.e., *t*, *df* and *p*) are italicized. Also, spell out numbers less than ten. If you are presenting qualitative findings it is often useful to organize text into sub-headings in order to guide the reader through the findings.

Learning Activity 5.2.9

Example of a Finding Section

Directions: Refer to the Botswana Report of the Review of the Botswana National Tuberculosis Programme in Appendix A of this chapter. Read Part 2 (pages 32-39) for an example of how to write the Findings section of a technical report.

5.2.10 Discussion

In the discussion section you will give a concise interpretation of the findings. The purpose of the discussion is to interpret your findings and justify your conclusions. The discussion section is not a selective emphasis or biased interpretation of the findings, but rather an objective description and discussion of the findings. Your discussion should clearly indicate how your findings relate to the hypotheses, purposes, or questions guiding the project. You should also identify potential confounders and biases that may have impacted your findings. Include descriptions of and possible explanations for unanticipated findings; this part of the discussion can include more subjective interpretation of the findings based on your educated guess of why the study yielded the findings that it did.

In the discussion section, be sure to address the weaknesses and limitations of the study design and findings. This would include explaining any sampling bias that might have been introduced by your sampling method as well as any biases that may have been introduced by the methods used. Keep in mind that there is no perfect evaluation design; they all have limitations. Clearly addressing the limitations and the implications of these limitations is important for contextualizing the findings.

Many authors include specific recommendations for further investigations in the discussion section.

Learning Activity 5.2.10

Example of a Discussion Section

Directions: Refer to the Botswana Report of the Review of the Botswana National Tuberculosis Programme in Appendix A of this chapter. Read Part 3 (pages 42-52) for an example of how to write a Discussion section of a technical report.

5.2.11 Conclusions

The primary aim of this section is to summarise the findings and it is sometimes called *Summary*. This is the part of the report that brings together the main issues. The conclusion should stress the importance of the evaluation project that was carried out and can refer back to the results presented by the literature review. The conclusion should also indicate what new studies, evaluation questions, or programmatic changes might emerge as a result of this report.

5.2.12 Recommendations

In the recommendation section you give suggestions for how the problem under investigation can be solved. It is advisable to make a numbered or bulleted list because this will make it easier for the reader to find the major points.

Learning Activity 5.2.12

Example of a Recommendations Section

Directions: Refer to the Botswana Report of the Review of the Botswana National Tuberculosis Programme in Appendix A of this chapter. Read Part 4 (pages 55-57) for an example of how to write a Recommendations section of a technical report.

5.2.13 References

While the reference section is one of the last sections of the report sequentially, it should be started the moment the evaluation question is developed. By starting to compile a list of references early you will save yourself the troublesome task of trying to identify sources of information after you have already decided to include the information. Citing and referencing authors is easier if you record the details of the work accurately and immediately. The reference list should follow your organization or publications style guide and should be accurate to enable the reader to locate the item easily.

The references section contains only sources that were referred to in the text or notes of the report. Details may include:

- author's name and initials,
- date of publication,
- title of the book, paper or journal,
- publisher,
- place of publication,
- page numbers, and
- details of the journal in which the article has appeared.

It is important to note that references should be listed alphabetically, as this does not show any order of importance. Please see Supplementary Material 5.10 for examples on referencing styles for information gathered from a variety of sources. Respect Intellectual Property Rights (IPR) including copyright, trademarks, patents, and confidentiality.

If references are not properly cited in the narrative portion of your report, the result can be deemed 'plagiarism'. *Plagiarism* is defined as "the unauthorized use or close imitation of the language and thoughts of another author and the representation of them as one's own original work." (Dictionary.com) As straight-forward as this may sound, it may not be easy for you to determine what constitutes plagiarism.

The following behaviours are considered to be plagiarism:

- Using another writer's words without proper citation (that is, not putting them in quotation marks "xx" and providing the names of the authors who wrote it).
- Using another writer's ideas without proper citation (for example, an assertion such as - HIV prevalence has levelled in Botswana - should be supported by the providing the source of this information).
- Citing your source but reproducing the exact words of a printed source without quotation marks.
- Borrowing the structure of another author's phrases or sentences without crediting the author from whom it came.
- Using someone else's outline to write your own report.

See Resource 5.10 for a list of websites with information on avoiding plagiarism.

Learning Activity 5.2.13

Sample Citations Using International Committee of Medical Journal Editors (ICMJE) Style

Directions: *Use Supplementary Material 5.2.13: Sample Citations Using ICMJE Style to determine the correct citation format for each of the scenarios below.*

Scenario

1. It is the 25th of June, 2010 and you are preparing a report for the quarterly DMSAC meeting. You want to include the latest national HIV prevalence statistics for Botswana. You find the information from the following website:

DHAPC. Gaborone: Botswana HIV/AIDS Programs. Available from: *http//www.hiv.gov.bw*

Use the ICMJE style to reference this source.

2. It is now August and you are writing a report with the TB Coordinator in your district focusing on outcomes of recent TB initiatives. You want to reference the 2007 Botswana National Tuberculosis Program Manual.

How would you correctly cite this source in your reference list using the ICMJE referencing style?

3. You are in the Community Health Nurse's office and you see the book "Contemporary Diagnosis and Management of HIV/AIDS Infection" by Robert L. Murphy and John P. Flaherty. You decide you are going to use this book as part of a literature review. This book is a 2nd edition and was published in November, 2003 by Handbooks in Healthcare in Pennsylvania, USA.

How would you correctly cite this source in your reference list using the ICMJE referencing style?

Discussion 5.2.13

Sample Citations Using International Committee of Medical Journal Editors (ICMJE) Style

(Note: Unlike the rest of the Discussion sections of Learning Activities throughout this Workbook, the answers in this activity are not printed in Italics. This is because there are specific elements of some citations that are required to be printed in Italics. Thus, only the sections of the citation that are required to be in Italics per the ICMJE style will be printed in Italics.)

Scenario

1. It is the 25th of June, 2010 and you are preparing a report for the quarterly DMSAC meeting. You want to include the latest national HIV prevalence statistics for Botswana. You find the information from the following website:

DHAPC. Gaborone: Botswana HIV/AIDS Programs. Available from: *http//www.hiv.gov.bw*

Use the ICMJE style to reference this source.

Answer: *This source should be cited as part of a website/homepage.*

Department of AIDS Prevention and Care (DHAPC) [homepage on the Internet]. Gaborone: Botswana Ministry of Health; 2009 [cited 2010 June 25]. HIV and AIDS Statistics; [1 page]. Available from: *http//www.hiv.gov.bw*

2. It is now August and you are writing a report for the Botswana National Tuberculosis Control Program. You want to reference the 2007 Botswana National Tuberculosis Program Manual.

How would you correctly cite this source in your reference list using the ICMJE referencing style?

Answer: *This source should be cited as a technical publication.*

Botswana National TB Control Program (BNTP), Ministry of Health, Republic of Botswana. *National Tuberculosis Program Manual.* 2007

3. You are in the Community Health Nurse's office and you see the book "Contemporary Diagnosis and Management of HIV/AIDS Infection" by Robert L. Murphy and John P. Flaherty. You decide you are going to use this book as part of a literature review. This book is a 2nd edition and was published in November, 2003 by Handbooks in Healthcare in Pennsylvania, USA.

How would you correctly cite this source in your reference list using the ICMJE referencing style?

Answer: *This source should be cited as a book.*

Murphy RL and Flaherty JP. Contemporary Diagnosis and Management of HIV/AIDS Infection. 2nd ed. Pennsylvania: Handbooks in Healthcare; 2003.

5.3 Appendices and Formatting

5.3.1 Appendices

The final section of a report is the Appendix. An appendix contains additional information related to the report but which is not essential to the main findings. The appendices may include data tables, background calculations, and details of interview questions, a glossary of items or any other information which might be useful to the reader. All appendices should be indexed in the Table of Contents and can be referenced throughout the report.

5.3.2 Formatting

While the exact format of the evaluation report may be dictated by the entity receiving the report, there are some guidelines that generally apply across all formats. Reports should be typed, double-spaced on single sides of good quality A4 paper. The standard font is usually Times New Roman size 12. Normally margins are: 40 mm on the left hand side, to allow for binding, 10 mm on the right-hand side, and to 20 mm on the top and bottom.

Pagination refers to the process of numbering the pages of the report. Pages should be numbered sequentially on the bottom right hand side of each page.

The title page rarely is numbered. Typically the Acknowledgements, Table of Contents, Abstract and Indices of Tables and Abbreviations pages are numbered sequentially and are in lower case Roman numerals, such as one (i). The main text of the report, starting with the Introduction is in Arabic page numbers (1, 2 etc.).

Headings are important to de-lineate the different sections of the paper for the reader. The most important thing to keep in mind when using headings is to be consistent. Generally major headings such as 'Introduction' are centred, in capitals and in bold. Subheadings are typically right justified, in bold with only the first letter capitalised.

Paragraphs should also be formatted uniformly. All paragraphs should be indented consistently. A single line of a paragraph should not be carried over to another page. In this case it is appropriate to carry over the preceding line so that a minimum of two lines of a paragraph remain on the new page. Similarly, a new paragraph should not begin at the end of a page unless at least two lines of text from that paragraph can appear.

There are some general guidelines for, grammar and punctuation as well.

Avoid using personal pronouns such as "I, we, or you". Use the third person voice throughout the report. Avoid using jargon and if you use abbreviations remember to apply the standard method of spelling out the word(s) the first time it appears in the report, and then putting the abbreviation in parenthesis immediately following

the word. Even if you spell out the abbreviation the first time, it is also necessary to put the abbreviation in the list of abbreviation section of the report.

The most important thing to remember about formatting your report is to be consistent and uniform throughout the report. This will make your report easier to read and look more professional. And lastly, while it is essential to use a computer to spell-check your document, do not rely on the computer alone. Read through your report word-for-word to make sure that your grammar and spelling are correct. It may also be helpful to read your report aloud to help you detect any errors.

Refer to Resource 5.2 for a Report Writing Checklist. You may use this checklist as a guide for writing your own reports in the future.

Learning Activity 5.3.2

Practice Writing an Executive Summary

Directions: By completing Learning Activities 5.2.4a-5.2.10 you have read the entire report, Review of the Botswana National Tuberculosis Programme in Appendix A of this chapter. Use the guidelines presented in this chapter to write an executive summary. You may refer back to the report for details and specific information you would like to include in the Executive Summary.

Consider including the following when writing the executive summary:

- Purpose and scope of document
- Methods
- Findings
- Conclusion
- Recommendations
- Other supportive information

Discussion 5.3.2

Writing an Executive Summary

See below for the executive summary written for the Review of the Botswana National Tuberculosis Programme Report. The executive summary you wrote and the one presented here likely have some differences. That is O.K. Just note the strengths of your summary and the areas of improvement of your summary based on the one presented here. Some of the strengths of this summary are:

- *The introduction is brief and concise.*
- *The key points of the report are clear*
- *The conclusion paragraph is clear, concise and does not offer commentary or a discussion of key points.*
- *The recommendations are clear. The bulleted list makes it easier to read and leaves the reader with a clear understanding of the recommendations.*

The Ministry of Health established the Botswana National Tuberculosis Programme in 1975 with technical assistance from the World Health Organization. The implementation of TB Control occurs mainly in two ministries. The Botswana National Tuberculosis Programme (BNTP) is responsible for policy formulation while implementation of activities is fully integrated into the primary health care system under Ministry of Local government. 0ver 90% of health services are provided by the government through government hospitals, clinics and state supported mission hospitals.

The goal of the BNTP is to eliminate tuberculosis and adopts the DOTS Strategy in line with the STOP TB Strategy. Tuberculosis is a major public health problem in Botswana. The 2006 and 2007 data also shows that, in Botswana there is a 60% - 86% TB/HIV co-infection (Custom-Writing.org 2010).

A number of drug resistance studies in Botswana have indicated that drug resistant cases are increasing. A survey conducted 1996-1997 revealed the prevalence of MDR TB to be 0.2% among new TB cases and 6.1% in retreatment cases. In 1999, another survey results showed a rise in the prevalence from 0.6% and 9.0% respectively and in 2002, the results indicated 0.8% and 10.4% respectively.

The BNTP has a GFATM Round 5 grant of USD 8.9 million for DOTS expansion

activities over a period of 5 years and so far has implemented the first 2 year phase (2007- 2008) with award of USD 5.52 million. In 2008 the program put across a renewal proposal for second 3 year phase (of USD 3.4 million) which was also approved but on conditions, one of which is the assessment of the quality of TB program management in the country carried out in an independent and objective way. The GFATM seem to be concerned about the increasing numbers of drug resistant TB particularly MDR TB, which is as a rule a man made problem resulting from poor DOTS management. In 1999 and 2006, the BNTP underwent comprehensive evaluations.

Main conclusions of the 2006 evaluation were that there was inadequate supervision and human resource development; poor implementation of TB/HIV Collaborative activities; MDR TB cases increasing; inadequate laboratory services for TB Control in Botswana; partnerships, with the stress then that Co-operation between Ministry of Health and the Ministry of Local Government needed to be improved and financing for TB control was inadequate. Recommendations made prioritized actions to reverse the picture, namely: development of a short term TB action plan; reassess priorities for utilization of Global Fund grant; ensure rapid recruitment of district co-coordinators to re-establish TB standards and meet Global Fund prerequisite; upgrade laboratory quality and range of services to respond to TB programme needs; urgent development of clear algorithm for management of smear negative TB and build capacity to exclude TB in individuals selected for Isoniazid Preventive Therapy; and provide technical support to review the BNTP manual and MDR TB treatment guidelines.

Little progress was made since the 2006 review. The majority of the 2006 recommendations were partially achieved. A few recommendations were not achieved at all. **The undertaking of TB drug resistance survey and the development of the manual are the only two full achievements.**

Major achievements since the 2006 Review are:

- Proportion of non evaluated patients dropped significantly from 18.7% to 6%
- Progressive trend of TB patients tested for HIV, though uptake of CPT and ARVs not documented
- IPT Programme is implemented, though record of activities is poor.
- Regular periodic surveillance of Drug Resistant TB (DRS surveys every 3-4 years)
- Introduction of Fixed Doses Combinations (FDCs)
- Strategic plan 2008–2012 developed
- Infection control guidelines developed
- Multi-drug resistance TB treatment guidelines under development

Summary of major BNTP weaknesses

- Inadequate management capacity of the Central Unit of the BNTP with unclear the leadership role of the NTP Manager
- Inadequate role of laboratory in diagnosis and follow up of treatment deficient
- Suboptimal treatment outcomes; *low cure rate of 42%; high 'treatment completed' rate of 30% with smears undone and unfavourable outcomes above the 10% and a* 72% Treatment Success Rate
- Inadequate formal TB/HIV Collaboration at national and district levels
  - Low/not documented CPT uptake and access to ARVs
  - IPT activities carried out without involvement of the HIV/AIDS Programme
- MDR TB cases on the rise; DRS surveys conducted between 1996–1997, 1999 and 2002 show that the prevalence of drug resistance TB in new cases raised from 0.2% to 0.6% and 0.8%, respectively. In previously treated cases it rose from 6.1% to 9.0 and 10.4%. Results from the 2007/2008 survey still being assessed show:

  - Any resistance to 1st line among new patients: 29.0%
  - Any resistance among re-treatment patients: 31.5%
  - MDR in new patients: 3.3%
  - MDR in re-treatment: 9.3%
- Routine registration of MDR TB cases is not yet implemented
- Lack of surveillance system for MDR-TB.
- Guidelines for MDR TB are under development and the country has applied for a GLC grant
- Sub optimal Drug Management System
  - Inadequate Drug Management resulting in stock outs at all levels
  - No control of TB drugs in the private sector
- Limited involvement of private practitioners in TB Control
- Inadequate supervision at and from all levels
- Inadequate Monitoring as a result of Unsatisfactory Recording/Reporting of DOTS performance and laboratory services for TB control
- Inadequate collaboration and coordination between
  - MOH and MOLG
  - DHT and Primary Hospitals
  - Departments of Clinical services and Public Health at the Ministry of Health.
  - Partners/donors
- Inadequate capacity of Human Resources for TB Control at various levels

BNTP major current challenges:

- Human Resources capacity for TB Control
- Programme Management
- TB and HIV/AIDS Programme collaboration
- Coordination of partners and involvement of the private sector in TB Control
- Coordination between MoH and MoLG regarding implementation of TB services

Conclusion:

The Botswana National TB Programme has a 100% DOTS geographical coverage; in 2006, Treatment Success Rate was 73%; treatment completed rate constituting cases with smears not done for follow up is at a high 30%; TB/HIV Collaborative activities are not regularly undertaken and at present TB and HIV/AIDS Programmes do not jointly plan or work; MDR TB cases are increasing, among new and retreatment cases. Regarding laboratory services for TB Control, the review noted that Quality Assurance is not yet covering all facilities involved in TB control; training of laboratory personnel needs to be accelerated and the interaction between the BNTP and NTRL is not adequate. Drug management is not adequate and stock outs of major TB drugs were reported in 2008 and 2009.

Recommendations:

- Improve cure rate and Treatment Success Rate
- Reduce proportion of smears not done for follow up of treatment
- A roll out plan of the introduction of FDCs should be immediately prepared
- Drug calculations should be based on number of patients reported, and a buffer stock should be considered
- TB paediatric formulations should be introduced and listed in the essential drug list
- FDCs should be included in the national essential drug list
- Introduce quality assurance for TB drugs
- NRTL to expand EQA to cover all districts
- Training of laboratory technicians to be accelerated
- Revitalize National TB/HIV Advisory Committee and install district TB and HIV/AIDS committees
- Recording in patients treatment cards, TB registers, and laboratory registers should to be improved with the aim of getting complete data to

monitor and evaluate programme performance

- Instructions for regular quarterly reporting from district to national level should be prepared and disseminated
- Surveillance of MDR TB cases should be initiated
- Supervision supported by a checklist should be implemented from national to district level and from district to facility level
- Support to TB District Coordinators – job descriptions and closer monitoring and support to this important group in Tb Control should be reinforced
- Human Resources Development Plan for TB should be integral part of the Human Resources Development Plan of the MoH
- Coordination of partners should be consolidated
- Engagement of private sector in TB Control, in particular private practitioners, to be strengthened

Chapter Summary

Writing a report is an opportunity to identify and answer important evaluation questions, share information and experiences, and guide programme planning. Being able to write a well-structured, clear, concise and professional report will serve you well both in your role as an M&E officer, but also in other realms of your life.

Supplementary Material 5.2.4: Example of an Executive Summary

1.0 Executive Summary (Willumsen & Rollins 2001)

Introduction

In April 1999, the Government of Botswana instituted a programme to prevent mother-to-child transmission (pMTCT) of HIV, which provides ZDV (zidovudine) to HIV-infected women from 34 weeks of pregnancy and to their infants for the first 4 weeks of life. The pMTCT programme actively recommends the avoidance of all breastmilk and provides replacement feeds in the form of commercial formula milks. This provision was initially for the first 6 months of the infant's life but has recently been extended for a total of 12 months. HIV-infected women who express a preference to breastfeed are advised to do so exclusively, followed by abrupt cessation of breastfeeding at about 34 months. The replacement-feeding component of the programme has met with some difficulties and there has been some concern that the implementation of the infant feeding recommendations is suboptimal. For this reason the pMTCT Advisory Group, Botswana Food and Nutrition Unit, Family Health Division has, with the assistance of UNICEF Botswana, conducted this study.

Objectives

The objectives of the study were to evaluate current infant feeding practices among HIV-infected and uninfected women at PMTCT sites and women of unknown HIV status at clinics where the programme has yet to be implemented.

Methods

This was a cross-sectional, quantitative and qualitative study of infant feeding practices, the determinants of these and mothers' perceptions and utilisation of the PMTCT programme. Health workers were also interviewed to assess knowledge, attitudes and practices with regards to HIV transmission, infant feeding and counselling.

Main Findings

Infant feeding practices were found to differ significantly between PMTCT and non-PMTCT sites and between mothers of unknown status and those HIV-uninfected. Most HIV-infected mothers chose to formula feed, even though many declare a desire to breastfeed. Overall 89% managed to formula feed exclusively (without giving any breastmilk) from birth until the time of interview. Any exposure to breastmilk among formula fed infants increases the risk of HIV transmission and undermines the efficacy of the intervention and this needs to be addressed. Most mothers were happy with how formula was distributed from the clinic, although concerns regarding confidentiality were raised. Among HIV-infected mothers who chose to breastfeed only 20% managed to exclusively breastfeed (no other fluids, milks or solids) between birth and the time of interview. Mothers received little advice on the abrupt

cessation of breastfeeding and few had attempted this. Those who had stopped breastfeeding before the infant was 6 months of age had encountered breast health problems and criticism.

Recommendations

Exclusive breastfeeding (EBF) until 4 and preferably 6 months of age is recommended to mothers of unknown status or uninfected. Although most mothers at non-pMTCT sites chose to breastfeed, EBF rates are low, mainly due to the early introduction of fluids. Breastfeeding rates are lower among uninfected mothers than those of unknown status and EBF rates are significantly lower, mainly due to the early introduction of formula feeds. This points towards considerable "spillover" of formula feeding by uninfected mothers at pMTCT sites. Greater emphasis and support needs to be given to the promotion of EBF among mothers of unknown status, uninfected mothers or infected mothers who choose to breastfeed. Complementary feeding practices are generally sub-optimal and may be the cause of growth faltering observed in the second 6 months of life. All health workers need to be trained in order to assist mothers with optimal introduction of complementary feeds.

Conclusion

Health worker knowledge of HIV and transmission was generally poor and practice of counselling regarding infant feeding practices sub-optimal. Many health workers did not demonstrate the preparation of formula feeds to every mother counselled. Given that formula feed preparation is inadequate this needs to be addressed.

These results reflect the socio-economic context and political commitment in Botswana. Care is needed before extrapolating conclusions and recommendations to other regions in sub-Saharan Africa.

Supplementary Material 5.2.13: Sample Citations using ICMJE Style

From http:// www.nlm.nih.gov/bsd/uniform_requirements.html

Books

Personal author(s)
Murray PR, Rosenthal KS, Kobayashi GS, Pfaller MA. Medical microbiology. 4th ed. St. Louis: Mosby; 2002.

Editor(s), compiler(s) as author
Gilstrap LC 3rd, Cunningham FG, VanDorsten JP, editors. Operative obstetrics. 2nd ed. New York: McGraw-Hill; 2002.

Author(s) and editor(s)
Breedlove GK, Schorfheide AM. Adolescent pregnancy. 2nd ed. Wieczorek RR, editor. White Plains (NY): March of Dimes Education Services; 2001.

Organization(s) as author
Royal Adelaide Hospital; University of Adelaide, Department of Clinical Nursing. Compendium of nursing research and practice development, 1999-2000. Adelaide (Australia): Adelaide University; 2001.

Chapter in a book
Meltzer PS, Kallioniemi A, Trent JM. Chromosome alterations in human solid tumors. In: Vogelstein B, Kinzler KW, editors. The genetic basis of human cancer. New York: McGraw-Hill; 2002. p. 93-113.

Articles in journals
Standard journal article

List the first six authors followed by et al. (Note: NLM now lists all authors.)
Halpern SD, Ubel PA, Caplan AL. Solid-organ transplantation in HIV-infected patients. N Engl J Med. 2002 Jul 25; 347(4):284-7.

As an option, if a journal carries continuous pagination throughout a volume (as many medical journals do) the month and issue number may be omitted.
Halpern SD, Ubel PA, Caplan AL. Solid-organ transplantation in HIV-infected patients. N Engl J Med. 2002; 347:284-7.

Optional addition of a database's unique identifier for the citation:
Halpern SD, Ubel PA, Caplan AL. Solid-organ transplantation in HIV-infected patients. N Engl J Med. 2002 Jul 25; 347(4):284-7. Cited in PubMed; PMID 12140307.

More than six authors:

Rose ME, Huerbin MB, Melick J, Marion DW, Palmer AM, Schiding JK, et al. Regulation of interstitial excitatory amino acid concentrations after cortical contusion injury. Brain Res. 2002; 935(1-2):40-6.

Organization as author

Diabetes Prevention Program Research Group. Hypertension, insulin, and proinsulin in participants with impaired glucose tolerance. Hypertension. 2002; 40(5):679-86.

Scientific or technical report

Issued by funding/sponsoring agency:
Yen GG (Oklahoma State University, School of Electrical and Computer Engineering, Stillwater, OK). Health monitoring on vibration signatures. Final report. Arlington (VA): Air Force Office of Scientific Research (US), Air Force Research Laboratory; 2002 Feb. Report No.: AFRLSRBLTR020123. Contract No.: F496209810049.
Issued by performing agency:
Russell ML, Goth-Goldstein R, Apte MG, Fisk WJ. Method for measuring the size distribution of airborne Rhinovirus. Berkeley (CA): Lawrence Berkeley National Laboratory, Environmental Energy Technologies Division; 2002 Jan. Report No.: LBNL49574. Contract No.: DEAC0376SF00098. Sponsored by the Department of Energy.

Dissertation

Borkowski MM. Infant sleep and feeding: a telephone survey of Hispanic Americans [dissertation]. Mount Pleasant (MI): Central Michigan University; 2002.

Newspaper article

Tynan T. Medical improvements lower homicide rate: study sees drop in assault rate. The Washington Post. 2002 Aug 12; Sect. A: 2 (col. 4).

Dictionary and similar references

Dorland's illustrated medical dictionary. 29th ed. Philadelphia: W.B. Saunders; 2000. Filamin; p. 675.

Electronic material

CD-ROM

Anderson SC, Poulsen KB. Anderson's electronic atlas of hematology [CD-ROM]. Philadelphia: Lippincott Williams & Wilkins; 2002.

Journal article on the Internet

Abood S. Quality improvement initiative in nursing homes: the ANA acts in an advisory role. Am J Nurs [serial on the Internet]. 2002 Jun [cited 2002 Aug

12];102(6):[about 3 p.]. Available from: http://www.nursingworld.org/AJN/2002/june/Wawatch.htm

Monograph on the Internet

Foley KM, Gelband H, editors. Improving palliative care for cancer [monograph on the Internet]. Washington: National Academy Press; 2001 [cited 2002 Jul 9]. Available from: http://www.nap.edu/books/0309074029/html/.

Homepage/Web site

Cancer-Pain.org [homepage on the Internet]. New York: Association of Cancer Online Resources, Inc.; c2000-01 [updated 2002 May 16; cited 2002 Jul 9]. Available from: http://www.cancer-pain.org/.

Part of a homepage/Web site

American Medical Association [homepage on the Internet]. Chicago: The Association; c1995-2002 [updated 2001 Aug 23; cited 2002 Aug 12]. AMA Office of Group Practice Liaison; [about 2 screens]. Available from: http://www.ama-assn.org/ama/pub/category/1736.html

Database on the Internet

Open database: Who's Certified [database on the Internet]. Evanston (IL): The American Board of Medical Specialists. c2000 - [cited 2001 Mar 8]. Available from: http://www.abms.org/newsearch.asp

Closed database: Jablonski S. Online Multiple Congenital Anomaly/Mental Retardation (MCA/MR) Syndromes [database on the Internet]. Bethesda (MD): National Library of Medicine (US). c1999 [updated 2001 Nov 20; cited 2002 Aug 12]. Available from: http://www.nlm.nih.gov/archive//20061212/mesh/jablonski/syndrome_title.html

Part of a database on the Internet

MeSH Browser [database on the Internet]. Bethesda (MD): National Library of Medicine (US); 2002 - [cited 2003 Jun 10]. Meta-analysis; unique ID: D015201; [about 3 p.]. Available from: http://www.nlm.nih.gov/mesh/MBrowser.html Files updated weekly.

Self Assessment Quiz

1. What is the primary difference between an Executive Summary and an Abstract.
   a. An executive summary is a detailed summary of the findings and a abstract is only contains information about the rationale and results of the study.
   b. An abstract is used when sending your report to a journal for publication and an executive summary is read in lieu of reading the entire report.
   c. a and b
   d. None of the above

2. Which of the following is considered plagiarism?
   a. Using another writer's ideas without proper citation.
   b. Citing your source but reproducing the exact words of a printed source without quotation marks.
   c. Borrowing the structure of another author's phrases or sentences without crediting the author from whom it came.
   d. Using someone else's outline to write your own report
   e. All of the above

3. List three major topics that should be included in the Methodology Section.
   a. _____
   b. _____
   c. _____

4. True or False

   The findings section is where you include your interpretations of the data and recommendations based on the study.

Resource 5.1: Avoiding Plagiarism

There are hundreds of excellent resources available on the Web on detecting and avoiding plagiarism. The best way to avoid plagiarism is to know when and how to properly cite sources that you use in written work. There are many helpful guides on the internet, including:

Warning Signs & Prevention
http://library.duke.edu/research/plagiarism/warning/index.html

Citing Sources and Avoiding Plagiarism
http://library.duke.edu/research/plagiarism/index.html

Citation & Writing Guides (UW)
http://www.lib.washington.edu/research/wri.html

Resource 5.2: Report Writing Checklist

	Title Page
	• Report Title
	• Name of the person, organization or company for whom the report has been prepared
	• The name of the person, organisation or company who authored the report
	• The date the report was completed
	Acknowledgments
	• Include all people and/or organisations who made a significant contribution to the report
	Table of Contents
	• List all sections with page numbers
	o Exclude title page, table acknowledgments and the table of contents
	• Include index of appendices
	Executive Summary
	o Evaluation question to be addressed
	o Brief summary of methods
	o Summary of findings
	o Conclusions
	o Recommendations
	Introduction
	• Problem statement
	• Aims and Objectives
	• Significance of the study
	Literature Review
	• Critically appraise existing literature, highlight conflicting findings, and identify why an evaluation study is needed
	Study Methodology
	• Study design
	o Describe and justify study design
	• Study Sample
	o Include study sites, reference population, inclusion/exclusion

	criteria, and any potential sampling bias
	• Sample Size
	o State sample size, size of effect to be tested, power of the study, level of significance, and prevalence of condition (if applicable)
	Ethical Considerations
	• Identify any issues with confidentiality, and/or if HRU approval was sought
	Data Collection
	• Describe what data was collected, include tools in appendices, describe variables, explain measurement bias (if applicable)
	Statistical Analysis
	• Describe methods of data analysis, statistical software used, and specific statistical tests based on types of variables (categorical or continuous)
	Findings
	• Present findings as factual statements
	• Include charts and tables where appropriate
	o Label all charts and tables correctly
	Discussion
	• Identify key issues, interpret findings, be objective
	Conclusions
	• Highlight most important issues and importance of the evaluation conducted
	• Indicate potential follow-up studies, evaluation questions or programmatic changes
	Recommendations
	• Clearly state how the evaluation question might be resolved
	o Maybe appropriate to present as a bulleted list
	References
	• List alphabetically making sure to include author's name, date of publication, title of book, paper or journal, publisher, place of publication, page numbers and any other details from a source
	Appendices
	• Include all data collection tools, background calculations, and other information not essential, but helpful for the reader
	• Make certain appendices are indexed in the Table of Contents

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BOTSWANA

REPORT OF THE REVIEW OF THE BOTSWANA NATIONAL TUBERCULOSIS PROGRAMME

FINAL

27 April – 08 May 2009

ACKNOWLEGMENTS

The consultants are grateful to Ministry of Health national top officials, in particular the Permanent Secretary and Deputy Permanent Secretary; directors at central level, BNTP staff, Regional and District management personnel, and health facility staff for their welcome, availability, support and patience to work with the review teams. Very special thanks go to District Councils officials of districts visited, who through out the mission kindly briefed review members on Botswana current status of social-economic development; roles and responsibilities of the Local Government as far as TB is concerned; the drawbacks and bottlenecks experienced to control TB; and the challenges ahead. Last thanks go to Central Unit of the BNTP for the logistical support to the review mission and assistance to gather information through out the mission.

REVIEW TEAM MEMBERS AND SITES

The 2009 Review of the Botswana National TB Programme (BNTP) was undertaken between 27 April and 08 May 2009, by multi-disciplinary teams drawn from international organizations, Non Governmental Organisations, Southern African National TB Programmes, and other international and national institutions and experts. The teams were composed of the following persons:

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Mr G. Moalosi	MoH/BNTP
Dr. Esther C. Kip	MoH/BNTP

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MDR-TB and Infection Control

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Dr. Francesca Cainelli	University of Pennsilvania, Botswana
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Drug procurement and Drug Management System

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Mr C. Rannana	MoH

Programme Management and Coordination

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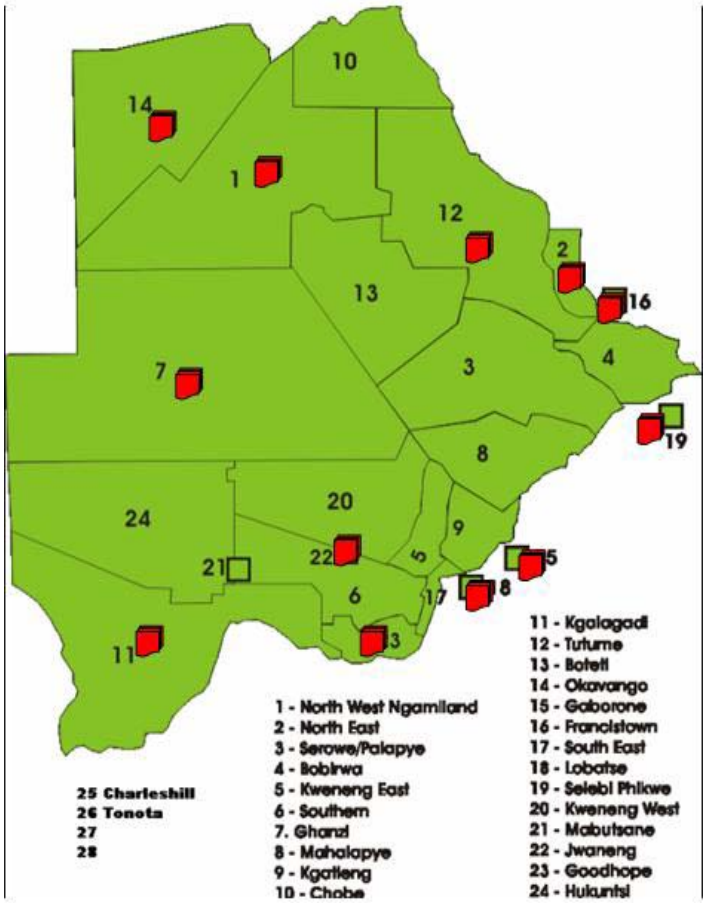
Mr N. Bozongwana	Diagnofirm
Mr O. Kgoleyamotho	MoH

Opinions and analyses produced in this report are the responsibility of the consultants. The views expressed through out the report do not necessarily reflect the opinion or position of the Ministry of Health of Botswana or of the Botswana National TB Programme, but are in line with modern policies adopted in Tuberculosis Control, and are in line with the STOP TB Strategy and STOP TB Partnership working group's recommendations. Conflicts of interest have been taken into consideration. National and local experts listed in the teams acted exclusively as resource persons.

Districts and sites visited

Fig 1; Map of Botswana



Districts	Sites	Team
1. Gaborone*	• Princess Marina Hospital • Bontleng Clinic • Block A Laboratory • Gaborone Prison Clinic • Seretse Khama barracs Clinic • Central Medical Sore • BOTUSA, ACHAP, I - TECH • University of Botswana • CCM • BONASO	Dr M. Angélica Salomão, WHO/AFRO/IST ESA Dr Eugene McCray, CDC/Atlanta Ms O. Motsamai, MoH/IPT Mr G. Moalosi, MoH/BNTP Dr. Esther C. Kip, MoH/BNTP
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	• Mabule Clinic	Ms Othilia Phumaphi, I –TECH
4. Jwaneng	• Jwaneng Town Council – Senior management – DHT – Ditsweletse Clinic – Tshimologo Clinic • Jwaneng Mine Hospital	Dr Evelyn Isaacs, WHO/AFRO/IST ESA Dr D. Dickinson, Botswana Private Practitioners Association Dr. Robert Makombe, BOTUSA Mr J. Setlhako, MoH/BNTP
5. Kgalagadi North	• Hukuntsi Hospital • Hukuntsi clinic • Kang clinic	Dr. M. Maboshe, WHO Zambia Mr O. Kgoleyamotho, MoH Mr N. Bozongwana, Diagnofirm
6. Francistown**	• Nyangabgwe Hospital • Masego clinic • Botswelelo clinic • BDF Clinic • Prison clinic • DHT laboratories (AreaW clinic) • Tati Riverside hospital • Northern pathology services	Dr A. B. M. Tauhidul Islam, WHO/HQ Ms T. Motsemme, MoH/BNTP Mr Zaid. Gamil Saaed, WHO/AFRO/IST ESA Dr Kwasi Addoh, Ghana Dr. Valentina Anisimova, MoH/KNCV/NTRL
7. 7. Lobatse	City Council	Dr M. Angélica Salomão, WHO/AFRO/IST ESA Dr Eugene. McCray, CDC/Atlanta Mr G. Moalosi, MoH/BNTP
8. Ngamiland	• Maun Hospital • 2. Maun Clinic • Boseja Clinic	Dr Joel K. Kangangi, WHO Kenya Ms M. Kobo, BONELA Ms B. Gasennelwe, WHO Botswana Mr C. Rannana, MoH/BNTP
9. North East	• Masunga clinic • Masunga Primary Hospital • Motseleje clinic • DHT store	Dr A. B. M. Tauhidul Islam, WHO/HQ Ms T. Motsemme, MoH/BNTP *Mr Zaid. Gamil* Saaed, WHO/AFRO/IST ESA *Dr Kwasi* Addoh, Ghana Dr. Valentina Anisimova, MoH/NTRL
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11. Selibe Phikwe	• Selibe-Phikwe Hospital • Tapologo clinic • Bothabelo clinic	Dr Mc Gregor Bob, University of Pennsylvania Mr Ms M. Kobo, BONELA L. Moremi, MoH Dr. Grace Nkubito, MoH/BNTP
12. Tutume	• Tutume Primary Hospital • Nata Clinic • Madisakwane Health Post (Tonota Clinic)	Dr Lindiwe Mvusi, NTP Manager, South Africa Dr Francesca Cainelli, University of Botswana Mr. O. Kgoleyamotho, MoH/BNTP

* This team was responsible for contacts with policy makers, partners, MoH officials and institutions/departments, and relevant implementers. Unfortunately, Finance Departments in the Ministry of Health and Ministry of Finance could not be contacted. The Ministry of Health Administration, responsible among other issues of Human Resources could not be contacted.

** Back to Gaborone, this team visited Princess Marina Hospital, the National Tuberculosis Reference Laboratory and the Central Medical Store

ABBREVIATIONS AND ACCRONYMS

AC – Air conditioned
ACHAP - African Comprehensive HIV/AIDS Partnerships
ACSM – Advocacy, Communication and Social Mobilization
AFB – Acid Fast bacilli
AIDS- Acquired Immunodeficiency Syndrome
ART - Anti Retroviral Therapy
ARV – Anti Retroviral
BIPAI - Baylor International Pediatric AIDS Initiative Clinic
BNTP – Botswana National Tuberculosis Programme
BONASO - Botswana Network of IDS Service Organizations
BOTUSA –Botswana USA Project
BSC – Bio safety cabinet
CCM – Country Coordination Mechanism
CDC – United States Centers for Disease Control and Prevention
CMS - Central Medical Stores
CPT – Cotrimoxazole Preventive Therapy
CTBC – Community TB Care
DHT – District Health Team
DOTS – Directly Observed Therapy, Short Course
DST – Drug Sensitivity Test
DTC – District TB Coordinator
ETR - Electronic Tuberculosis Register
FDCs – Fixed Drug Combination tablets
GFATM – Global Fund to fight AIDS, Tuberculosis and Malaria
HBC - High Burden Countries
HBC – Home Based Care
HCW – Health Care Worker
HEA – Health Education Assistant
HQ – Head Quarters
IC – Infection Control
ICF – Intensified Case Finding
IEC – Information, Education and Communication
IPT – Isoniazid Preventive Therapy
IST ESA - Inter Country Support Team, Eastern and Southern Africa, WHO/AFRO
I - TECH - International Training Education Center on HIV
MDR TB – Multi Drug Resistant Tuberculosis
MoH – Ministry of Health
MoLG – Ministry of Local Government
M & E – Monitoring and Evaluation
NGOs – Non Governmental Organisation/s
NTP – National Tuberculosis Programme
NTRL - National TB Reference Laboratory
PLWHA – People Living with HIV/AIDS
QA – Quality Assurance
TB- Tuberculosis

TOR – Terms of Reference
WHO – World Health Organisation
WHO/AFRO - World Health Organisation, Regional Office for Africa

EXECUTIVE SUMMARY

(Please note: The Executive Summary of this report has been removed for the purposes of a Learning Activity. You will find the Executive Summary in the Discussion Section of Learning Activity 5.11.)

1. PART 1

1 INTRODUCTION

1.1 COUNTRY DATA

- Botswana is a landlocked country in Southern Africa, sharing borders with South Africa to the south and south-east, Namibia to the west and north-west, Zimbabwe to the north-east and Zambia to the north (map below). Most of the land consists of semi-desert scrubland, with the Kalahari Desert to the west.
- The population is 1.8 million, and the area is generally sparsely populated. The country is a democracy and it is divided into 12 administrative districts and has 24 Health districts.
- Botswana is now classified as a middle-income country. GDP per capita was estimated to be over USD 12,000 in 2005.

1.2. MAGNITUDE OF TUBERCULOSIS

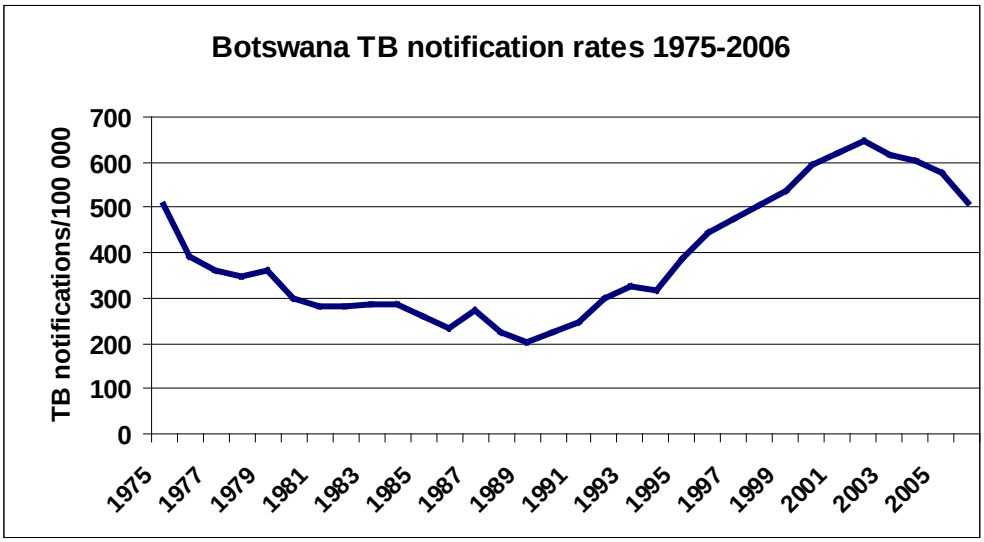
1.2.1. GLOBAL MAGNITUDE OF TUBERCULOSIS IN BOTSWANA

- Globally, there were an estimated 9.27 million incident cases of TB in 2007, this being an increase from 9.24 million cases in 2006, 8.3 million cases in 2000 and 6.6 million cases in 1990[1]. The highest burden is experienced in Sub-Saharan Africa and Asia, mainly distributed in the 22 High Burden Countries (HBC). Nine out of the twenty two high burden countries are in Africa. Of the nine, four countries, including Botswana, are in Southern Africa.

1.2.2. MAGNITUDE OF TUBERCULOSIS IN BOTSWANA

- Tuberculosis is a major public health problem in Botswana, which like other countries in the Southern African region with small populations, has suffered from a high TB burden. The disease causes significant mortality among adults living with HIV/AIDS, which is highly prevalent in the country. Figure 1 shows that between 1990 and 2003, notification rates tripled mainly due to the HIV/AIDS pandemic. Although the graph shows a slight decline from 2005, the country remains one of the high burden countries of the world. In 2007, the case notification rate was 477/100 000[2].

Figure 1: Botswana TB Notification rates

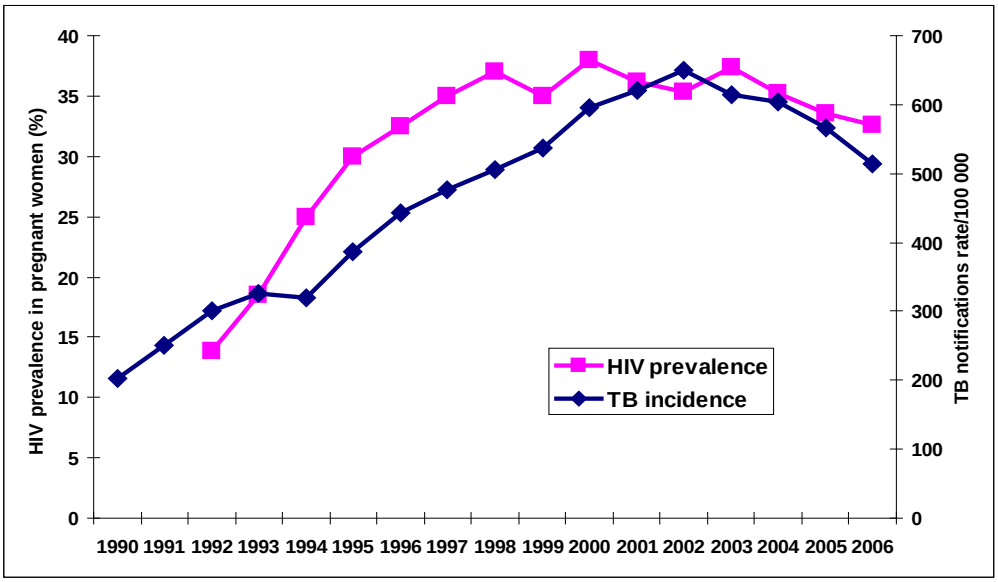


Source: BNTP

1.2.3. MAGNITUDE OF TUBERCULOSIS IN BOTSWANA

- The HIV/AIDS pandemic has contributed significantly to the global burden of TB. Global estimates shows 50-80% of TB patients in the country have HIV and TB[1] while 2006/2007 data estimates from Botswana put the range of TB patients co-infected with HIV[2] at 60-86%.
- HIV surveillance data for 2004 in Botswana showed that 34.7% of pregnant women were HIV positive (figure 2) while prevalence in the general population of 18 months to 64 years, is 17.2 percent [3].

Figure 2: TB incidence and HIV prevalence in pregnant women, Botswana 1990-2006

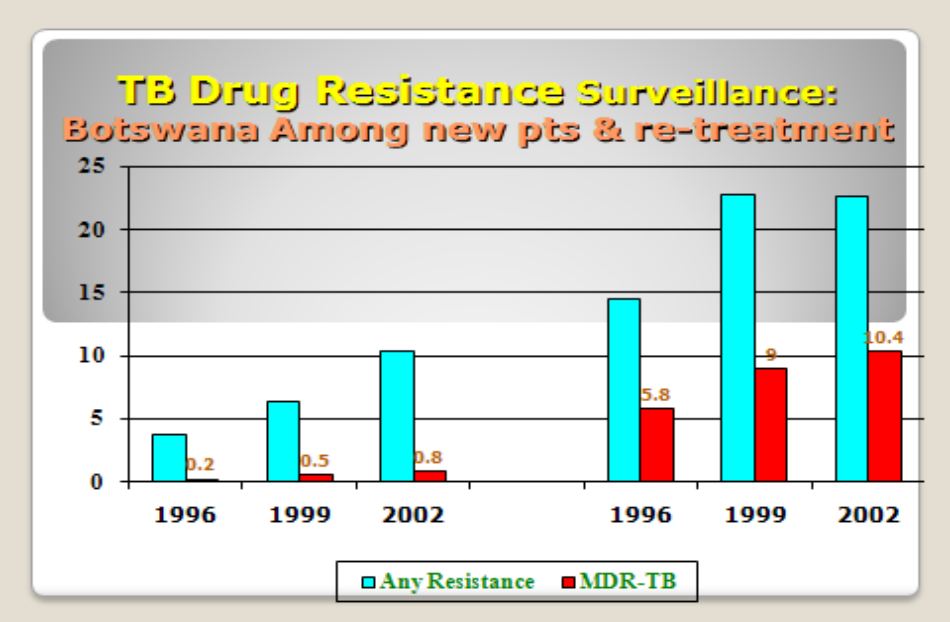


Source: MoH

1.2.4. DRUG RESISTANT TUBERCULOSIS IN BOTSWANA

- A number of drug resistance studies in Botswana have indicated that prevalence of drug resistance cases is increasing. A survey conducted 1996-1997 revealed the prevalence of MDR-TB to be 0.2% among new TB cases and 6.1% in retreatment cases. In 1999, another survey showed a rise in the prevalence from 0.6% and 9.0% respectively and in 2002, results indicated 0.8% and 10.4% respectively as shown in Figure 2[2]. In 2007 - 2008 another survey was conducted and though final results are yet to be reported preliminary results still show incremental pattern.

Figure 3: Patterns of DR-TB in Botswana 1996 - 2002



Source: BNTP

1.2.5. HEALTH CARE SYSTEMS IN BOTSWANA

PUBLIC HEALTH POLICY AND PROVISION OF HEALTH CARE SERVICES

- Botswana's health care system is based on the Primary Heath Care (PHC) approach. The country has a decentralised health care delivery system, with the Local government sector mainly responsible for implementation. Health care is delivered through a network of hospitals, clinics, health posts and mobile posts and every person is within a 15km radius from a health facility. Over 90% of health services are provided by the government through government hospitals, clinics and state supported mission hospitals. Private hospitals including those run by mining sector companies provide the remaining 10%, largely catering for their employees and dependants.
- The Ministry of Health (MoH) is responsible for all hospitals while Local Government Authorities are responsible for all clinics, health posts and mobile services in the various districts and town councils, as well as coordination of preventive and primary health care services at district level. Roles of the two Ministries can be summarized as follows:
    - Ministry of Health
        - Responsible for overall national health improvement and development, including supervision
        - Sets broad policy directions, goals and strategies for health development and delivery
    - Ministry of Local Government

- Responsible for primary health care service provision through local authorities, i.e., implementation
- TB focal persons (TB coordinators) at district and hospital levels are MOH employees but follow under the MoLG.

- The Organogram of Ministry of Health and Ministry of Local Government as relevant to TB Control is presented in fig 4. The Botswana National TB Programme is a Unit in the Division of Communicable Disease under the Department of Public Health. The Department is one of six departments in the Ministry of Health, each of which is led by a Director. The Organogram of the BNTP is presented in fig 5. and the programme hosts the Isoniazid Preventive Therapy (IPT) Programme.

HEALTH ENVIRONMENT AND HEALTH FINANCING

- Several partners operate in the health sector in Botswana, including the Government, NGOs, external and internal partners, and public and private institutions. The role of the NGOs and partners ranges from technical to financial support in implementation of activities.
- Technical and financial support for the programme is from partners including the World Health Organisation (WHO), Botswana US project (BOTUSA), Africa Comprehensive HIV/AIDS Partnerships (ACHAP), International Training Education Centre on HIV (I-TECH), University of Pennsylvania and Baylor. Some NGOs including KURU, YOHO and others also play pivotal role in implementing activities. The programme has started the process of engaging more partners in TB. The first Partnership Forum was held in early March 2009 with the intention of forming a national STOP TB partnership forum.
- Private practitioners are not formally involved in TB control and there is no Public Private Partnership framework. However in recognition of the importance of the private practitioners' role in TB care, training of private doctors on TB Case Management as part of the programme goal to involve all care providers is undertaken by I - TECH on behalf of the BNTP.

Fig 4 Organogram of Ministry of Health and Ministry of Local Government Relevant to TB Control

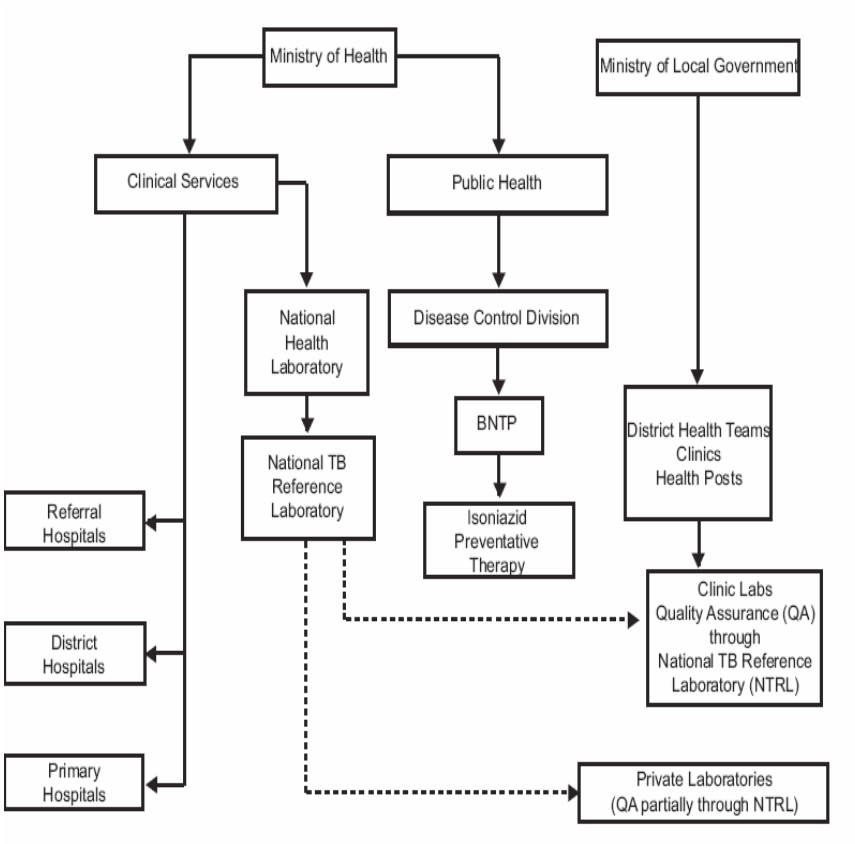
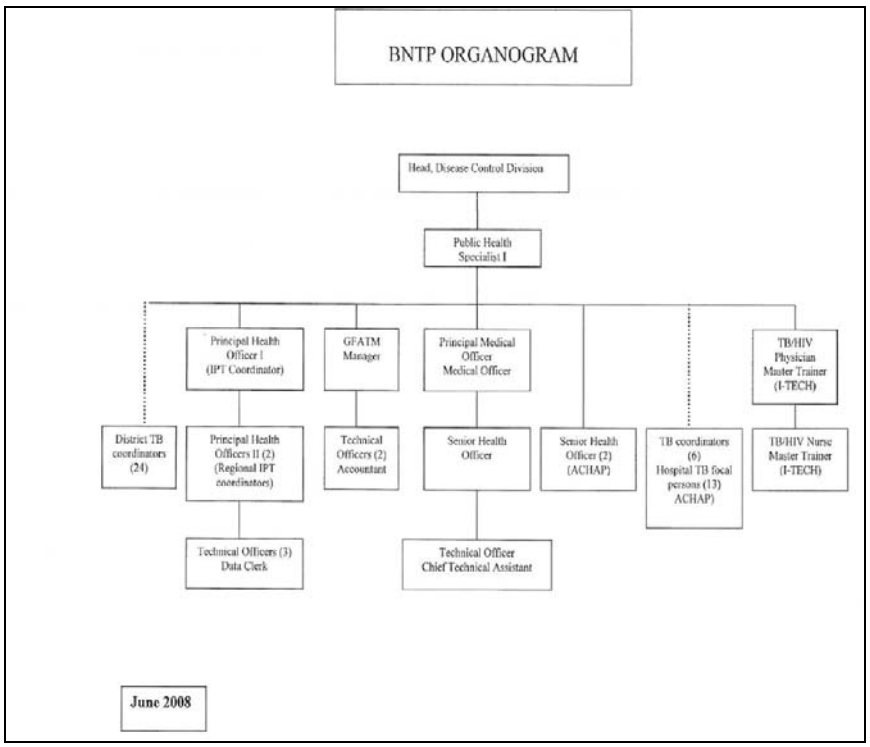


Fig 5; Organogram of the BNTP



2. BACKGROUND INFORMATION

2.1 THE BOTSWANA NATIONAL TUBERCULOSIS PROGRAMME

- The Ministry of Health established the Botswana National Tuberculosis Programme in 1975 with technical assistance from the World Health Organization. The goal of the BNTP is to eliminate tuberculosis, bearing in mind the financial constraints pertaining to the medical services in the country.

- The implementation of TB Control occurs mainly in two ministries. BNTP in MOH is responsible for policy formulation while implementation of activities is fully integrated into the primary health care system under Ministry of Local government.

- The programme introduced short-course-chemotherapy in 1986, and adopted the DOTS strategy in 1993. In 1995, first-line treatment for adults was changed to the current Category I regimen (2EHRZ/4HR); Category 2 regimen of 2RHZES/1HRZE/5HRE (children 2HRZS/1HRZ/5HR) and Category 3: 2RHZ/4RH.

- The BNTP strives to achieve the international standards for TB Care and reports to have adopted the STOP TB Strategy in its routine operations. In each district, the Chief Public Health Officer (CPHO) leads the district health team. District TB Coordinators (TBCs) are responsible for reporting and recording TB surveillance data and coordinate programme activities at the district level.

- The national TB control strategic plan ended in 2006. The new strategic plan 2008-2012 was adopted in December 2008, a*ddressing the recommendations of the 2006 evaluation*. In 2007 and 2008, TB control was managed using annual plans

2.2 OBJECTIVES OF THE BNTP

The specific objectives of the BNTP are:

1. To strengthen integration of TB control into the health system and safeguard the government commitment to TB control
2. To detect 70% of expected new cases of infectious TB and cure at least 85% of these (i.e., smear negative at the end of treatment)
3. To ensure standardized short-course chemotherapy on an ambulatory basis under direct observation whenever possible.
4. To strengthen standardized case notification based on case finding and confirmation by effective AFB smear microscopy.
5. To provide timely and reliable TB laboratory services with respect to microscopy and TB

culture and sensitivity

6. To ensure effective integration of TB and HIV treatment services
7. To strengthen programme supervision based on performance indicators standardized recording and reporting, and monitoring and evaluation.
8. To ensure quality and client-oriented TB control services.
9. To maintain a reliable and regular TB drug supply and distribution.

2.3 STRATEGIES OF THE BNTP

- In 1993, Botswana launched the BNTP and adopted WHO-recommended "DOTS" strategy with the following components; political commitment, passive case finding with microscopic diagnosis, use of short course chemotherapy given under 'DOT' in first two months, regular supplies of quality assured anti-TB drugs and an effective and efficient monitoring system

- The Government of Botswana's demonstrates its commitment to TB control by supporting TB control activities, maintaining a continuous and sustained supply of high quality TB drugs, and providing free treatment to all TB patients.

- A new edition of the National Tuberculosis Programme Manual has also been adopted in 2007 and its content corresponds to modern concepts and approaches of DOTS implementation and it is in line with the STOP TB Strategy.

- The country reports 100% geographical "DOTS" coverage.

2.4 DOTS IMPLEMENTATION IN BOTSWANA

2.4.1 DOTS (Institutional and Community)

- In line with the DOTS Strategy, clients presenting with signs and symptoms suggestive of TB are screened mainly through sputum examination which is done in a network of laboratories throughout the country. The network includes the National TB Reference Laboratory (NTRL) situated in Gaborone and forty nine peripheral laboratories (equivalent to one diagnostic centre per 35,000 populations). These include: one referral hospital laboratory, 32 Government, 2 Government assisted Mission Hospitals, 2 Mine and 12 Private laboratories. Laboratories at district, mission, primary and mine hospitals perform only smear microscopy while the National TB Reference Laboratory (NTRL) in Gaborone performs smear microscopy, culture, identification and first line drug susceptibility testing using solid LJ media and refers cultures from MDR TB patients for second line drugs susceptibility testing.

- The NTRL is also responsible for performing and overseeing the National External Quality Assessment for the whole country, development of guidelines for standardizing smear microscopy and undertaking training of laboratory personnel for TB testing. Currently the lab is under the process of accreditation and is preparing as well for introduction of rapid testing as liquid culture technique MGIT and rapid tests for identification of *Mycobacterium tuberculosis*. The NTRL started the EQA program for AFB microscopy and conducted training workshops in 2008.
- All diagnosed TB patients receive WHO recommended standardized treatment regimens from quality assured drugs for adults and children. Procurement of both first and second line drugs is currently the responsibility of Central medical Stores (CMS) a unit within the Ministry of Health. There exits a Quality Assurance Unit within CMS which is responsible for both the physicochemical analysis and monitoring of the quality of drugs in use in the public sector. The CMS undertakes drug forecasting and budgeting, and operates an open tender system of procurement from suppliers with the approval of the Public Procurement and Asset Disposal Board (PPADB) within the Ministry of Finance and Development Planning
- Clients are supervised throughout the course of treatment by trained personnel in a health facility or at community/family level. Data collected stipulate that all patients are monitored throughout treatment by review by clinicians on monthly basis and based upon end of initial phase and end of treatment sputum results, appropriate actions taken. Patient records are entered into well-organized standardized recording and reporting systems; paper registers at facility level, both paper and electronic registers at district levels. Data from districts are sent to national level electronically on a quarterly basis where it is entered into an electronic register (ETR). Currently the programme does not receive TB data from the private sector. At the national level, the policy is to produce quarterly and annual reports,
- National and district-level TB coordinators are responsible for conducting regular supervision and monitoring visits to health care facilities in their districts. Field support and supervision visits to the districts are conducted at least once a year per district. At the beginning of each year, all programme staff prepare an annual support supervision plan.

2.5 TB/HIV MANAGEMENT

- With the aim of addressing the high TB/HIV co-infection, the BNTP instituted policies for care and support for these dually infected patients. In 2003 government started nationwide implementation of Isoniazid preventive therapy to all eligible HIV positive persons. Intensified TB case finding among

PLWHA is carried out by screening clients in HIV service areas such as ART sites, PMTCT, VCTs, paediatric centres medical clinics and wards.

- BNTP Policy manual clearly instructs health care workers to offer the HIV test to all TB patients for HIV. Routine offer of HIV testing policy has also contributed significantly towards the efforts of testing TB patients for HIV and current records shows that about 67,5 % patients tested for HIV of which about 68% are HIV positive. As earlier mentioned, the 2006 and 2007 data also shows a of 60% - 86% TB/HIV co-infection.
- Measures for strengthening infection control have recently been initiated and still being expanded.

2.6 DRUG RESISTANT TB MANAGEMENT

- Drug resistant TB cases especially mullti-drug resistant have been documented for some years in the country and show a rising trend. Over time there has been no systematic surveillance and concrete estimates of MDR/TB were generally made through cross sectional DRS surveys. In 2007, three cases of XDR-TB were reported. In 2008 alone, 102 MDR-TB cases were diagnosed and have been reported. A drug resistance survey was carried out in 2007 – 2008 with preliminary results as indicated in fig x

Preliminary Results from 2007-2008 drug resistance survey

- Any resistance to 1st line among new patients: 29.0%
- Any resistance among re-treatment patients: 31.5%
  - MDR in new patients: 3.3%
  - MDR in re-treatment: 9.3%
  - Three (3) XDR TB patients reported in 2007
    - One died; 2 currently on treatment
- Drug-resistant smear-positive new TB patients in Botswana, 2002: as compared with the 2008 situation
  - Isoniazid (2.0x increase)
  - Rifampicin (2.3x increase)
  - Ethambutol (2.2x increase)

- The program has recently developed paper based surveillance tools which makes recording and reporting easier while the electronic data base in underway. The current BNTP policy manual also outlines the identification of potential drug resistant TB cases and their management.
- At present, management of MDR TB and XDR-TB occurs in two centres: Princess Marina Hospital and Nyangabgwe Referral Hospitals by specialized physicians, respectively in Gaborone and Francistown. Identification of MDR TB is purely by laboratory diagnosis, the National TB Laboratory is responsible for culture and DST necessary to diagnose the cases while government procures 2nd line drugs.

- One current and important plan is to build an MDR TB Isolation ward in Francistown Nyangabgwe Hospital to cater for inpatient care of MDR TB patients in the northern part of the country. Other plans are underway to decentralize MDR TB care to other centres in the near future (Maun General Hospital and Sekgoma Memorial Hospital)[1]
- Some capacity building through development of MDR TB management guidelines and M&E tools has been undertaken. There is also continuous training of health care workers on the subsequent care after inpatient care.

2.7 INFECTION CONTROL

- Attempts to strengthen infection prevention and control measures in health care have been started. There is currently continued review of the existing health care settings to meet infection control requirements and newly developed infection control guidelines have been developed and recently approved (1st quarter of 2009). are ready for printing and dissemination. An Infection control plan is under development while health care workers are currently being trained on infection control.
- There is a program of screening health care workers for TB.
- Also to address Infection Control, the BNTP through the support of GFATM funds have built two TB isolation wards, one in Gaborone and one is in Bamalete Lutheran Mission hospital.

2.8 ACSM AND ENGAGEMENT OF ALL PROVIDERS

- Community TB care (CTBC) was initiated in 2004, starting with four pilot districts. By the end of 2007, the initiative had been scaled up to all the 24 districts. Coverage of TB treatment services are still centred around health facilities often to the great disadvantage of patients.
- The mission noted that in most districts CTBC interventions are little implemented and the implementation of DOTS services does not take into consideration the scaling up of community TB care using alternative models. Some NGOs reported the wish to be more involved in the DOTS implementation
- A national STOP TB Partnership was launched in March 2009. However, practical engagement of all providers (public-public, public-private, NGOs, Civil Society Organisations and the Communities is yet to be reinforced. A coordinated plan of the involvement of partners with clear roles and responsibilities is not available.

[1] In Botswana most hospitals used to have isolation wards for TB until the 1990s when these were turned into general wards. This unfortunately coincided with the growing HIV/AIDS pandemic, hence the need to re-establish such centres. Drug resistant TB poses a particular threat to PLWHA

- The program collaborates with other government departments including HIV/AIDS, Health Education, Ministry of Local government, Ministry of education, Finance and others. Non systematic interactions with the Ministry of Defence and Security and Ministry of Labour and Home Affairs occur, but effective linkages do not appear to exist.
- The country celebrates world TB days, and some IEC materials have been produced. The program has disseminated brochures, calendars, billboards and newspaper adverts, but an ACSM strategy does not exist.

2.9 PREVIOUS PROGRAMME REVIEW

- In 2006, the BNTP underwent a comprehensive evaluation. The following main conclusions and recommendations were made then:

	MAIN CONCLUSIONS
Supervision and human resource development	Lack of investment in human resources for TB control and poor supervision of TB control activities has led to a marked decline in achievement of the basic recommended standards for TB control, especially investigation of suspect TB and poor recording and reporting
TB/HIV	Formal collaboration between the TB and HIV programme is established at all levels to ensure that comprehensive TB and HIV prevention, treatment and care services are provided as close as possible to individuals in need
Threat of MDR TB in Botswana	MDR-TB is increasing in Botswana. The economic and human impact of MDR-TB in Botswana will be vast unless urgent action is taken to improve adherence to international guidelines for TB control and limit the spread of MDR TB among people living with HIV.
Laboratory services	Investment in laboratories and the laboratory system is insufficient to provide an effective, quality-assured service for TB control.
Partnerships and coordination	The BNTP should ensure that International Standards of TB control are delivered and maintained. Co-operation between Ministry of Health and the Ministry of Local Government needs to be improved
Sustainable financing to regain TB control	The current budget allocated to TB control is inadequate to regain TB control in Botswana. The projected resources available for TB control over the next two years are unlikely to be sufficient to urgently scale up TB control activities in Botswana.
	RECOMMENDATIONS:
Priority steps for action	• Establish emergency committee to develop short term TB action plan • Reassess priorities for utilization of Global Fund grant • Ensure rapid recruitment of district co-coordinators to re-establish TB standards and meet Global Fund prerequisite • Upgrade laboratory quality and range of services to respond to TB programme needs • Urgently develop clear algorithm for management of smear negative TB and build capacity to exclude TB in individuals selected for isoniazid preventive therapy • Provide technical support to review the BNTP manual and MDR-TB treatment guidelines

3. Justification and Context of the Review

- The BNTP has a GFATM Round 5 grant of a total of USD 8.9 million for DOTS expansion activities over a period of 5 years and so far has implemented the first 2 year phase (2007- 2008) with award of USD 5.52 million. In 2008 the program put across a renewal proposal for second 3 year phase (of USD 3.4 million) which was also approved but with conditions. One of the conditions the undertaking of an assessment of the quality of TB program management in the country in an independent and objective way.

- The GFATM seem to be concerned about the increasing numbers of drug resistant TB particularly MDR/TB, which is as a rule a man made problem resulting from poor DOTS management. The evaluation of the program as such is as prerequisite for disbursement of funds towards construction of MDR TB management centre at Nyangabgwe referral hospital in Francistown.

- The review that was conducted from 27 April to 08 May 2009.

4. THE TERMS OF REFERENCE (TOR) OF THE 2009 REVIEW

The 2009 Review was undertaken to respond to the queries and concerns of the Global Fund regarding implementation of DOTS in Botswana and the performance of the BNTP.

4.1 TERMS OF REFERENCE (TOR)

2. To assess the quality and reliability of the Monitoring and Evaluation System, particularly the integration of the Drug Resistant TB data into the National TB Registry and the reporting of the quarterly data.
3. To assess the general Monitoring and Evaluation System data and quality.
4. To assess the case finding strategy.
5. To assess the status and quality of TB Laboratory services including the methodology for monitoring Drug resistant TB.
6. To assess the first and second line treatment strategies, treatment administration and follow up, including the determination of successful treatment and an evaluation of the need and appropriateness of the proposed new TB isolation ward.
7. To assess the procurement and supply management system for the first and second line treatment TB drugs, including an assessment of the drug quality standards.
8. To assess the quality and implementation of joint TB/HIV strategies and activities.
9. Any other issues arising in the discretion of the independent assessor:
    a. *Integration of the Health Information System (HIS) Systems*
    b. *Coordination of partners*
    c. *Involvement of the private sector in TB Control*

d. *Human Resources Development Plan*

e. *Visibility of the BNTP*

10. To make recommendations based on the findings of the assessment above.

5. METHODOLOGY OF THE 2009 REVIEW

5.1 Review Methodology

The review was undertaken by eleven teams that covered twelve districts. The methodology adopted consisted of desk review of TB records, Programme reports and other strategic documents, face-to-face interviews with key informants and observations of some activities in the selected review sites. Each team integrated at least one external expert and local experts and staff drawn from the Botswana National TB Programme (BNTP), and local partners from the public and private sector. WHO was selected to lead the review. The main role of the WHO was to provide technical advice on the content and process of the review, and to organize the participation of international review team members.

5.2 Selection of review sites

Currently, there are 26 health districts in Botswana. Since not all the districts could be reviewed, selection criteria for drawing areas that might give a reasonable representation of the TB situation and control activities in Botswana were set. For the 2009 review, there was a consensus to select twelve (12) districts which are representative of all health districts. These districts have been selected purposefully according to the burden of TB disease. The districts were divided into 3 classes, namely of high, moderate and low burden. In each district data were collected from one hospital, the District Health Team (DHT) and two clinics currently managing at least ten patients per day.

5.3 Review informants

The informants were TB patients and health workers (doctors, nurses, Pharmacy personnel, lab personnel, TB coordinators and TB focal points, Auxiliary and Health Education Assistants), policy makers, community TB care volunteers and home based care volunteers, NGOs including private sector. In addition, TB case-identification, laboratory results and treatment outcomes and other important variables regarding human character of all TB patients during the past few years in each district had been evaluated. Senior policy and decision makers in various departments of MOH, DHT and MoLG were also interviewed.

5.4 Data collection tools

The tools were developed to address the specific objectives of the evaluation and for the specific settings involved in TB Control (MoH, DHT, MoLG, and clinics). Interviews using structured

questionnaire developed from tool that has been used for similar reviews and those prepared by WHO working groups had been utilized. As previously mentioned, other tools consisted of reviewing desk records like cohort reports, annual reports and relevant documents. In some settings, observation was used to assess certain procedures and practices.

- For the patient's interview, some individuals were interviewed in the local language (Setswana). Thus, the questionnaires had to be translated from English to Setswana and then back translated into English to check for consistency and compare with the original version. The following tools were used:

- Patient tool
- Health Worker Questionnaire
- TB Coordinator Questionnaire
- Laboratory Staff Questionnaire
- Pharmacy Questionnaire
- Health facility Questionnaire
- Basic facility Questionnaire
- Prison/Botswana Defence Force Questionnaire
- Two month outcome tool
- Two month sputum conversion tool
- Policy-Makers Questionnaire
- NGOS and Partners Questionnaire
- Checklist

5.5 Data Processing and Analysis

A data manager reviewed all the responses and summarized them into common occurring thematic areas. At the end of the data collection, the summaries of the thematic areas were compiled together and further analyzed to make bigger impressions about TB control in Botswana. The raw data was entered into an electronic database for storage and further analysis.

5.6 Pretesting of data collection tools

The BNTP pre-tested the data collection tools in two health facilities in Gaborone City. These facilities were excluded from the 2009 main evaluation activity and the collected data was not included in the final report. The BNTP reported that the purpose of pre-testing these instruments was to determine whether the instruments were clearly worded and free from major biases and whether they solicited the type of information that is required. Pre-testing was also done to assess the required time for each interview.

5.7 Ethical considerations

The concept paper of the 2009 Review was submitted to the Ministry of Health Research Unit for approval. The District Health Team Managers from the selected districts were informed about this review. In general, the review did not inflict any harm upon the participants involved. Informed consent from all participants and the review strictly considered all ethical issues. The purpose of the review was

explained carefully before getting consent to conduct interview and confidentiality was strictly considered.

5.8 Orientation for the Review Team

A one-day training and orientation was conducted for local and international review officers selected to undertake the program review. The reviewers were oriented on the objectives of the BNTP, planned programme of activities, data collection tools, TB overview epidemiology and status of the programme. The other issues of the procedures to be followed during data collection, data analysis and report writing were also addressed.

5.9 Dissemination of the Review findings

The findings will be disseminated at the TB annual conference and district managers meetings. The report will be distributed to all stakeholders.

2. PART 2

2.1 THE FINDINGS OF THE REVIEW

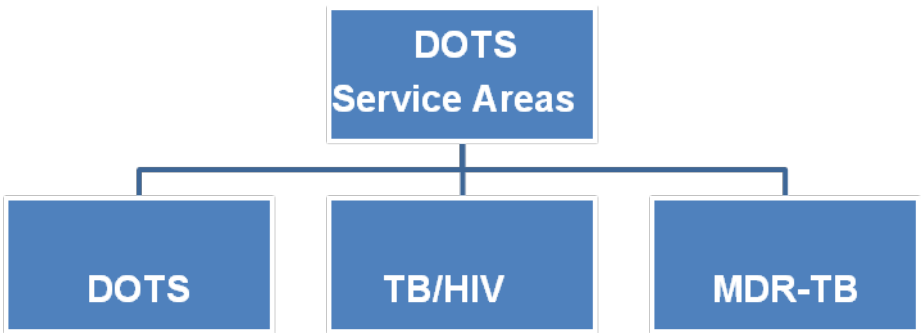
The teams deployed to the selected 12 districts collected information that was collated to draw conclusions on the status of the TB Control Programme in Botswana and respond to the Terms of Reference from the Global Fund. Most of the findings are similar to the 2006 conclusions. Basically, Human Resource capacity, DOTS performance, programme management, and partners coordination improved minimally.

2.2 SUMMARY OF MAJOR GENERAL FINDINGS

2.2.1 CURRENT STATUS OF THE BNTP

In line with the New STOP TB Strategy, the BNTP has a well structured Tuberculosis Programme with a Central Unit that addresses DOTS, TB/HIV and MDR TB as a package (figure 4). These components work as service areas that take care of TB Control management. Support areas in place to ensure good programme performance are: Laboratory services, Drug Management System, Training and Supervision and Monitoring and Evaluation.

Figure 4. The DOTS services package



Taking into account the three main services areas, most relevant general findings are discussed, along with those of support areas including ACSM and Health Systems Strengthening.

PROGRAMME MANAGEMENT

- A new NTP Manager was recruited in February 2009 following two changes of managers in nine months after the resignation of the previous programme manager in April 2008. there have been several changes recorded since 2007.
- The Programme responsibilities include managing TB control activities and ensuring that skilled human resources are available for these activities.
- The Central Unit of the BNTP has an inadequate capacity to manage TB Control in line with the STOP TB Strategy components and implementation approaches. This results in some limitation in management of Programme activities and of the Partners, and inadequate DOTS performance.
- Although there is a reported structure of the Central Unit of the Programme, this does not appear to be applied.

2.2.2 DOTS SERVICES AREAS

The review mission observed the following regarding DOTS implementation:

- Most TB cases occur between 15 – 54 years age group (25 – 34 most commonly affected)
- Males are more affected than females

In figure 4, case detection and Treatment Success trends in the last 13 years are shown. Particularly in the last 5 years, both Case Detection and the Treatment Success Rates have remained stable. Figure 5 illustrates the cases notified from 1980 t0 2007: from 1995 to 2005, the trend was upward; from 2005 there seems to be a decline in the number of cases reported.

Figure 4. Trends in case detection rate and treatment success rate, Botswana, 1994-2006

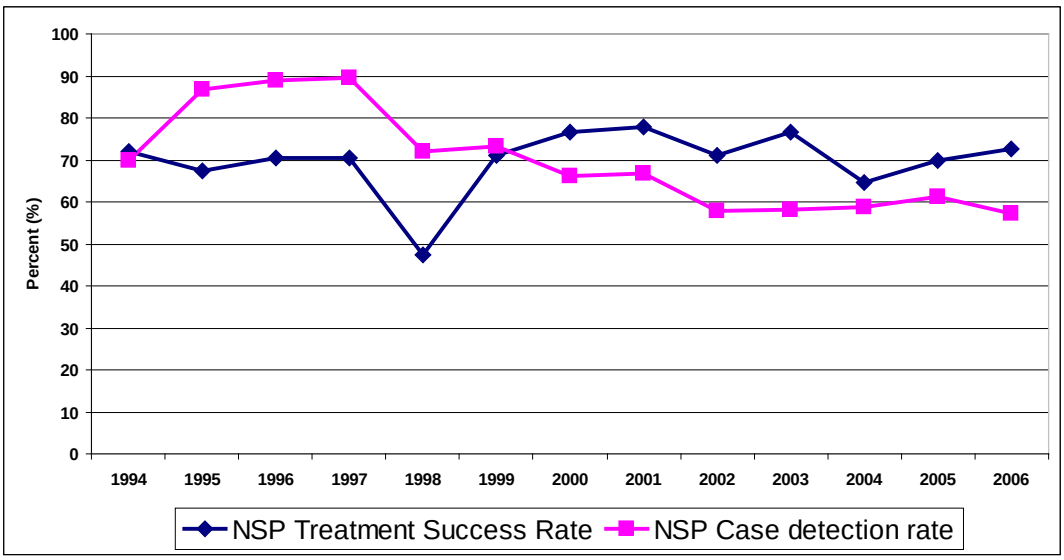
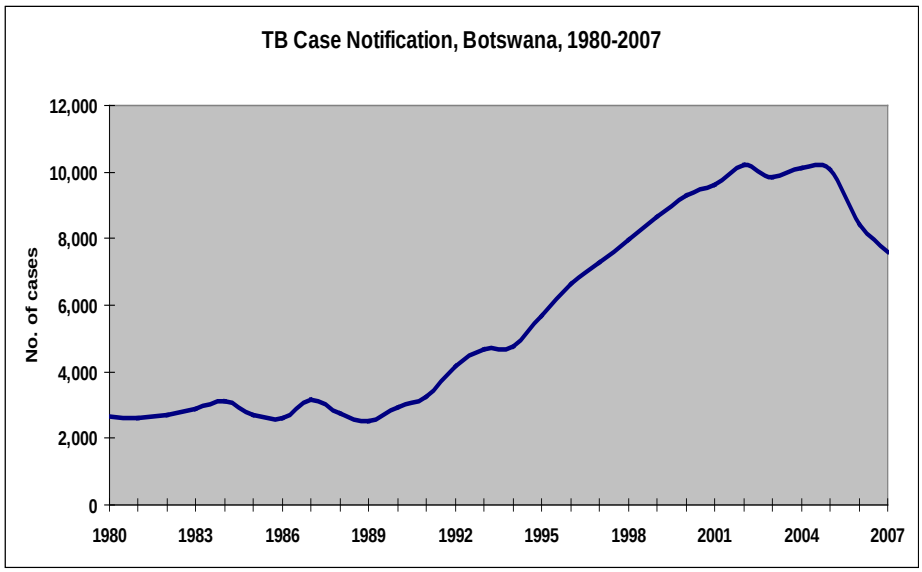


Figure 5. New Smear Positive Cases reported in Botswana, 1980-2007

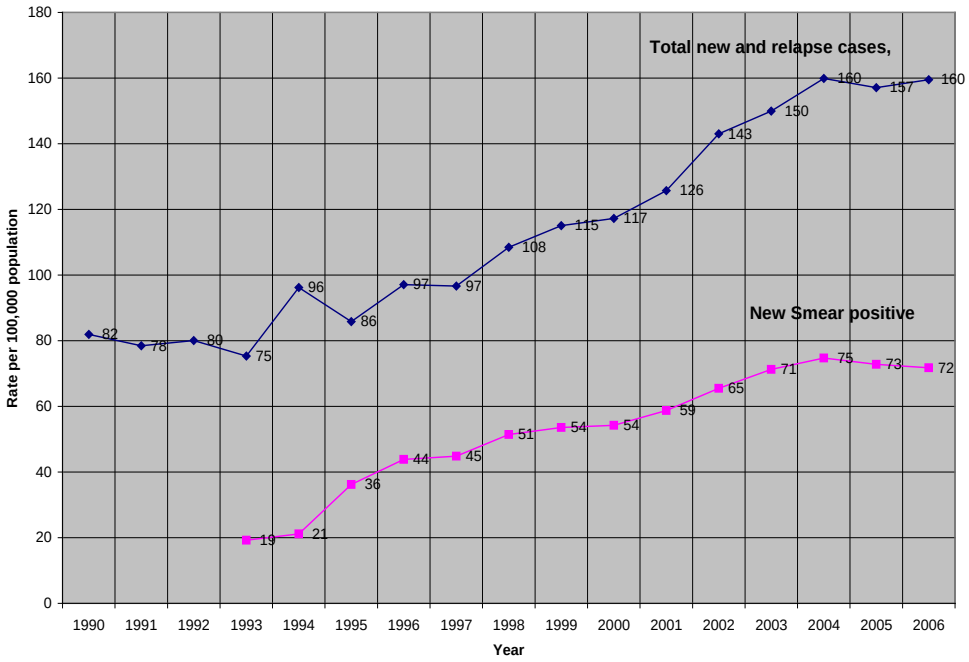


NSP – New Smear Positive cases

Source : Global TB Report 2009

For comparison, situation of the trend on overall and and new smear positive TB notification rates, 1993-2006, in the Africa Region is illustrated in figure 6. Botswana picture is similar.

Figure 6. *Trend of overall & new smear positive TB notification rates, 1993-2006*



Source: 2007 TB Surveillance Report, Africa Region

Table 2 illustrates available treatment outcomes data from Eastern and Southern Africa countries for the 2006 Cohort. Only Comoros, Eritrea, Kenya, Mauritius, Tanzania and Uganda have reached the 85% Treatment Success Rate target, with Ethiopia and Mozambique moving close.
The situation in Botswana is :

- Low cure rate of 43% though the Treatment Success rate is at 73%
- A significant proportion of patients without follow up smear results and a high 30% Treatment Completed rate
- High rate of unfavorable outcomes with total deaths, defaulters, transferred out, non evaluated rates above the recommended 10%
- Failure rate above the Africa average

Table 1. Treatment Outcomes. 2006 Cohort, IST ESA

	Cured	Completed	Died	Failed	Default	Transferred	Not evaluated	Success
Botswana	42	30	7	2	7	6	6	73
Comoros								91*
Eritrea	80	9	6	1	1	2	0	90*
Ethiopia	69	15	5	1	5	5	1	84
Kenya	73	12	5	0	7	3	0	85*
Lesotho	56	11	12	2	6	3	11	66
Madagascar	73	5	5	1	11	4	0	78
Malawi	77	1	12	1	3	2	3	78
Mauritius	46	46	3	0	5	0	0	92*
Mozambique	82	1	10	1	5	2	0	83
Namibia	64	12	7	3	8	6	0	76
Seychelles								
South Africa	63	11	7	2	9	5	3	74
Swaziland	27	15	6	4	13	16	18	43
Uganda	29	41	6	1	13	5	7	70
UR Tanzania	80	5	8	0	3	4	0	85*
Zambia	77	8	7	1	3	5	0	85*
Zimbabwe	54	6	8	0	5	8	19	60
ESA	62	14	7	1	7	5	4	77
AFR	65	10	6	1	8	4	5	75

Source: Inter Country Support Team, Eastern and Southern Africa, WHO/AFRO

*Countries that achieved the 85% Treatment Success Rate target

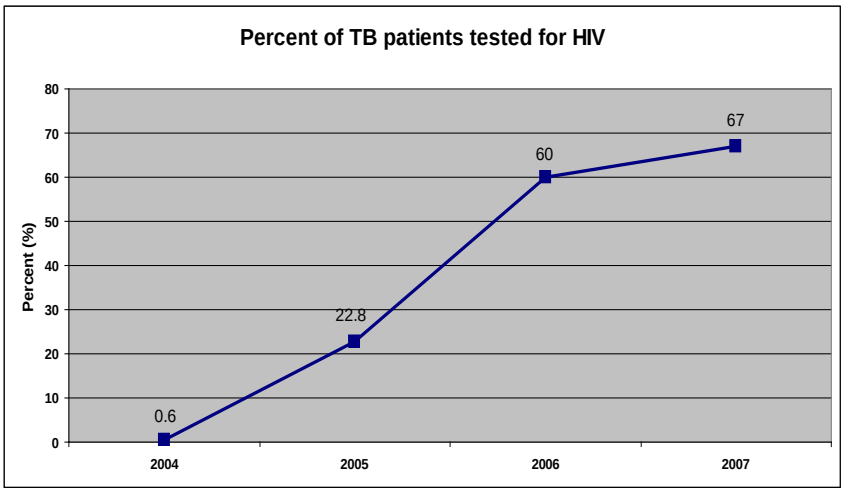
2.2.3 TB/HIV

Botswana recognised the need for TB/HIV programme collaboration and has taken up the activities in the WHO interim Policy for Collaboratory TB/HIV activities for national programmes in countries with generalised HIV prevalence. A national TB/HIV advisory committee was established with the participation of all stakeholders, with similar committees to be set up at the district level to accelerate role out. The National TB/HIV Advisory Committee however is currently dysfunctional and there is neither TB/HIV national policy nor implementation guidelines

There is the limited collaboration between TB and HIV/AIDS programmes at all levels, particularly at national level in programmes management [2]. Efforts to reduce the burden of HIV in TB patients do not match in general with the HIV/AIDS efforts to reduce the burden of TB in PLWHA. TB/HIV Collaborative activities, including the National IPT programme which was recently evaluated (May 2008), are mostly undertaken by the Tuberculosis Programme. TB infection control national guidelines were finalized in 2009

Acknowledging the ongoing process of establishing a system for linking HIV positive TB patients to ART services, the review noted that at present, few TB patients have access to ARVs. There is integration of TB and HIV/AIDS care and support HBC at community level in some districts but inadequate integration of TB and HIV care for dually infected and lack of recording and reporting of joint care for clients without duplication

Figure 6. TB patients tested for HIV, 2004-2007



[2] Most TB Program workers interviewed believe that true integration of the HIV care and TB programs requires more planning and policy setting at the top of both programs. "There isn't a lot that we can do here at the district level."

2.2.4 MDR TB AND INFECTION CONTROL

- The main challenge is the ineffective management of important components of MDR management and control especially isolation of infectious patients. Infection control measures at facility level are inadequate; facilities often not amenable; there is inadequate training of staff and policies and guidelines not adhered to
- Basic training on infection control was given to health professionals, but effective implementation is hampered by non-conducive environment; isolation wards in most facilities are not suitable for MDR TB patients
- BNTP is developing MDR TB Treatment guidelines but the drug regimen used *for MDR TB is not as per international guidelines*)
- TB infection control national guidelines finalized in 2009, but no plans are in place for roll out of IC guidelines. The result is infection control plans or real programmes are not yet being implemented

2.2.5 SUPPORT AREAS FOR DOTS IMPLEMENTATION

2.2.5.1 LABORATORY

- There are standardised national TB lab registers and request forms used in most places but the TB laboratory register does not have column for address
- Interaction between the BNTP and the Central Laboratory is not adequate
- There is a national laboratory QA system with guidelines and manuals but TB microscopy QA is still not fully implemented; in 2007 EQA was not in place but 2008 almost all labs participated in panel testing from NTRL; 7 labs enrolled into pilot phase of blinded re-checking and 35 labs received support on-site visits from NTRL in 2008 - 2009. It is expected that the EQA program will be fully in place in 2009 – 2010.
- Program does not appear to have Standard Operating Procedure (SOPs) /guidelines for AFB microscopy available in the places of work (although Procedures for AFB microscopy are part of the National Laboratory Manual)
- Inadequate numbers of laboratory workers are trained on AFB microscopy by NTP program; total 51 lab technicians had been trained since 2007. Training program 2009 - 2010 is in place.

2.2.5.2 DRUG MANAGEMENT

- Botswana aims to have an effective drug supply and management system with a reliable system of procurement and distribution of all essential anti-TB drugs to all relevant health facilities. For this,

there is a TB recording and reporting system in place, designed to provide the information needed to plan, procure, distribute and maintain adequate stocks of drugs

- At present drugs are not purchased based on the number of TB patients reported and there is not a buffer stock system to ensure stock outs.
- Fixed Dose Combination tablets (FDCs) were introduced in second quarter of 2009 but are currently not on the list of essential drugs
- The linkage between BNTP and Central Medical Store reported to be challenging
- TB drugs including FDCs are available in the open market and paediatric formulations are not in place
- BNTP has applied for a GLC grant

2.2.5.3 MONITORING AND EVALUATION

- The Botswana TB M&E system relies on a well organized standardized recording and reporting system consisting on paper registers at facility level and electronic registers at district level. These registers were found to be generally well kept and up to date but there is non-systematic reporting from districts to national level. The electronic TB register (ETR) information is sent to national level for producing quarterly and annual reports.
- Client and Programme monitoring and evaluation are regarded as a critical part of the Botswana National TB programme.

2.2.5.4 HUMAN RESOURCE; TRAINING AND SUPERVISION

- In some facilities, high staff turn over and HR shortages compromises continuity of activities
- Facilities visited claimed that they were not supervised regularly by central team, regional and TB coordinator
- BNTP remains responsible for training, that is mainly conducted by partners
- Inadequate TB case management training for TB nurses in some facilities visited - Most health care workers not trained recently (within two years)
- Limited training opportunities for laboratory and pharmacy staff

2.2.5.5 ADVOCACY AND SOCIAL MOBILISATION (ACSM)

- Poor understanding of TB and treatment by patients and communities
- In some places visited, no posters, leaflets and other IEC materials were displayed, and in some other quantities available were insufficient
- Community participation in TB program is not expanded
- BNTP does not have ACSM national guidelines

2.2.5.6 HEALTH SYSTEM STRENGTHENING

BNTP issues

- Doctors and TB coordinators aware of policies (what's on paper) but ineffective systematic implementation (*MOLG senior admin doesn't understand what's required – e.g. adaptation of HQ instructions to local situation)*
- Inadequate prioritisation of activities according to community needs for disease reduction
- National home based care programme/PHC workers not fully utilised for case finding.

- Sputum and Suspect Dispatch (SSD) Registers in clinics up-to-date, accurate, and being used to identify TB patients
- No community mobilisation for increased access to case finding

POLICY ISSUES BEYOND BNTP

- Communication between DHT, TB coordinator, and facilities appears inadequate
- Collaboration between MOH and MLG hampers programme implementation, in particular at district level
- Failure of communication/collaboration between government structures and NGO
- No TB focal person in some facilities resulting in diffusion of responsibilities
- Private sector involvement in TB seems to be only confined to diagnosis and referral to public institutions, as private hospitals/laboratories/doctors/ pharmacies are not included in the program
- Within the integrated budget system, currently it is difficult to see what is earmarked for TB control activities

4.2 Summary of National TB Programme challenges

- Laboratory role in diagnosis and follow up of treatment deficient
- Suboptimal treatment outcomes; *low cure rates; high 'treatment completed' rate and unfavourable outcomes above the 10%*
- Inadequate formal TB/HIV Collaboration
  - Low/not documented CPT uptake and access to ARVs
- MDR TB cases on the rise
- Sub optimal Drug Management System
  - Inadequate Drug Management resulting in stock outs at all levels
  - No control of TB drugs in the private sector
- Limited involvement of private practitioners in TB Control
- Inadequate supervision at and from all levels
- Unsatisfactory Recording/Reporting and monitoring and evaluation
- Inadequate collaboration and coordination between
  - MOH and MOLG
  - DHT and Primary Hospitals
  - Departments of Clinical services and Public Health at the Ministry of Health.
  - Development partners/donors
- Inadequate capacity of Human Resources for TB Control at various levels

2.3 PROGRESS SINCE THE 2006 REVIEW

Progress made since the 2006 review can be summarised as follows:

- Proportion of non evaluated patients dropped significantly from 18.7% to 6% - *this is really the most significant achievement*
- Progressive trend of TB patients tested for HIV, though uptake of CPT and ARVs not documented
- IPT Programme is implemented, though record of activities is poor. In addition, it is a Programme within the BNTP, with its own electronic register. The HIV/AIDS that should be responsible for IPT implementation has been away.
- Regular periodic surveillance of Drug Resistant TB (DRS surveys every 3-4 years)
- Introduction of Fixed Doses Combination (FDCs)

Table 3 analyses achievements for each 2006 recommendation.

Table 3. Status of achievements since the 2006 review

Recommendations	Status	Remarks
SUPERVISION AND HUMAN RESOURCE DEVELOPMENT		
Develop and implement a comprehensive human resource development plan at national and district level.	Not achieved	
Establish a full complement of district TB coordinators fully-oriented in BNTP policies.	Partially achieved	Review noted that District TB Coordinators in place but not all were briefed on their tasks/job description, and informed of the chain of authority
Create short-term emergency measures to accelerate recruitment of the essential personnel for TB control and review the roles and responsibilities of existing staff to make most efficient and effective use of available human resources	Partially achieved	
Urgently finalize review of the BNTP manual based on current WHO/IUATLD TB policies and International Standards of TB Care.	Achieved	New BNTP manual adopted in 2007
TB/HIV COLLABORATION		
Develop a national policy framework and implementation guidelines to provide integrated TB/HIV services in every facility.	Not achieved	TB/HIV Collaboration not routine, though some facilities have started joint activities. TB/HIV management is integrated into both the updated BNTP manual and case management
Improve TB/HIV collaboration at district level.	Partially achieved	
Assess impact of the IPT Programme on TB incidence and isoniazid resistance.	Partially achieved	IPT Programme evaluated in May 2008; report still due
Ensure careful TB screening in HIV positive patients	Partially achieved	Currently BNTP is doing counseling and is responsible for HIV testing of TB/patients; ICF a routine of a HIV Programme is not yet in place
THE THREAT OF MULTI-DRUG RESISTANT TUBERCULOSIS (MDR TB)		
Urgently perform national drug resistance survey.	Achieved	
Revise and implement MDR-TB policy and guidelines consistent with WHO guidelines to avoid further amplification of drug resistance.	Partially achieved	
LABORATORY SERVICES		
The NTRL must be adequately staffed and resourced to provide the services that are essential to the TB Programme.	Partially achieved	Some laboratory scientists have been trained since 2007; on going training for 2009-2010
The district laboratories must be upgraded to provide sufficient space and equipment to process sputum smears and return results rapidly to health facilities.	Partially achieved	
The links between the NTRL and the supra-national laboratory should be re-established.	Partially achieved	
PARTNERSHIPS AND COORDINATION		
Establish strong partnerships between BNTP and all providers of TB services	Partially achieved	Coordination meetings have been started in 2009; preparation of the review involved MoH & partners
Establish mechanisms to ensure that all providers follow BNTP guidelines and standards.	Partially achieved	Currently the programme does not receive TB data from the private sector
Community TB care must be integrated with home-base care and expanded to all rural areas.	Partially achieved	Efforts to be made to expand CTBC activities
SUSTAINABLE FINANCING TO REGAIN TB CONTROL		
Develop a short-term emergency action plan for accelerating quality TB control in Botswana coupled with a long term development plan for TB control with sustainable funding	Partially achieved	MoH is addressing the issue

3 PART 3

3.1 Findings and Recommendations per TOR

The review was guided by the Terms of Reference and the report is based on assessment of the current situation, weighed against the expected status. It report describes accomplishments of the programme, gaps/weaknesses and areas requiring further action, challenges hampering progress and then concludes with recommendations for each area.

For practical reasons, the assessment reports pertaining to TOR 1 and 2 were combined as both refer to programme monitoring and evaluation.

3.2 MONITORING AND EVALUATION

TOR 1. To assess the quality and reliability of the Monitoring and Evaluation System, particularly the integration of the Drug Resistant TB data into the National TB Registry and the reporting of the quarterly data

TOR 2. To assess the general Monitoring and Evaluation System data and quality

- The BNTP's Monitoring and Evaluation System is planned with the basic elements of DOTS programme monitoring efforts in line with the STOP TB partnership to track the inputs, outputs and six objectives of the current TB strategic plan.
- Data collection is from routine surveillance; case finding and details on TB cases; treatment outcomes; community TB care, IPT and CPT/ARV provision; drug resistance and support and supervision.

Gaps and weaknesses

- Recording and reporting is inaccurate in some instances with respect to
    - Quality and completeness of records[3]
    - Register cross-checking and cohort analysis which was incomplete
    - Under estimation of successful treatment due to lack of sputum analysis at 2 and 6 months of treatment[4]
    - Inconsistent use of suspect and sputum dispatch registers in some centres
- Non systematic or formal submission of quarterly reports in some districts (refer to table 2).

[3] Gaps in information in treatment cards, facility TB registers, laboratory registers, quarterly reports sometimes lacked information including patient gender, HIV status, sputum results, new versus retreatment status, classification of category, IPT use, outcomes

[4] Because sputum is not submitted for smear analysis at the mandated times, successful treatment was often underestimated

Table 2. Completeness of Quarterly TB reports, 2006-2007

Year	2006				2007			
Quarter	1	2	3	4	1	2	3	4
Nº districts reports	24	24	20	19	22	21	20	17
Completeness (%)	100	100	83.3	79.2	91.7	87.5	83.3	70.8
Districts not reporting					Ngamiland Southern	Ngamiland Southern Gumare	Ngamiland Southern Gumare Kgalagadi North	Ngamiland Southern Gumare Kgalagadi North Kweneng East Gantzi Francistown

- Patient monitoring and evaluation
    - Smear microscopy inadequately used for diagnosis and follow up; Chest X-ray main diagnostic tool and sputum Follow up examination (six months) are not done regularly
    - Data of the 3 programmed registers (ETR, IPT and HAART) are not linked electronically (without compromising confidentiality)
    - In some facilities, a lot of 'transfer out ' of patients in the treatment outcomes
- Defaulter tracing not well organized. Contact tracing is usually limited to compiling lists and asking patients to refer their contacts, instead of actively pursuing them from the clinics.
- Supervision at all levels inadequate
    - No checklist available
    - Minimal evidence of supervision by TB coordinators to reconcile and cross-check data
    - Supervision quality difficult to measure in absence of record or reports

<u>Challenges</u>

- Routine surveillance of MDR-TB not in place and MDR/XDR TB information is captured in the remarks column of the data collection tool
- Data from three programme registers (ETR, IPT AND HAART registers) are not linked electronically
- TB coordinator – faces challenges with workload, 'improvement'; has no job description and often no integration (TB coordinator is an employee of the MOH but supervised by the MoLG)
- Policy issues in relation to transport (availability, pooling) seriously hampering supervision and monitoring activities were reported

<u>Recommendations</u>

- Routine recording and monthly reporting of MDR TB cases to be immediately introduced

- MDR TB focal points at central level should supervise the coordination of MDR services in the designated health facilities
- Consider training of The MDR TB Focal Point in short term
- Develop checklist and system for joint supervision and monitoring (council and hospital, TB and HIV)
- Introduce and support quarterly review meetings involving the heads of health facilities facilitated by TB coordinator and technically supported by BNTP until satisfactory levels of data quality have been achieved.
- Ensure transport for (supportive) supervision and defaulter tracing

3.3 CASE FINDING STRATEGY

TOR 3. To assess the case finding strategy

- The BNTP strategic plan 2008-2012 indicates that the case-finding strategy in Botswana relies on quality assured bacteriology for timely detection and treatment of smear positive pulmonary TB cases. There are also clear strategies for determination of sputum negative, extrapulmonary and paediatric cases which must be done by medical officers
- TB management guidelines are available at facility level and their use has been re-enforced by the training of staff which was undertaken in 2007/8 and health workers were found to be knowledgeable about diagnosis and care. There is also integration of TB care into general health services with some passive case finding at the institutional/facility level.

Gaps and weaknesses

- Bacteriology is not is adequately used for diagnosis and follow up of cases and this affects case classification
- Role of laboratories in diagnostic and follow up of treatment is sub-optimal – smears are not done at diagnosis or 2 or 6 month follow up and/or recorded
- Case-finding from active patients' contacts is usually passive: although contact lists are compiled, patients are told to ask their contacts to come to clinic for evaluation

Challenges

- MDR suspects are not identified properly due to lack of awareness among health care workers at peripheral level
- TB Coordinators, HCWs, HEAs, and even community volunteers rarely perform evaluation in the home. Thus, true contact-evaluation is carried out in 1/3 or less of patient contacts

Recommendations

1. The TB coordinators and clinic teams must create a system to actively follow up people on patient Contact Lists.
2. Strengthen contact tracing
3. HEAs and treatment supporters should be utilized to do evaluations for chronic cough among patient contacts and to bring suitable cases to clinic for medical evaluation

3.4 TB LABORATORY SERVICES AND MONITORING OF DRUG RESISTANT TB

TOR 4. To assess the status and quality of TB Laboratory services including the methodology for monitoring Drug resistant TB

- The laboratory basic services in Botswana are functioning with relatively well organized sputum transport system from facilities without laboratories and acceptable turn around time of smear results within forty eight hours or up to three days in most institutions. There are fairly adequate stocks of commodities including HIV test kits with public private collaboration in some districts. The standardized TB register and request form are used in most facilitates.
- Currently, there is some internal quality assurance carried out at a few laboratories. The External QA system, although not in place in 2007 is expanding from the pilot phase. It is expected that 2009 – 2010, the EQA program will be in place. Capacity is available and functional at the NTRL for culture and DST and there is a system for submission of specimens for these tests from lower levels.

Gaps and weaknesses

- Inadequate number of microscopes was noticed in several of the visited sites
- Many lab personnel have not yet been trained on sputum smear microscopy by the NTP
- SOPs/guidelines for sputum microscopy and internal quality control systems were not observed in most labs
- Laboratory Registers incomplete for important variables in a few visited facilities and also indicate that total number of smears submitted for each patient is frequently less than recommended – 1/3 of patients had only one smear submitted.

- No active communication of results to district facilities (responsibility of each facility to collect results) though NTRL reports positive results for children and MDR results by phone/fax/email and in addition MDR TB results reported to BNTP on regular basis.

Challenges

- Major components of quality assurance lacking
- Shortage of laboratory personnel in some facilities
- Critical shortage of microscopes in some facilities
- Turn around time for Culture and DST was found to be about 3 months
- Inadequate rooms for smear microscopy in some facilities (Smear microscopy is done in closed AC room (without BSC or extractor fans) and lack of space for sputum smear microscopy in others

Recommendations

1. Quality assurance should be fully implemented:
    - Regular External quality assessments (blinded rechecking of examined slides) and Quality improvement
2. National TB Laboratory manual and SOP for Botswana should be developed
3. (Immediate) Procurement of more microscopes needed (47 microscopes had been distributed to MoH laboratories in 2008)
4. Organize refresher courses for the laboratory personnel (51 staff already trained using customized for Botswana WHO/CDC/UIALTD/APHL AFB microscopy package)
5. Employment of more laboratory personnel
6. Culture/DST proficiency testing should be conducted by the SNRL

3.5 TREATMENT STRATEGIES AND THE PROPOSED NEW TB ISOLATION WARD

TOR 5. To assess the first and second line treatment strategies, treatment administration and follow up, including the determination of successful treatment and an evaluation of the need and appropriateness of the proposed new TB isolation ward

- The national tuberculosis manual has been revised and TB patients are given standardized and appropriate first line treatment. The TB manual has the principles of second line treatment and treatment for MDR TB is initiated at Princess Marina hospital and then patients are referred back to

the district level with their drugs. At present, BNTP has defined 2 institutions to manage MDR TB cases: Princess Marina Hospital in Gaborone and Nyangabgwe Referral Hospital in Francistown.

- The country reports 100% DOTS coverage; daily at facility level and community DOTS for the bedridden and very ill patients. Treatment supporters involved in community DOTS are trained with a standard manual.

Gaps and weaknesses

- Patients released from hospital as per smear conversion and not culture conversion
- Most MDR TB patients inadequately monitored during ambulatory phase of treatment
- MDR patient outcomes are not known
- Drug regimen used for MDR TB is not in line with international guidelines
- Community TB not adequately used to expand access to remote areas
- Determination of successful treatment is hampered by irregular performance of sputum bacteriology at 2 and 6 months of treatment
- Patients with drug resistant TB not managed for adverse effect (loss of hearing power)

Challenges

- MDR TB registers not in use; these registers are important for surveillance and control of drugs
- MDR TB management at the Central Unit is not organized.
- Process of GLC application slow

Recommendations

1. Review and update the treatment regimen and management of MDR TB, including drug management of Second Line Drugs
2. Expand DOTS services to remote areas through Community TB Care (CTBC)
3. Ensure transport for outreach and for supervision (control of drug stocks)
4. Acceleration process of GLC application
5. intensify infection prevention and control training and implementation
6. improve facilities to isolate infected patients

3.6 PROCUREMENT AND SUPPLY MANAGEMENT SYSTEM

TOR 6. To assess the procurement and supply management system for the first and second line treatment TB drugs, including an assessment of the drug quality standards

- The drug procurement system is centrally managed and drugs are supplied to the facilities from the Central Medical Store. There appeared to be adequate stocks of drugs for MDR-TB patients in selected facilities and some facilities had no reported stock outs of drugs.

- In April 2009, The BNTP introduced Fixed Dosage Combinations (FDCs). Currently, some patients are treated with loose tablets and those enrolled after April 2009 are on short course, making normal the existence of two types of regimens in the same facility.

Gaps and weaknesses

1. Absence of quality assurance for TB drugs, mainly in private pharmacy.
2. Logistical management issues in drug procurement and management at the central level
3. Drug supply not reliable in all facilities
    - TB drug stock outs reported; Rifampicin, Isoniazid and Streptomycin stock outs occurred at least twice in 2008 and 2009. Reported stock outs of MDR TB drugs mainly due to logistic problems
    - needs are not estimated based on quarterly reports
    - no system of buffer stock
4. Inadequate record keeping for TB drugs in the treatment centres
5. No control of drugs in the private sector
6. No anti TB paediatric formulations in the country

Challenges

1. The transition from single drug formulation to FDCs not clearly stipulated; no roll out plan.
2. Delay of procurement due to statutory reliance on and use of generic public procurement regulations, procedures and other instructions.
3. linkages between BNTP and CMS reported to be suboptimal

4. Sub-optimal drug management and supply system including long delivery times to Health care facilities from the CMS
5. Inadequate number of pharmacy technician exists in districts, which requires the use of nurses to handle and dispense drugs.

Recommendations

1. A plan for the roll- out of FDCs must be effectively communicated to the districts and partners
2. FDCs and second line drugs for treatment of MDR TB should be included in the essential drug list
3. Quantification of drugs should be based on quarterly case detection and treatment outcomes report
4. Paediatric formulations should be made available
5. Training and refresher training should be organized for drug management.
6. Consider regular technical assistance in Drug Management for all health facilities.

3.7 JOINT TB/HIV STRATEGIES AND ACTIVITIES

TOR 7. To assess the quality and implementation of joint TB/HIV strategies and activities

- The three pillars of TB/HIV Collaboration; (1) establishment of the mechanisms for collaboration between TB and HIV/AIDS Programmes; (2) decreasing the burden of Tuberculosis in people living with HIV/AIDS (HIV/AIDS Programme) and (3) decreasing the burden of HIV in tuberculosis patients (TB Programme) have been adopted by Botswana
- TB/HIV collaborative committees were found to exist in some of the districts and some were functional. Currently, national TB/HIV curriculum is used for training and health care workers apply guidelines for managing dually infected persons.
- Counseling and Testing is offered routinely to TB patients in many institutions and there has also been over the past four years, an increase in the proportion of TB patients who have undergone HIV testing[5]. A national IPT programme is in place and HIV patients are screened with a standard tool for TB and suspects referred for further investigation and care. CPT is available and offered to

5 At present 67.5% of TB Patients are tested for HIV with 68% of them are positive (figure 6).

dually infected patients in most institutions visited, including military facilities. Also, community home based care workers in the HIV and PHC programmes are doing community work in both HIV and TB

Gaps and weaknesses

Coordinating Mechanisms

- In most districts visited, no district joint TB/HIV advisory committee was functioning and thus no joint planning of TB/HIV activities
- No documentary evidence for both TB/HIV team work; Joint TB/HIV planning, monitoring and supervisory systems and follow up of clients
- No documented process of coordinated case finding between TB and HIV care services

Decreasing burden of TB in HIV patients

- Intensified TB case finding (ICF) not systematically done for PLHIV nor routinely done for high risk such as prisoners. HIV patients are not evaluated for TB on regular basis
- IPT recording and outcomes are poor (one of the districts referred number enrolled falling each year, completion rate of 24% 2006; 44% in 2007; 36% in 2008).
- Five districts report national shortage of INH (also observed) and directive was received suspending initiation of IPT
- IPT programme run by TB Programme - limited engagement /ownership of HIV/AIDS Programme for screening of HIV-infected clients for TB or referring TB suspects for further investigation and care

Decreasing burden of HIV in TB patients

- HIV Testing for TB patients is not always offered, accepted or documented and uptake can be improved.
- Referral process for ART for eligible TB patients inadequate

Challenges

- No TB/HIV national policy for collaboration for Joint TB/HIV activities
- HIV/AIDS Programme not involved in TB programme implementation
- No clear TB/HIV IEC strategy
- Lack of implementation plan for roll out of Infection Control guidelines

- Inadequate integration, lack of recording and reporting of joint care activities (CPT and ART). Databases of ETR and ART electronic register do not allow cross-referencing

Recommendations

1. Revitalize National TB/HIV Advisory Committee
2. Develop National TB/HIV policy and establish collaboration mechanisms
3. Strengthen system of regular evaluation of HIV patients for TB
4. Develop TB/HIV IEC strategy
5. Improve engagement of HIV Programme in IPT delivery
6. Develop national implementation plan for roll out of national infection control guidelines
7. Improve provision, acceptance and documentation of HTC in TB patients
8. Strengthen delivery, recording and reporting of joint care in dually infected patients

3.8 OTHER ISSUES ARISING

TOR 8. Any other issues arising in the discretion of the independent assessor:

8a. Program Management and Coordination

Gaps and weaknesses

- Job descriptions for BNTP staff and TB coordinators not readily available although they can be accessed through human resources department

Challenges

- Inadequate accountability of members of the Central Unit
- Unclear leadership role of the NTP Manager

Recommendations

1. There is an urgent need of a structured co-ordination of TB activities at all levels: Re-establish routine schedule for supervisory and mentoring visits at local level with clear delineation of tasks to be conducted at each visits.
2. Strengthen the management and coordination role of the NTP Manager

8b. Coordination of partners and Involvement of the private sector in TB Control

Gaps and weaknesses

- Limited engagement of private sector in TB control activities e.g. No TB reporting from private sector
- Coordination and linkages from the public sector to the community care groups is weak and the fora for communication, planning and implementation of activities are limited.
- No functional forum exists for coordinating partners involved in supporting and implementing TB program activities

Challenges

- No policy document in place to support coordination of partners
- The policy on sustainability of community health care groups such incentives are not clearly defined.

Recommendations

1. Establish fora for involving private practitioners in TB and TB/HIV control activities
2. Develop policy guidance and implementation plan for engaging private practitioners in TB and TB/HIV control
3. Establish a forum for coordinating partners to avoid duplication and ensure that activities are consistent with and supportive of the National TB Strategic Plan.
4. Engage partners according to their mandate, skills and experience
5. Establish fora for the coordinated engagement between the community care groups, NGOs and the public sector

8e. Coordination between MOH and MOLG

Challenges

- Lack of BNTP authority over implementation of planned activities by the local government at the district level

Recommendations

- Consider transferring the primary health care delivery in the districts from the current arrangement of MOLG to MOH or for one ministry to be wholly responsible for activities at the district level with clear channels of reporting to BNTP.
- BNTP should consider the establishment of a national TB Steering or Advisory Committee to create a forum for more input, better coordination and support to the program

8c. Human Resources Development

Gaps and weaknesses

- Job description for District TB Coordinators not adequately disseminated
- A plan to strengthen the capacity of District TB Coordinators is not in place
- Lack of supervision (and feedback) affects development of Human Resources for TB Control

Challenges

- Comprehensive human resource development plan at national and district level in progress
- Inadequate capacity of staff for TB Control implementation
- Development of a plan to strengthen capacity of District TB Coordinators

Recommendations

1. Accelerate process for developing and implementing a comprehensive human resource development plan
2. With support of partners, draw a plan for training, focusing initially on the areas identified as more problematic or less performing (M & E; laboratory issues; Drug Management and DOTS management)
3. Consider a plan to train abroad some of the most critical profiles for TB Control implementation

8d. Visibility of TB Program

Gaps and weaknesses

- Location of the BNTP in the MoH structure

Challenges

- No specific budget line for TB
- Location of TB program in organizational structure relative to HIV/AIDS – TB is a 'Unit' while HIV Prevention and Care is a 'Department'
- Among 17 technical officers in BNTP, only five are Government of Botswana supported

Recommendations

1. As a priority disease, TB should have a specific budget line
2. Elevate TB program to level of a Department and provide resources for the program with permanent GOB funded staff positions.

4 PART 4

4.1 Conclusions

- In general, the Tuberculosis programme in Botswana has been relatively slow in improving implementation of planned strategies and approaches in the past three years towards reducing the burden of TB in the country.
- The main constraining factors include less than optimal management of the BNTP, inadequate capacity to manage the STOP TB Strategy approaches, and inadequate coordination of partners.
- There was inadequate evidence of progress in the programme implementation and monitoring and evaluation needs to be urgently addressed, particularly recording and reporting of activities and programme data. Information recording in TB and laboratory registers, completeness of reports and IPT and CPT implementation and the lack of an MDR TB register in the central unit and the national TB reference laboratory. are a major challenge which hamper monitoring and evaluation of both patients and the programme.
- The procurement and supply system for drugs needs improvement particularly in forecasting, management of second line drugs and the lack of buffer stocks at all levels.
- human resource is challenged by both existing capacity and its management, with major issues being the need to update the TOR and job descriptions of district coordinators; the lack of a plan for supervision; lack of a human resource development plan and inadequate capacity of the MDR focal point.

4.2 Recommendations

4.21 GENERAL RECOMMENDATIONS

- The Ministry of Health and the BNTP need to draw up an immediate plan to address the identified gaps and weaknesses especially to urgently improve implementation of DOTS and revamp the TB control programme.
- With specific regard to the funding request for an isolation ward for MDR TB in Nyangabgwe Referral Hospital in Francistown, the Review mission recommends a two phased process.

<u>First phase</u>

- In this phase, the country must strengthen routine monthly surveillance of MDR TB cases, build capacity for MDR TB management; ensure linkages and referral system is operational for MDR

TB cases; improve laboratory diagnostic capacity, drug and logistics management and infection control.

Action	Responsible
Introduce routine registration of MDR TB cases	BNTP/MDR-TB Focal point
Report monthly the MDR/XDR TB cases diagnosed from the facilities to the Central Unit and from the Central Unit to World Health Organization	BNTP/MDR-TB Focal point
Train staff for management of MDR TB, including recording and reporting	BNTP/WHO
Introduce and operationalize formal referral system which includes feedback for MDR TB from facilities to centres currently managing MDR TB and then to Princess Marina and Nyangabgwe Referral Hospitals	BNTP/NTRL
Ensure that culture/DST proficiency testing is conducted by the SNRL	BNTP/NTRL
Strengthen interaction between the BNTP and National TB Reference laboratory through regular meetings and joint supervision	BNTP/NTRL
Ensure that CMS have sufficient First and Second Line Drug	BNTP
Accelerate GLC application	BNTP/WHO
Disseminate the Infection Control guidelines in facilities identified to manage MDR TB cases	BNTP/MDR-TB Focal point/HIV/AIDS Prog.

Second phase

- After the successful implementation of the first phase, an independent assessment of progress should be undertaken (at 6 months) and depending on progress made, funds for the isolation ward be granted.
- The BNTP needs to concentrate efforts on creating an enabling environment for proper diagnosis, treatment and management of tuberculosis, including ensuring adequate stocks of drugs and reliable data management for MDR TB information (recording and reporting)

4.2.2 SPECIFIC RECOMMENDATIONS

4.2.2.1 Ministry of Health

For immediate implementation

1. FDCs and second line drugs for treatment of MDR TB should be included in the essential drug list
2. Strengthen Programme management with particular attention to the Central Unit

3. Improve accountability of members of the Central Unit
4. Strengthen the leadership role of the NTP Manager
5. Job descriptions for BNTP staff and TB coordinators to be made readily available
6. Procure microscopes for laboratories
7. Introduce quality assurance for TB drugs
8. Revitalize National TB/HIV Advisory Committee

For short term implementation

1. Paediatric formulations should be made available
2. Strengthen the centralized system for forecasting (LMIS) to ensure there are no stock-outs
3. Ensure availability of means of transport for outreach, supervision and patients
4. Consider regular technical assistance in Drug Management for all health facilities
5. Develop National TB/HIV policy
6. Establish collaboration mechanisms at all levels
7. Consider regular technical assistance in Drug Management for all health facilities
8. Define place of TB and HIV/AIDS Programmes in MoH structure
9. Strengthen Community DOTS

For medium to long term implementation

1. Accelerate process for developing and implementing a comprehensive human resource development plan
2. Establish a specific budget line for the BNTP
3. Elevate TB program to level of a Department and provide resources for the program with permanent GOB funded staff positions
4. Consider transferring the primary health care delivery in the districts from the current arrangement of MOLG to MOH or for one ministry to be wholly responsible for activities at the district level with clear channels of reporting to BNTP FDCs and second line drugs for treatment of MDR TB should be included in the essential drug list

4.2.2.2 Botswana Tuberculosis Control Programme

For immediate implementation

1. Introduce routine surveillance of MDR-TB
2. Introduce routine EQA in the laboratories
3. Strengthen recording of laboratory results by ensuring the registers are properly filled
4. Ensure smear microscopy is used for diagnosis and follow up of treatment
5. Effectively communicate and introduce FDC roll-out plan to districts and partners

6. Strengthen Logistic Management and Information System (LMIS) to improve forecasting of drugs based on consumption / reported cases
7. Introduce Buffer stocks at all leve
8. limit circulation of second line TB drugs, which as at now have no person responsible for

For short term implementation

1. Strengthen recording and reporting, by ensuring the registers are properly maintained and quarterly reports are timely sent
2. Strengthen delivery, recording and reporting of joint care in dually infected patients
3. Strengthen Programme management with particular attention to the Central Unit
4. Make job descriptions available and ensure use at all levels
5. Strengthen supervision through effective planning and use of a checklist
6. Develop and implement training plan for staff including laboratory and drug management professionals
7. Advocate for the revitalization of the National TB/HIV Advisory Committee
8. Consider the establishment of a national TB Steering or Advisory Committee to create a forum for more input, better coordination and support to the program
9. Jointly develop National TB/HIV policy and establish collaboration mechanisms at all levels with the HIV programme
10. Improve coordination of partners to avoid duplication and ensure that activities are consistent with and supportive of the National TB Strategic Plan.
11. Consider organizing a retreat to plan roll out / implementation of the strategic plan (annual plans) with involvement of Partners and relevant NGOs
12. Disseminate the review report
13. Re-establish links between the CNTRL and the supra-national laboratory.
14. Involve the private sector in TB control activities
15. Establish fora for the coordinated engagement between the community care groups and formal health care system

For medium to long term implementation

1. BNTP to plan regular training for the most critical professionals for DOTS implementation
2. BNTP should consider a organising a retreat to strategise on of implementation of the Strategic plan (annual plans) with involvement of Partners and relevant NGOs

4.2.2.3 Partners

Recommendations include that Partners should;

1. Provide technical and financial support to BNTP in the implementation of the annual plans and the 2008-2012 strategic plan
2. Strengthen capacity of BNTP, in particular of the Central Unit, through support for training and steering meetings

3. Assist in the development and expansion of the national STOP TB Partnership
4. Support the BNTP to define the emergency plan to revamp the BNTP, with particular attention to DOTS performance/ case management

4.2.2.4 World Health Organization

It is recommended that the World Health Organization provides technical assistance for;

1. capacity strengthening of Central Unit and the BNTP to implement the annual plans and the 2008-2012 strategic plan
2. the MoH/BNTP to define a functional national structure with clearly defined roles and responsibilities
3. the MOH to revamp the BNTP to adopt STOP TB Strategy implementation approaches
4. the MOH/BNTP to define priorities in the training of Human Resources for TB Control
5. monitoring progress in DOTS performance and progress towards MDG targets in Botswana

4.3 ANNEXES

4.3.1 LIST OF PERSONS MET

4.3.1.1 GOVERNMENT

I. Ministry of Health

Mr Newman Kahiya, Permanent Secretary
Dr. Kolaatamo Malefho, Deputy Permanent Secretary (Health Services)
Ms Shenaaz El-Halabi, Director, Department of Public Health
Dr. Khumo Seiphone, Director, Dept of HIV/AIDS Prevention and Care
Dr Joconiah Chirenda, MD, Botswana NTP Manager
Ms O. Motsamai, Nurse, BNTP/IPT Coordinator
Mr G. Moalosi, BNTP

Central Medical Store

Dr. V. Sebako, MD, Acting Manager
Mr O. Omojuwa, Senior Pharmacist, Procurement, ARVs/TB drugs

Infectious Disease Care Clinic

Dr. Chawangwa Modongo, Internal Medicine, TB physician
Dr. Mary Kestler, Infectious Disease specialist, University of Pennsylvania
Mrs Cynthia K. Cauphiw, Nurse, TB Coordinator, Princess Marina Hospital
Mrs Lephata M. Molapisi, TB/HIV Nurse

Block A Laboratory

Mr Otsile Matjhambe – Diploma in Medical Laboratory Technology
Mr Utlwanang Rampupunyane – Diploma in Medical Laboratory Technology

II. MINISTRY OF LOCAL GOVERNMENT

Francistown

Mr Christopher Makgopa, Principal Health Officer

Gaborone City

City Council

Mr Lebuile Israel, Deputy Town Clerk
Dr Godfrey Simoonga, Chief Medical Officer
Mrs Opelo Gaabopiwe, Senior Nurse Officer/Acting Primary Health Care Manager
Dr Ntombizodwei Typhen Bhala, Principal Medical Officer
Ms Idah Kabasia, District TB Coordinator, Gaborone
Ms Morah Tshenyego, Community Health Nurse
Ms Lydia Zungufya, Senior Pharmacist
Ms Bernardette Mungurwa, Senior Laboratory Officer

Lobatse

City Council

Mr G.S.Dipholo, Laywer, Town Clerk
Mrs Modiane Keatimile, Nurse, Primary Health Care Manager
Dr. Bob M. Wagkuna, Principal Medical Officer, PHC Division
Mr Karabo Kerobale, Health Educator, District TB Coordinator
Mr Tankiso Babuile, Laboratory Manager

III. OTHER MINISTRIES

Ministry of Labour and Home Affairs

Gaborone Prison Clinic
Mr Kutlwano Macha, Nurse
Mr Taduma Christmas, Assistant Commissioner, Deputy Prisional Command South
Ms Sekano Sekano, Senior Assistant Commissioner, Divisional Command South

Ministry of Defence

Sir Seretse Khama Barracs, Gaborone

Mrs Neo J. Nmatli, Nurse, TB Clinic
Khumoyame Lapologang, Senior Pharmacist Technician
Bobby Lekuni, Senior Laboratory Technician

IV. PARTNERS

ACHAP – African Comprehensive HIV/AIDS Partnerships

Dr. Themba L. Moeti, Managing Director

BIPAI - Baylor International Pediatric AIDS Initiative Clinic

Dr. Paul Mullan, MD
Ms Bonnie Ngathi, Nurse

BONASO - Botswana Network of IDS Service Organizations

Mr Daniel Motsatsing, Exeutive Secretary

CDC/BOTUSA

Dr Taraz Samandari, Associate Director, TB/HIV Research
Dr. Robert Makombe,

I – TECH- InernationalTraining Education Center on HIV

Dr Bazghina-werq Semo, Country Director
Ms Othilia Phumaphi, Nurse, Training Coordinator

CCM

Mr Daniel Motsatsing, Chair

V. INSTITUTIONS

University Of Botswana

Dr M. Bradshaw, Dean, Medical School, University Of Botswana

ANNEXE 2

- Orientation Program for Botswana National TB Program review
- Data collection tools list
- Checklist 2009rev
- Review Team field reports
- PP presentation on Data validation

Self Assessment Quiz Answer Key

1. What is the primary difference between an Executive Summary and an Abstract.
   a. An executive summary is a detailed summary of the findings and a abstract is only contains information about the rationale and results of the study.
   b. ***An abstract is used when sending your report to a journal for publication and an executive summary is read in lieu of reading the entire report.***
   c. a and b
   d. None of the above

2. Which of the following is considered plagiarism?
   a. Using another writer's ideas without proper citation.
   b. Citing your source but reproducing the exact words of a printed source without quotation marks.
   c. Borrowing the structure of another author's phrases or sentences without crediting the author from whom it came.
   d. Using someone else's outline to write your own report
   e. ***All of the above***

3. List three major topics that should be included in the Study Methodology Section.
   a. *Study Design*
   b. *Study Sample*
   c. *Sample Size*
   d. *Ethical Considerations*
   e. *Data collection*
   f. *Statistical Analysis*

4. True or ***False***

   The findings sections is where you include your interpretations of the data and recommendations based on the study.

The purpose of the Findings section is to present factual statements of the observations and measurements made. It is NOT the section where data is interpreted or summarized. In the Discussion section you will give a concise interpretation of the findings. The purpose of the Discussion is to interpret your findings and justify your conclusions.