UNIVERSITY OF OSLO
Department of Informatics

ANALYSIS OF DECISION-MAKING PROCESS AND ACCESS TO DATA IN THE MINISTRY OF HEALTH;

Free malaria medicine in Mozambique

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Master Thesis

May 2009

I dedicate this thesis to Ndully, my kid, for the Love, patience and support.

DECLARATION

I, Nercénia Salomão Mbie, declare that

Analysis of decision-making process and access to data in the Ministry of Health: Free malaria medicine in Mozambique

is my original work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

Nercénia Salomão Mbie
1st May 2009

ABSTRACT

Decision-making in the health sector is complex and, it depends on all health care levels as health facilities, district, provincial and national level. Routine health information in the Ministry of Health (MISAU) are collected in the health facilities (health centres and health posts) and analysed in the district level. The essential data set are sent to provincial level where they are aggregated by districts and subsequently sent to the national level. This study presents the analysis of the decision-making process and its relationship with the access to this data flow in the health sector in Mozambique. The focus of the case study in this thesis is to illustrate the decision-making process in the Malaria programme as in Mozambique malaria is the principal cause of morbidity and mortality. As with other epidemics, malaria delays the personal, economic and social development of its citizens and constitutes a challenge for the health services in the whole country.

The empirical fieldwork was conducted between 29th of September 2006 to 8th of November 2006 and 21st of June 2007 to 14th of August 2007. In order to understand the decision-making process and data access, the study was carried out using an interpretive case study research with the purpose of investigating how the decision-making of offering free malaria medicine was made. This necessitates explaining and understanding how malaria data is collected, synthesised and presented, the information flow and also the situation regarding malaria in Mozambique. It also required a deep understanding of who was involved and the information used specifically regarding the decision made of free malaria medication. The researcher conducted interviews with decision-makers of the MISAU in the malaria programme and in one malaria endemic district in Maputo province, Matola district, directly observed the data collection process, attended meetings and reviewed internal documents to obtain this data.

My research was informed by the ongoing debates in Health Information Systems (HIS) literature on complexity and access to data, on the situation analysis, treatment and management of malaria and more general literature on decision-making models.

Through an understanding of the debates and principles of the decision-making models the findings of this research reveal the influence of routine data flows in initiating debates and discussions on decisions which are ultimately taken. In this light recommendations on ways to improve these routine data flows are made as a necessary, though not sufficient, influence on important decision making process in the health sector in Mozambique

Keywords: Decision-making, decision-making models, data, information, access to data, Health Information System, Malaria, Information Systems, malaria medicine.

ACKNOWLEDGEMENT

I would like to acknowledge the many individuals who have contributed to this research:

To all my family, Nhancale and Mbie who, besides the constant incentive, could understand my absence, even when I was physically present;

Especially to my son, Ndully, for his patience, tolerance and company at all the moments involved in the realization of this master's degree;

To my supervisors: Prof. Dr. Esselina Macome, thank you for the supervision and contributions in the preparation of this thesis and for the suggestions, criticism and incentives which contributed to the improvement of this work. To Prof. Dr. Elaine, for the thoughtful supervision, patient, clear, objective and stimulus provided in each supervision meeting, research methodology class and exchange of emails, which contributed immeasurably to my thesis.

To the Ministry of Health (MISAU), for the permission to conduct the research, I specially thank to the manager of Malaria Programme, Dr. Francisco Saúte, for providing a valuable information, to the health promoters of Malaria Programme, and to the health workers of Matola II and Machava II, in particular to the laboratory agent, preventive medicine technician and pharmacy agent who provided me the malaria data to the study.

To Nelson Jossias and Antonio Essumaila, friends and critical readers of my writing; to Mauricio Fato, listener and tireless collaborator, whose reflections on each chapter of this thesis made it simpler and clearer. Thanks for this possibility of sharing;

To Prof. Dr. Jens Kaasbøll, for his research collaborations;

In a special way, to Prof. Dr. Emílio Mosse, Coordinator of Master's degree in Mozambique who, shared his thoughts and reflections which helped me to develop this study further;

To the students of UiO, in particular to the foreign students Luis, Anastacia, Elena, Lyndy, Marlen, Edwin, Carol and Tan, for the companionship and fondness. They always put their knowledge at my disposal;

To a group of post graduate students in UiO, João Carlos, Leopoldo, Humberto, Faraja, Lungo, Gertrudes and Mirian, who patiently explained student life in Oslo, shared manuals, and provided critical considerations. The contributions and their reflections were fundamental in the preparation of this thesis. The opportunity for sharing my writing with persons inside the program was extremely opportune and gratifying;

To NORAD, for the financial support of my scholarship, I am deeply indebted;

Finally, not only thank you, but I dedicate this work to the teachers and officials of the University of Oslo (UiO) and all the Mozambican students in Norway. So, from the first moments in which I stood in Norway, the reception, the experience and my cultural provided me with an indescribable opportunity. In this experience, I obtained, besides an immeasurable apprenticeship, lessons and memories that I will keep me for my whole life, but an opportunity to contribute in a small way to the challenges of combating malaria in Mozambique. I would add a special thanks in this regard to the malaria programme, health facilities (herein referred to as health facilities), provincial and district directorates of health where I worked in my fieldwork.

To all, and in special tribute to the Norwegians, my gratitude in Norwegian: **Takk!**

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List of Acronyms

ACTs	Artemisinin Combination Therapy
AECI	Agência Espanhola de Cooperação Internacional
AIDS	Acquired Immune Deficiency Syndrome
AIDI	Atenção Integrada às Doenças da Infância
AS	Artesunate
AQ	Amodiaquine
BEM	Boletim Epidemiológico Mensal/ Epidemiological Monthly Bulletin
BES	Boletim Epidemiológico Semanal/ Epidemiological Weekly Bulletin
BE-PS	Boletim Epidemiológico – Posto de Saúde/ Epidemiological Bulletin – Health post
BIRD	World-wide Bank
CISM	Manhiça Health Research Centre
CNLM	Comissão Nacional da Luta Contra a Malária
CQ	Chloroquine
DFI	Departamento para o Desenvolvimento Internacional
DIS	Departamento de Informação e Saúde
DNS	Direcção Nacional de Saúde
DPS	Direcção Provincial de Saúde/ Provincial Department of Health
DDS	Direcção Distrital de Saúde/ Distrital Department of Health
ELAT	Estratégia de Luta Anti-. Tuberculosa
GDP	Gross Domestic Product
GIDI	Gestão Integrada de Doenças Infantis
HIV	Human Immune Deficiency Virus
HIS	Health Information Systems
HMIS	Health Management Information Systems
HTZ	Hermatozoário
IDEL	Iniciativa de Desenvolvimento Espacial dos Libombos
IMF	Internacional Monetary Fund
INS	Instituto Nacional de Saúde
IRS	Indoor Residual Spraying
IS	Information Systems
ITNs	Insecticide- treated Nets
LSDI	Iniciativa de Desenvolvimento Espacial de Lubombo
MISAU	Ministério da Saúde/ Ministry of Health
NGO	Non Governamental Organisation
OE	Orçamento do Estado
RESP	Repartição de Educação para Saúde Pública
RDT	Rapid Test of Diagnosis
SIMP	Sistema Integrado de Planificação/ Planning Integrated System
SMI	Saúde Materno Infantil/ Maternal and Child Health
STD	Sexuality Transmission Diseases
SP	Sulfadoxine-Pyrimethamine
TB	Tuberculosis
TIP	Tratamento Intermitente Preventivo
UiO	University of Oslo

UNICEF	United Nations Children's Fund
USAID	United State Agency for International Development
PATH	Program for Appropriate Technology in Health
PAV	Programa Alargado de Vacinação
PF	Plasmódio Falsíparo
PNCM	Programa Nacional de Controlo da Malária/ National Malaria Control Program
PNCTL	Programa Nacional de Combate a Tuberculose e Lepra.
PROSAÙDE	Programa Nacional de Reorientação da Formação Profissional em Saúde
PSI	Population Services International
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Introduction

The purpose of this chapter is to describe the importance of decision-making in organizations, to describe the malaria situation of Mozambique in general and, to outline the issues related to analysis of the decision implemented recently in offering the free charge of malaria medicine to the population. In order to present the overall issues addressed, this chapter is structured as follows: Section 1.2 presents the study background and context; Section 1.3 describes the research purpose; Section 1.4 presents the research objectives; Section 1.5 presents the overview of the research approach; Section 1.6 presents my contributions; Section 1.7 Overview in the ethical issues; Section 1.8 presents my role as researcher; finally in section 9 the structure of the thesis is outlined.

1.2 Background and Context of the Study

Decision-making is indispensable in our daily life; one way or the other, we are forced to make choices. In the context of organization decision-making pervades all its organizational activities, process, managements and systems (Blurtit, 2009). Lippeveld *et al.* (2000) affirms that making decisions in the health sector is a complex process. However, the decision-making process can be simplified by establishing objectives, polices and procedures in order to provide the guideline for the decision-makers in making decisions.

Mintzberg (1983:100) referencing Paterson (1969) views the decision process as number of steps: (1) Collecting *information* to pass on to the decision-maker, without comment, about what can be done; (2) processing that information to present *advice* to the decision-maker about what should be done; (3) making the *choice* – that is, determining what is intended to be done; (4) *authorizing* elsewhere what is intended to be done; and (5) doing it – that is, *executing* what is, in fact, done (such as shown in the figure 1.1).

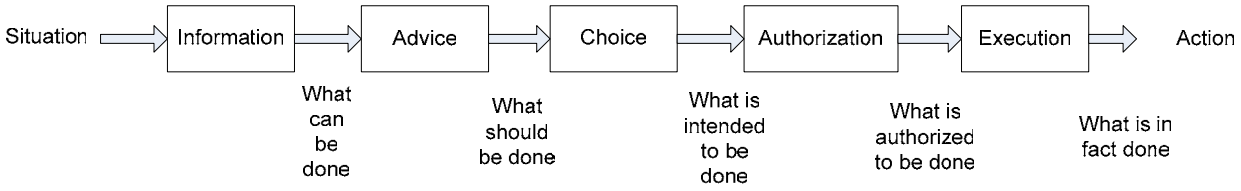


Figure 1.1 – Steps of decision-making process

Source: Adopted from Mintzberg (1983:100) referencing Paterson (1969)

Decisions can be classified as either programmed or non-programmed decisions. Programmed decisions are repetitive and routine decisions and, these decisions can be solved through clear-cut mechanical procedures, such as applying the rules to find the solution. Rules of decisions identify the situation and specify how the decision will be made. Non-programmed decisions describe exceptional or non routine situations, and they are often made under crisis conditions which involve so much ambiguity that specific procedures or programs are not available; in this decision, the problem has not arisen before, it is difficult to define problem's nature and structure and the problem is important and requires a unique solution.

The malaria programme has programmed decisions which can be solved following existing programmed decision rules; for instance, the domiciliary pulverizations is an action which is taken periodically in order to prevent the population against malaria. The decision of offering free malaria medicine is not routine decision. In this case to take this decision the decision-makers had to generate non-programmed decision-making through decision-making approaches using knowledge, skills, ideas, and so on. Therefore, decision-makers who must make non-programmed decisions rely on judgement and creativity (Blurtit, 2009).

The Information Systems (IS) should reflect the demands of the various stakeholders and the data from the IS should be accessible to assist the decision-makers to make effective decisions. In Mozambique, studies developed in the health sector were conducted to analyze the quality of routine malaria data and arguments were given on the importance of good Health Information Systems (HIS). For example, Chilundo et al. (2004) argue that "Good Health Information Systems (HIS) at district, provincial and national levels is fundamental for evidence based decision-making and improved management of intervention programmes, for example, to allow effective and equitable resource allocation in different areas. Information systems can support the management of malaria programmes by: (a) drawing malaria density maps by health area according to different targets and (b) by estimating the number of children under-five years of age living in malaria areas by health facility catchments area, as well as by district or province, thus allowing rational planning based on evidence" (Chilundo *et al.*, 2004:2). However, in the study conducted by Chilundo *et al.* (2004), it was found that the existing reporting system for malaria does not satisfy the information needs of managers.

I will explore the decision made recently in the Ministry of Health (MISAU) to provide malaria medicine free of charge because in the diseases that cause most mortality rate in Mozambique, such as HIV/AIDS, Tuberculosis and malaria, malaria is the only programme that is being charged for. A large proportion of the population are unable to pay for the treatment and this lack of treatment contributes to the high mortality rate due to Malaria in Mozambique. Malaria is the principal cause of morbidity in Mozambique, being responsible for 40 % of all the outpatient consultations and up to 60 % of children admitted in the paediatrics wards (PNCM, 2006). Malaria is also the principal cause of mortality in the hospitals in Mozambique, accounting for almost 30 % of all the registered deaths. Estimates of malaria incidence place infection rates of 40 to 80% in children between 2 and 9 years, with infection rates, in some areas, as high as 90% in children under the age of 5 (DNS, 1992:22). A recent result from ongoing research which investigates the clinical cases of malaria suggests that the risk of the clinical malaria is bigger in the age group from 1 to 3 years (DNS, 1992). Malaria infection in pregnant women in the rural zones is approximately 20 %.

Additionally, access to health care in Mozambique is very low (PNCM 2006) and only 36.1 % of the Mozambican population has easy access (within 30 minutes) to a health facility (IAF 2002/2003). The lack of proper sanitation facilities increases the risk of infection, whereas the poor access means accessing proper malaria treatment is problematic.

In addition to the severe impact on the health status of the people of Mozambique, malaria contributes to elevated economic losses, high rates of school absenteeism and a low agricultural productivity which is principal means of subsistence of most of the rural population. This extended

impact of malaria is difficult to measure, but illustrates the severity of the situation and the impact malaria has on other sectors besides health.

1.3 Research Statement

This research explored the decision-making process and its relationship with access to data in the Malaria related health programmes in Mozambique. Based on the study conducted by Chilundo *et al.* (2004) in selected districts of Mozambique, there is evidence that inaccurate data collected at the health facilities contributes to inaccurate representations of malaria incidence. It is argued that (Sauerborn and Lippeveld, 2000:3) in order to improve health services management, an integrated HIS in terms of collection, processing and reporting will result in the use of health information and improved knowledge that will influence decision-making, programme action and research. This is based on the argument by Sauerborn (2000:33) that firstly, good data, once available, will be transformed into useful information-based decisions, which in turn will influence decisions and; secondly, that such information-based decisions will lead to a more effective and appropriate use of scarce resources through better procedures, programmes, and policies, the execution of which will lead to a new set of data which will then stimulate further decisions and so forth in a spiral fashion.

Decision-makers at all levels of the organization need to measure the trends in health system performance, identify factors that influence it and articulate policies that will achieve better results in a variety of settings (Murray and Frenk, 2000). The performance of components of the health system, such as the public health services, needs to be assessed in order to lead to better health status. For good decision-making, the data must be available on time for the managers whenever they need it

With this aim, HIS in Mozambique have been a priority for the MISAU since 1982. The main outcome of the HIS is the production, preparation and dissemination of information to decision makers at all levels within the health sector, so that efficient planning and management of the resources occurs (DIS, 2003).

This research investigated the recent decision made by the National Malaria Control Programme (PNCM) in April of 2006 to provide free malaria medicine to the population of Mozambique. The reason for this investigation will be to see whether this decision was made based on routinely available information on malaria, and therefore, whether improvements in terms of access to reliable and timely routine data on malaria would lead to improved decision-making in the future or whether there are other challenges, besides access to information, facing decision-makers which also need to be addressed.

1.4 Research Objectives

The objectives of my study are: (1) to understand how MISAU decided to implement the decision-making of offering free malaria medicine; (2) to understand the decision-making process in the Malaria programme in the MISAU in Mozambique; (3) to understand how access to data from routine and non routine information sources influences this decision-making process, and; (4) to

explore whether improved access to routine Malaria IS will result in more effective decision-making in the Malaria programme.

1.5 Overview in the Research Approach

In this study, I adopted the interpretive case study as the philosophical perspective to provide an understanding of the decision-making process. In order to conduct the empirical work in the interpretive approach I used in-depth case study to understand how and why the decision made in offering the malaria medicine was implemented and, also to comprehend how the routine and non-routine data are used in the process of decision-making in the Ministry of Heath.

The research methods used were based on interviews, as the primary source, with the manager of malaria programme and health workers which are responsible for collecting malaria data in two visited health facilities, Machava II health centre and Matola II health centre, inside Matola District. The analysis of organisational documents was also used to acquire data. This method allowed the researcher to review documents related to Malaria such as, annual reports related to Malaria from Maputo province and National level, strategic plans, and policies. The literature review was used to provide the context and inform the research approach of this study.

1.6 Contributions

The decision-making process is crucial for the decision-makers inside an organisation as it takes place at all the time and in all the levels and it influence directly in the organisation performance (Freitas and Kiladis, 1995). This thesis is intended to contribute theoretically and practically and as such will be of value to decision-makers in the MISAU, in particular the Malaria programme, and to IS researchers who are interested in Health Information Systems (HIS), in particular in developing countries. The contributions made are detailed in the following sub-sections.

1.6.1 Theoretical Contribution

The problem of poor health in the health sector includes the health management information basically the decision-making process and how the routine data is presented to decision-makers.

This study brings many theoretical contributions. Regarding to the decision-making models mostly used in the decision-making process such as knowledge-driven, problem solving, iterative, and enlightenment models, should be meaningful inside the organisation. These models are instruments that help the best way of taking a decision for each type of problem. And also the results of this study can help to select actions among several existent alternatives to minimize a problem in general and in particular the problems caused by the malaria in Mozambique because the decision-making done by impulse or intuition has 90 % of chances of mistakes at the moment or on some time after his decision (Abrantes, 2007) therefore the whole decision must be made based on analysis and studies. The adaptation of some of these models will be useful to the decision-makers of MISAU. In the case study, it displays the interactions with the decision-making process and all the involved

stakeholders of the health system and display the information used in the Malaria IS in order to care the decision made in offering the free drugs of malaria medicine.

1.6.2 Practical Contribution

On the practical point of view, I expect to contribute to the improvement of the quality of routine[1] data which is used to decision-making in each level of health system, investigating how these data can influence the decision-making and how they can affect in the decision-making process.

Improving the quality of malaria data can enable the decision-makers to take decisions with full confidence.

1.7 Overview in the Ethical Issues

In this study, I followed the ethical process in operation at the Universities of Oslo and Eduardo Mondlane. Because my research involved data collected in the MISAU, an organisation outside the universities, I had also to submit an application to the ethical board in the MISAU in Mozambique requesting permission to conduct this study. During the empirical work in the field site, all the details about the research purpose were explained to all the participants before they were asked for their informed consent. Issues around confidentiality of data and participants information were respected.

1.8 Role of the Researcher

In order to conduct the empirical work for interpretive case study, the role of the researcher is an important issue. Walsham (2002:107) identifies two different roles, outside observer and participant observer. In the empirical work I was playing the role of an outside observer because I was not having a direct personal stake in various interpretations and outcomes, thus I did not express my point of view during the field work stage and in the meetings which I attended in the health facilities. Many occasions I was not able to participate. For instance, in the meetings regarding the decision-making process in the MISAU I was not allowed to participate because these were confidential and attendance was restricted. The interviews were the primary data source which afforded me the best access to the interpretations of the decision made recently in the Ministry of Heath.

1.9 Structure of the Thesis

This thesis is organized into seven chapters. This chapter, Chapter 1, **Introduction**, illustrated the context of the study, why I am investigating decision making in the Malaria and the contribution this research has made.

[1] Routine data is defined as information that is derived at regular intervals of a year or less through mechanisms designed to meet predictable information needs.

Chapter 2 presents the **Literature review** which was structured around the following topics: Health Systems and HIS; Complexity in Health Information Systems; decision-making models, and; the type of data which decision-makers have access to in the health sector. The purpose of this chapter is to provide an overview of existing knowledge, gaps and concepts from contemporary literature which is related to the research questions being addressed in this thesis.

Chapter 3, **Research methodology**, briefly distinguishes between the different IS research methodologies and expands on interpretive case studies, as this was the strategy adopted in this research. The process of collecting, analysing, and interpreting the data collected is detailed.

Chapter 4, **Empirical Settings**, describes the IS which supports the Malaria programme in Mozambique. It commences with placing the malaria programme in the context of the overall health system in Mozambique. I continue with a description of the malaria IS and the connection between malaria IS and overall HIS.

Chapter 5, **Implementation of the decision of offering free malaria medicine**, presents the decision made regarding the provision of free medication for the treatment of malaria. This describes the procedures to take this decision in the MISAU and presents the applicability of the decision-making models in the case study of offering free malaria medicine.

Chapter 6, **Discussion**, presents the findings of the research in terms of improvement of routine data.

The final chapter, **Conclusion and recommendations for future research**, addresses the research questions posed in this chapter, provides more detail of the contributions I have summarized in the first chapter, and suggests some future research which is needed.

CHAPTER TWO

LITERATURE REVIEW ON DECISION-MAKING PROCESS AND ACCESS TO DATA

2.1 Introduction

This chapter presents the literature review of the research. In order to illustrate the connection between decision-making and access to data, as well as the link between complexity of decision-making process and access to data in health organisation in terms of organisational structure this chapter presents some of the current debates in HIS literature. This background includes what HIS mean, the importance of HIS for effective and efficient health systems and how the design and development of such systems are inherently complex. Additionally, I present the main decision-making models used more broadly in IS literature, but also the particular models that are used in HIS studies. This discussion highlights the complexity of decision-making and how access to data is an important component of this process.

2.2 Health Systems and Health Information Systems

This section discusses the concept of HIS and its importance in the health systems. In particular it presents the connection between the HIS and decision-making in health systems.

Health information is essential for health decision-making at all levels of the health pyramid, from the level of individual patient care, to the management of specific health programmes through to the policy level where strategic decisions are made. Although, the health information field is complex, on the demand side of health information, there are different users such as patients, communities, service providers, programme managers, decision-makers, fund providers and organisations. All these stakeholders use the data for different purposes and thus, need information on a range of health activities and health outcomes, such as mortality and morbidity rates, for example in malaria, nutrition, environment, coverage and quality of health services; costs; and equity within the health sector (WHO, 2000).

Management Information System is "… a system that provides specific information support to the decision-making process at each level of an organisation." (Lippeveld and Sauerborn, 2000:16 referencing Hurtubise, 1984:28). The national HIS encompass the range of information sources and data generation methods required to support all the functions of the health system.

The Health Information System has an organised set of interrelating components which can be grouped under entities: the *information process* where the inputs are transformed into information in a "usable" form for management decision-making (outputs), and the *HIS management structure* (Lippeveld and Sauerborn, 2000:16).

The information process can be broken down into: (i) data collection, (ii) data transmission, (iii) data processing, (iv) data analysis, and (v) presentation of information for use in planning and managing the health services. Monitoring and evaluating the process ensures the right mixture of input procedures and the right type of outputs in a timely fashion.

The decision-making process for daily management tasks often consists of set of "routine procedures", where data is immediately linked to a series of actors. For example, malaria data is collected at the time of the patient visits, aggregated every month and transmitted from the health facilities to the district, and processed at the provincial level. Each year based on this data, coverage for preventive services is calculated and communicated to the district level for further analysis and action. One such action is that the National Control Malaria Programme offers free domiciliary fumigation in Mozambique annually in October as a preventative measure to the contraction of malaria.

In order to make the information process efficient, a HIS management structure is required to ensure that resources are used in such a way that the information process produces high-quality information in a timely fashion. This structure can be broken down into two components: (i) HIS resources, which include persons such as planners, managers, statisticians, epidemiologists, data collectors; hardware such as registers, telephones, computers; and financial resources; and (ii) a set of organisational rules, which ensure efficient use of HIS resources like the use of diagnostic and treatment standards, definition of staff responsibilities, supply management procedures, computer maintenance procedures.

The HIS structure should permit generation of the necessary information for rational decision-making at each level of the health services system. This health system is composed of various levels between the centre and the periphery, each with different management functions, health services provision, and resource availability.

Each level of the health system has specific functions, implicating a series of specific decisions to be made, ultimately leading to improvement of the health of the population (Lippeveld and Sauerborn, 2000:18). Thus, AbouZahr and Boerma (2005:578) describe the function of each level on the health services system and required information for appropriate decision-making at each level:

- At the level of individuals and communities, information is needed for effective clinical management and for assessing the extent to which services are meeting the needs and demands of communities. At this level, decisions on the care of individuals are made. Managers at this level are required to report vast quantities of data to higher levels, but rarely receive any feedback. All the provinces send the statistical information and present it in Epidemiological Weekly Bulletin to PNCM in order to help the national level to see the malaria evolution. The following indicators are used: mortality rate, admission movements, cause of admissions and death.
- At the level of district, health information enables health planners and managers to take decisions regarding the effective functioning of health facilities and of the health system as a whole. The malaria data is collected in the health facilities and aggregated in order to be sent to the tertiary level.
- At the higher level (tertiary level), health information is needed for strategic policy-making and resource allocation. PNCM is located in the national level and its responsibility is to plan out, to monitor the activities, to measure the impact and, to effectuate specific evaluations; in this level broader policy-making takes place.

However, developing an integrated and functioning HIS to provide this information is not a simple task. The next section presents the complexity of HIS.

2.3 Complexity in HIS

In this section I present the concept of *complexity* of HIS in order to comprehend how the process of decision-making and access to data can be easy or difficult in complex organizations in particular in the MISAU.

Mol and Law (2002) describe complexity in three points:

- Things could be related to each other, but do not add up; there are not one, but several different orders;
- Events cannot be described in linear time. When absent orders or phenomena remain as traces, or keep shifting between being absent and present;
- Phenomena cannot be categorised or registered as a set of co-ordinations within a field, either as different classes or as boxes in a coherent system of classification.

(Kärrholm, 2007:110)

The complexity is dependent on the number of different *types of components*, the number of *types of links*, and the *speed of change* of system (Hanseth et. al (2006:3) referencing Schneberger and McLean (2003)). Other authors (for example, Plsek (2003) and Penchas (2003:149) referencing Trefil (2003)) support this point of view in considering a complex system as a collection of individual agents who have the freedom to act in ways that are not always totally predictable, and whose actions are interconnected such that one agent's actions change the context for other agents. A health care organisational system is an example of a complex system.

Cilliers (2000) refines the more abstract description of complexity given above by outlining five characteristics of complex system, namely:

- They consist of a large number of components, which can be simple but which interact dynamically by exchanging energy or information (non-linear). The effects of these interactions are propagated throughout the system;
- No direct link is necessary for distant elements to interact – other elements mediate the interaction;
- They are open systems; they exchange energy or information with their environment and operate under conditions far from equilibrium;
- The history of a system is vitally important, therefore memory is not located at a specific place, but distributed throughout the system;
- The subcomponents of the system cannot have access to all the information in the system; they can only react to local information. Since the interactions are rich, dynamic, fed back, and above all, non-linear, the behaviour of the system as a whole cannot be predicted from an inspection of its components.

On the basis of these characteristics there are two important points to highlight with respect to the complexity of HIS:

- The health care sector in a country consists of a large number of institutions ranging from the small and simple health care centers up to the large and advanced hospitals. These institutions are managed by a number of institutional bodies, organised into geographic areas

(district, province, nation), and according to certain programs (HIV/AIDS, malaria, PAV) and services (primary health care, hospitals, laboratories, drug supply).

- Health care systems are designed to cope with number of difficult, interrelated and constantly interacting problems.

HIS can be conceptualised as a complex system. HIS comprise many independent components (agents), each of which interact with others to reach an objective. The organisational model consists of the health services at each level. The first level is the primary level, it is the point of contact between the health system and the population to whom health care is delivered. The second level, secondary or district level is the link between the health facilities and the provincial level, in which the activities plans are done and the tertiary level includes the provincial and national level, which provide specialized services as well as planning and management support. Each level is composed of information users, decisions on information needs and on how to develop or restructure data collection methods and instruments, data transmission and processing procedures, as well as appropriate feedback reports. The complexity of the organisation can affect the decision-making at all levels because the decision-making process affects not just each level, but the whole health system.

To assist with an understanding of what is entailed in a decision-making process a number of contemporary decision-making models are now explained.

2.4 Decision-making Models

Decision-making is the cognitive process leading to the selection a course of action among alternatives (Reason, 1990). Decision-making is considered to be activities, mentally or physically, made by a decision-maker. The decision-making outcome is the decision, which often is a part of a decision process and, can also be viewed as the subject matter that is dealt with in decision process (Alenljung, 2006). Decision-making is important for managers, where they apply their expertise in a given area to making informed decisions. For example, managerial decision-making of the MISAU should involve reflecting on the available statistical information to plan strategies to decrease the progression of malaria incidence. However, decision-makers of health sector face problems in implementing good decision-making processes due to the lack of specialists in the IS or health field, inadequate resources and infrastructure for technical and communication services. The ability to analyse the data in the health facilities compounds these problems.

According to Alenljung (2006), organizational decision-making is a complex process, and that it needs to be studied with different models. The models are created from a decision-making process, a series of steps which are interrelated and follow a specific methodology to ensure that one or more viewpoints are taken into account when collecting and depicting the data. Thus, a decision-making model is a systematic means of arriving at a decision; it is a way of organising data with the purpose of presenting or displaying it to the decision-maker in such a way that is more obvious that simply making a list of the alternatives (Alenljung, 2006). Organisational decision-making always involves making a choice to alter some existing condition.

Banken (2004) notes that organisations are the locus of decision-making and organisational routines and procedures can hinder or facilitate the use of knowledge by decision-makers. Health Technology and Health Impact Assessment are examples of tools for institutionalising evidence-based decision-making for health (Banken, 2004). Thus, using these tools could help the decision-makers in making decisions in the MISAU in order to minimize the malaria incidence.

With the purpose of improving the health of individuals and population, Banken (2004) affirms that decision-makers should use scientific evidence and knowledge. The use of scientific evidence and knowledge should lead to high quality decisions which should lead to the implementation of higher quality actions and consequently if all goes well, to better outcomes (Champagne, 1999:1). Scientific evidence and knowledge is viewed as that which is derived from systematic investigation conducted in such a way as being recognized as rigorous by a community of researchers (Champagne, 1999:1).

HEALNet defined evidence-based decision-making as

> the conscientious, explicit, and judicious use of the best available evidence from health care, management and policy research in the care of individual patients, the management of the health system, and health policy formulation (HEALNet 1998, cited by Erickson, 2003: 43).

Based on this definition of evidence-based decision-making, two main questions arise (Champagne, 1999:1):

- How is evidence supposed to come into use?
- Through which process and why would decision-makers and managers use evidence?

To answer these questions, several processes or models of knowledge can be used in decision-making. There are four main models of knowledge use in decision-making described in contemporary literature:

- ***Knowledge-driven model*** (Erickson, 2003:40; Sauerborn, 2000);
- ***Problem-solving model*** (Erickson, 2003:40 and many authors like Landry (1999), Lavis (2003), Denis et al. (2003), Habermas (1973), Yin & Moore (1999));
- ***Exchange or iterative model***; (Sauerborn (2000));
- ***Diffusion or enlightenment model*** (Champagne (1999:14), Porter & Hicks (2006));

2.4.1 Knowledge-driven Model of the Decision-making Process

The knowledge-driven model, also known as classical/purist or 'push' model, (Champagne, 1999:3) is derived from the physical sciences and, is the most traditional and vulnerable model of knowledge use.

Sauerborn (2000) presents this model as being useful for delineating distinct steps, which can be influenced separately. At the first step, *data* are turned into *information* through a process of selection and reduction; processing and analysing information with problem solving in mind leads to new *knowledge*; the interpretation of knowledge, then, is guided by subjective *judgement*, rather than by objective, scientific rigour.

This model reflects a rational, linear conception of the process of knowledge utilization and can be referred to as technocratic in that experts are in the best position to make decisions, without negotiation and neglecting (Habermas (1973) quoted by Erickson (2003:42)). The model thus neglects politics and ethics.

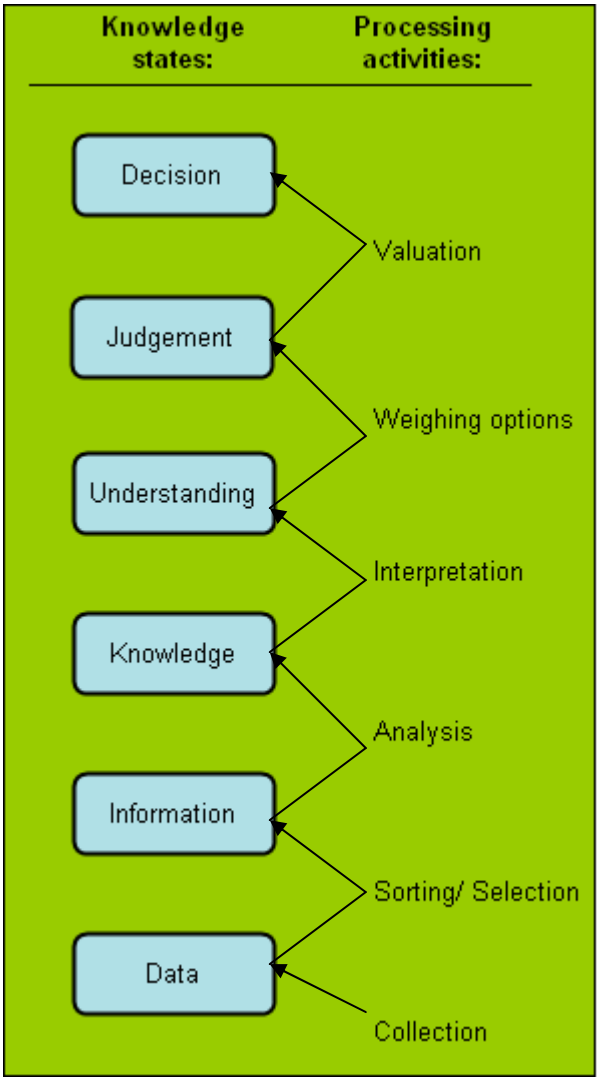


Figure 2.1 – Knowledge-driven model of decision-making

Source: Sauerborn (2000:35)

The Knowledge-driven model is often used to illustrate the work processes of a researcher (Weiss, 1979): basic research → applied research → development → application. The basic research discloses some opportunity that may have relevance for public policy; applied research is conducted to define and test the findings of basic research for practical action; if all goes well, appropriate technologies are developed and implemented (Weiss, 1979:427).

Champagne (1999:5) presented two limits to the applicability of this model in management: First, management knowledge is not apt to be so compelling or authoritative as to drive inevitably toward

implementation; and second, management knowledge does not readily lend itself to conversion into technology.

However, this in some way describes the logic behind the malaria information process at the MISAU. Malaria data are collected at the district health office, where they are transmitted to the provincial directorate and then to the national level. The logic behind this is that the collected data are processed and transformed into information at each level and this is then used for the decision-making at the national level.

2.4.2 The Problem-solving Model of the Decision-making Process

The problem-solving model can also be called information-seeking/ user-pull model/ 'pull'/ problem-driven, decision-driven model or classical model of decision-making, (Lasswell (1975) referenced by Sauerborn (2000)). This model can also be termed a decisional model in which users determine the ends, and experts determine the means (Habermas (1973) referenced by Erickson (2003). It is an instrumental model, in the sense that evidence is seen as directly useful and applicable to a decision (Champagne, 1999:6). This model identifies 7 stages, which follow each other over time in a linear and logical fashion (Sauerborn, 2000:34).

Generally, in this model a problem exists, a decision has to be made, and a gap in information, understanding, or knowledge exists for making that decision. The *pending decision* drives the search for knowledge and subsequent application of that knowledge. Goals are generally already agreed upon and the research is to help identify and select appropriate means to reach the goal. While in many instances knowledge is sought among existing research findings, occasionally policy makers will commission social science research to fill knowledge gaps. Sometimes those gaps remain (Weiss, 1979:427).

According to Erickson (2003:42) and Champagne (1999:6), this model follows a sequence that policy-makers identify a problem, then gathers and reviews all data about alternative possible solutions and their consequences, strive to improve decision-making by training practitioners in analysing and evaluating the quality of evidence. This can be named Variant A of this model, where research predates the recognition of the problem. Decision-makers faced with a decision go out and search for information from pre-existing research. (Champagne (1999:6). In variant B, research is commissioned to fill the knowledge gap, and so begins with the identification of a problem by a customer who requests the researcher to identify and assess alternative solutions (put the problem on agenda). (Champagne (1999:6). See Figure 2.3 for a diagrammatic representation of this model.

In both variants, newly acquired knowledge is used to better understand the problem situation and to choose among alternatives courses of action. Improvement of problem-solving skills of decision-makers is another potential target for improvement of knowledge transfer and decision-making. Furthermore, the model stresses that there need to be some sense of urgency and relevance for a problem to be put on the agenda and that this is not only done by the decision-makers themselves but by a wide variety of societal groups like community and special interest groups, the media (See Figure 2.3). Once the problem is "on the agenda", several options, for addressing it, are generally developed and compared to their relative costs and benefits. The adoption of one of these options in

this model is influenced by a set of sociopolitical "pressure groups"[2]. The implementation step is straightforward, followed by the final steps – monitoring, and evaluation – which may lead to the identification of new problems, making the linear process circular or, rather, spiral.

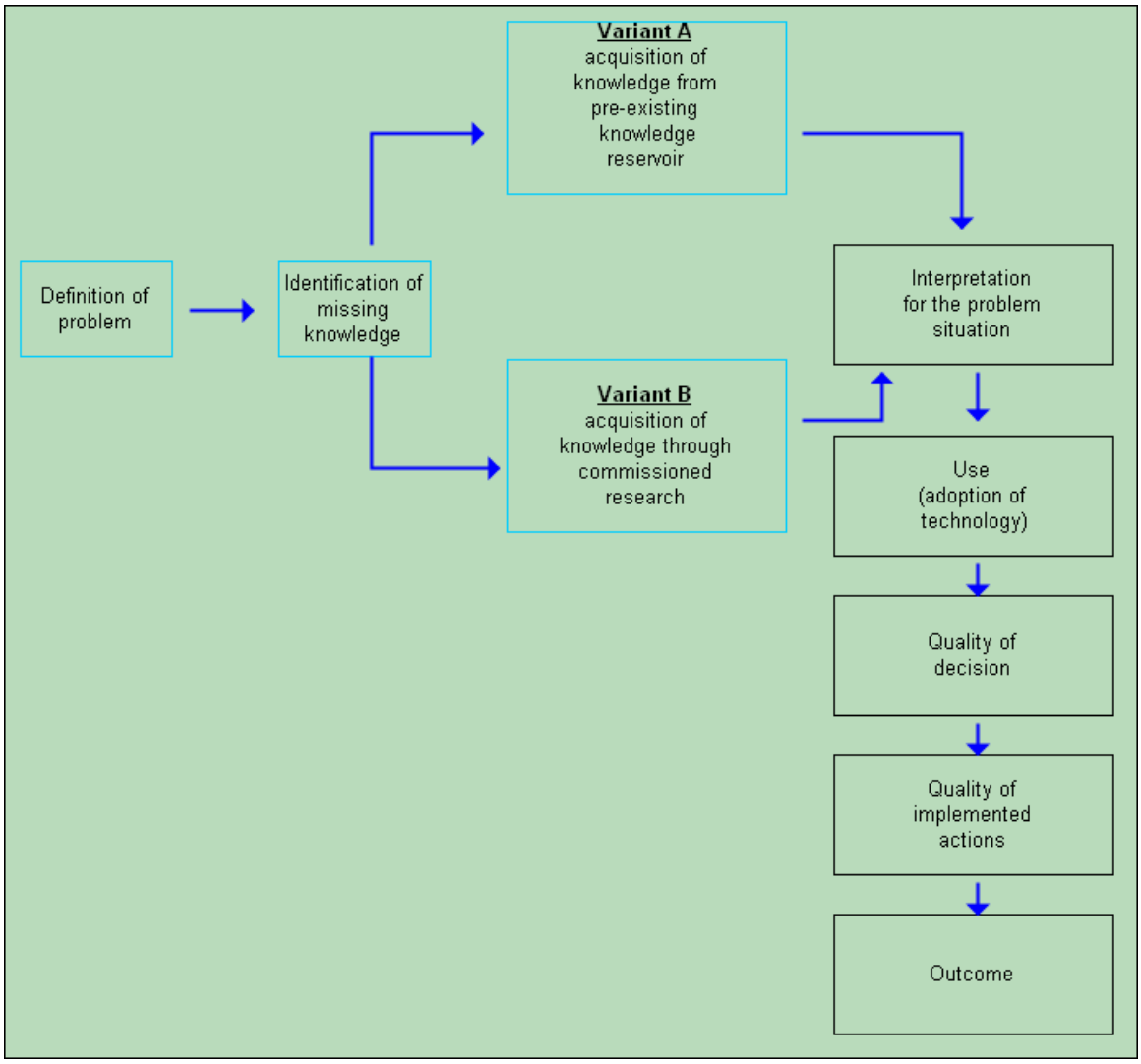


Figure 2.2 – Problem-solving model of scientific evidence use

Source: Adapted from Champagne (1999:7)

The strength of this model lies in its emphasis on the process of decision-making, rather than on the individual decision (Sauerborn (2000:34). The problem-solving model focuses on the decision-maker (Weiss, 1979). Sauerborn (2000:36) argues that information is but one of many inputs into the decision-making process. To have information available not only to decision-makers but also to the players influencing decision-makers, such as donors and community, is very important

[2] Sociopolitical, such as political parties, special interest groups, and governments.

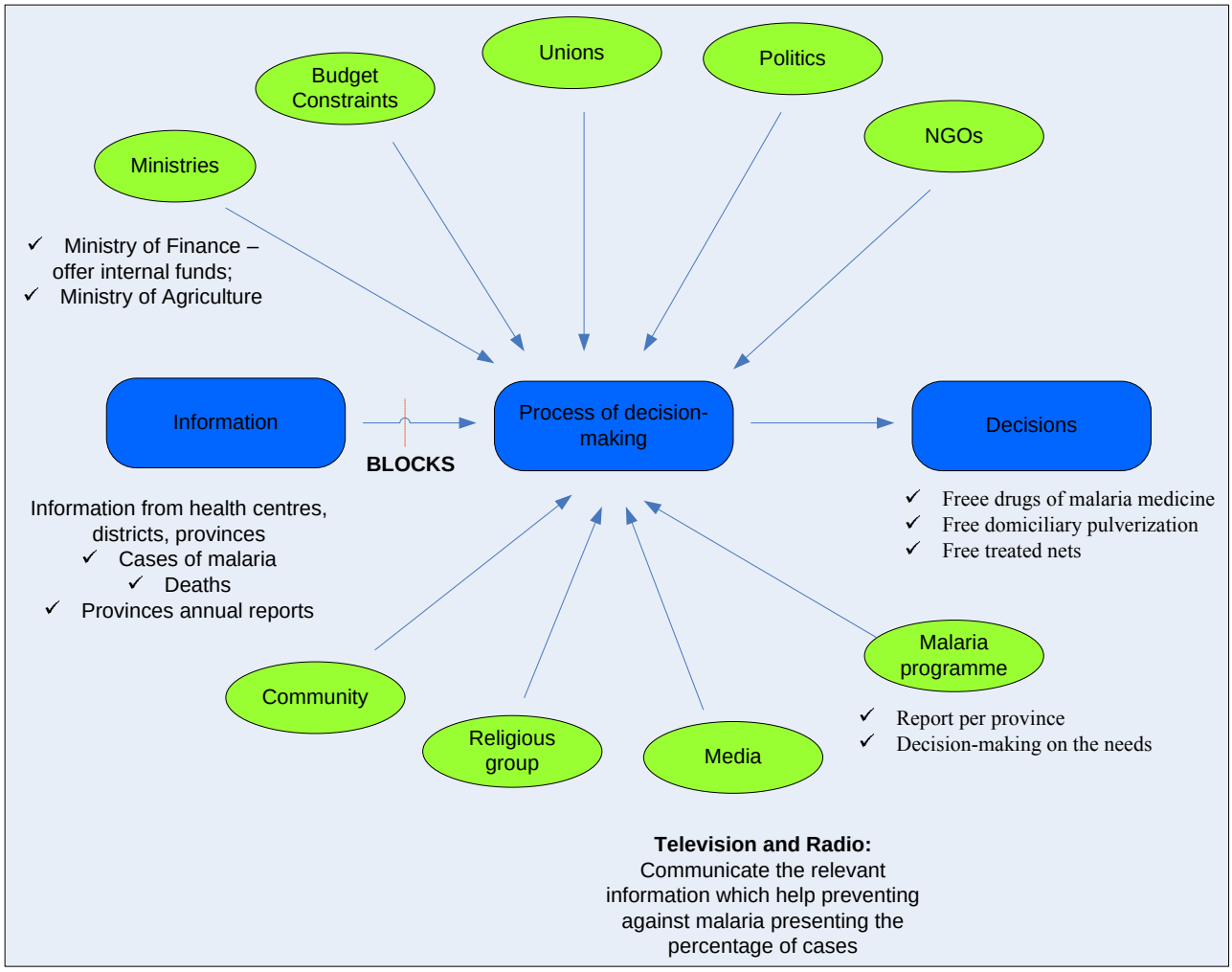


Figure 2.3 – Political, noninformational factors influencing decision makers

Source: Adapted from Sauerborn (2000:14)

Champagne (1999:9) presents serious limits to the applicability of the problem-solving model in management: the problem may be unclear, it assumes consensus in the problem definition; it ignores the difficulty in identifying information needs; ambiguous findings, time constraints and cultural gaps can occur in the acquisition of knowledge from pre-existing knowledge reservoirs and acquisition of knowledge through commissioned research phase; it ignores the troublesome link between knowledge and action in interpretation for the problem situation stage. Critics of this model point out that in the real world decisions are not likely to be made in such a neat and logical way; rather, phases overlap, and options are rarely compared methodologically (Sauerborn, 2000).

Like the knowledge-driven model, the problem-solving model addresses an important aspect of knowledge and decision-making processes once only information is investigated from social scientists; for instance, availability of malaria drugs, however, these models do not address other important factors in the overall decision-making process in health organisations such as the involvement of all the interested parties in the decision-making process. The iterative model addresses some of these factors (Erickson, 2003:43); so, in this model, the information is obtained

from variety of sources and all the concerned parties in the process, poll their talents, beliefs, and understandings in order to make sense of a problem.

2.4.3 The Iterative Model of Policy Making

The iterative model, also known by exchange/ interaction model, emphasizes the interactions or exchanges between various actors, often researchers and decision-makers (Erickson, 2003:40). Thus, the process here is a set of interactions between researchers and users rather than a linear move from research to decisions (Hanney et.al, 2003:12). These interactions help expose both groups to each other's worlds and needs, and increased interactions should be sought throughout the knowledge production process (Denis et al. (2003) referenced by Erickson (2003:44). In this model, researchers interact with all other stakeholders. They all engage in a disorderly fashion in mutual consultations that progressively move closer to potential decisions options (Champagne, 1999:14). In this model the multitude of players may have conflicting interests in the decision-making process, but that decisions are made in an iterative rather than linear way through dialogue and negotiation (Grindle & Thomas (1991) cited by Sauerborn (2000).

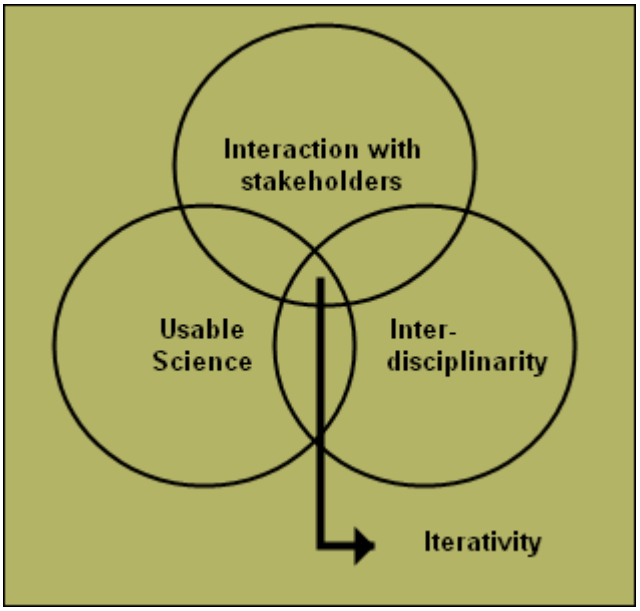


Figure 2.4 – Iterative model

Source: Lemos et. Al (2004:61)

As is illustrated in the figure above, 'iterativity' involves three essential components:

- ***Sustained Stakeholder interaction*** refers to the degree to which representatives of the constituency base are involved in aspects of the research: defining the problem, formulating research questions, selecting methods, conducting research, analyzing findings, developing usable knowledge, testing/evaluating research results, participating in dissemination of results, and participating in identifying next research steps (if any are required);

- ***Usable Science*** refers to the degree that the science produced through the integrated assessment process results in knowledge that meets constituent needs. Thus, the knowledge produced should directly reflect expressed constituent needs, should be understandable to users, should be available at the times and places it is needed, and should be accessible through the media available to the user community.
- ***Interdisciplinarity*** is defined as the effort of scientists from different disciplines to work together to tackle problems whose solutions cannot be achieved by any single discipline.

This model is one in which the decision steps are made incrementally and tested at short intervals. It is especially applicable to technology decisions, when alternatives must be tried and tested incrementally, for example the deployment of prototypes where the implementation of the system continually built upon the previous version until the final working version is complete. The advantages of the iterative model for technology projects are: faster coding, testing and design phases; and it facilitates the support for changes within the life cycle. However, the disadvantages of the model are that, more time spent in review and analysis, a lot of steps need to be followed in this model, and a delay in one phase can have detrimental effect on the software as a whole.

Another approach which explores a more gradual filtration of research into decision-making processes is the enlightenment model.

2.4.4 The Enlightenment Model

The enlightenment model, also known by percolation/ limestone or diffusion model puts the accent on the need for a distribution mechanism for research and considers that it is more likely to be used through the gradual sedimentation of insight, theories, concepts and perspectives (Erickson, 2003:45, Hanney et. al, 2003:12). Managers use background, integrated knowledge for understanding (Champagne, 1999:14). This model eschews the notion that research impacts are simple and instrumental in effect; instead research is seen to impact through the gradual sedimentation of insight, theories, concepts and perspectives (Davies et. al, 2005:14).

This model has the advantage of extending the range of ways in which research is seen to be utilized and, the process of diffusion of knowledge is simply added to the appreciation of the intrinsic value of knowledge in decision-making and society (Erickson (2003:45). Information produced by analysts contributes to the policy process indirectly and over time, by shaping more general interpretations and understandings of issues and gradually altering the working assumptions and concepts of policy makers (Porter & Hicks (2006)). Research provides the background of data and empirical generalizations from which policy ideas and choices are divided, but only rarely does it supply an "answer" that policy actors use to solve a specific policy problem. Research and analysis do influence the actors.

Table 2.1 – Models' summary

Model of decision-making	Concept	Characteristics	Limitations
Knowledge-driven model	New research findings lead to new applications and new	✓ The decision is made in linear way;	✓ Management is not apt to be so authoritative as to drive inevitably

	policies. The existence of knowledge is seen to lead directly to its use.	✓ Technocratic model - experts are in the best position to decide; ✓ Focus on the researcher; ✓ Research findings may be communicated to impel action. ✓ Ideas and discoveries from basic research eventually become commercial products.	toward implementation; ✓ Management knowledge does not readily lend itself to conversion into technology.
Problem-solving model	Direct application of results to solve a problem that was previously identified by the "user".	✓ Linear view; ✓ Users determine the ends, and experts determine the means; ✓ Focus on the decision-maker. ✓ Emphasis on the process of decision-making, rather than on the individual decision-maker; ✓ The problem is analysed by wide variety of societal groups like community and special interest groups, the media, and donors; ✓ Agree to solve problem. ✓ An issue requiring elucidation is identified by the policy maker and research provides the answer	✓ Unclear problem; ✓ No consensus in the problem definition; ✓ Difficulty in identifying information needs; ✓ Ambiguous findings; ✓ Time constraints; ✓ Cultural gap; ✓ Troublesome link between knowledge and action; ✓ Does not address important factors in the overall decision-making process in health organisations. ✓ Decisions are not likely to be made in such a neat and logical way; ✓ Phases overlap; ✓ Options are rarely compared methodologically.
Iterative model	Policy-makers seek information from a variety of sources, including practitioners, politicians, interests groups and friends and, the process of decision-making and research-to-policy dynamics involves interconnectedness and multiple-way; researches are just one set of participants among many.	✓ Decisions are made in an iterative rather than linear way; ✓ Emphasis on researchers and decision-makers. ✓ This theory claims that researchers and users belong to overlapping professional networks and are in frequent communication.	✓ Decisions are made incrementally; it can delay the decision-making process;
Enlightenment model	Concepts and theoretical perspectives that social science research has engendered permeate the policy-making process.	✓ Research and analyses influence the actors; ✓ Research impacts are simple and instrumental; ✓ Education.	✓ This model is an inefficient means for reaching policy audiences (Weiss, 1979): ✓ Many vital results of social science research never penetrate to decision-making centers; ✓ Some results take so long to come into currency that they are out-to-date by the time they arrive, their conclusions having been modified, or even contradicted, by later and more comprehensive analysis.

The MISAU is a complex organisation in terms of events which can be observed in the decision-making process. So, the decision-making is taken at different levels of health systems. In order to take decision of offering free malaria medicine, the MISAU takes other series of decisions such as changing the malaria medicine, providing prevention methods to the population in accordance with varies aspects like environment, region and so on. All these events can be explained using the decision-making models, but no single model can explain all of them at all. For instance, with the knowledge-driven model is explained the decision of searching information regarding the change of

malaria drugs; the problem-solving model can describe the decision made in terms of prevention methods; the iterative model can elucidate the decision of offering free malaria medicine as a whole and, the enlightenment model can explain other aspects related to the immunity by malaria drugs which can lead to resistance to the parasite.

2.5 Conclusion

In this section I describe the importance of availability of data for the decision-makers in organisations and also the communication with the stakeholders. In order to take decisions in an organisation it is not enough that the decision-maker has access to data. Data or information on their own will not generate the desired outcomes. Data, which are simple measures of characteristics of people and things, have little inherent meaning or value; analysis of the data enables the identification of patterns, thereby creating information. The use of information to generate recommendations rules for action, and behaviour change signifies the creation of knowledge that is used to make decisions and change human behaviour (Stansfield et al., 2000:1018). Good decisions are based on effective policies, services, and behaviours and require timely, accurate, and relevant information. Health information is required for strategic planning and the setting of priorities; quality assurance and quality improvement for health services; detection and control of emerging and endemic disease (Walsh and Simonet, 1995 referenced by Stansfield et al., 2000:1018). The health sector needs this information for the detection and control of consequences of epidemics in order to enable the managers to plan out strategies to reduce the incidence of the malaria in the country (Stansfield et al. (2000:1018).

There are many models of decision making which take into account the complexity of such decisions. In this research have been investigated four models of knowledge utilization, knowledge-driven model, problem-solving model, iterative model, and enlightenment model and, taking into account the complexity of organization in study, a single model can not explain all the events observed in MISAU. Thus, in the knowledge-driven and problem-solving models the policy process is inherently rational, with research results being used when they exist and decision-makers calling for research when it is needed; the iterative and enlightenment models stressing that both the research and decision-making processes take place in parallel with a number of other social processes and thus play several different roles.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The aim of this chapter is to describe and justify the research strategy and methods that I applied to address the research questions and the research objectives as described in Chapter 1. Explicitly outlining the strategy and methods used is very important for the reliability and validity of the findings, because "all researches are based on some underlying assumptions about what constitutes 'valid' research and which research methods are appropriate" (Myers and Avison, 2002:5). In accordance with this perspective, I explain the philosophical perspective I adopted, the strategy - case study research I used and how I collected and analysed the data for that case study. Additionally, I cover the ethical implications and the limitations during the research methods.

3.2 Philosophical Position

Research methods allow us to answer research questions about the interaction of humans and computers. According to Myers and Avison (2002:4), research methods can be classified as qualitative and quantitative research methods.

Quantitative research methods arose out of the study of natural phenomena. Examples of quantitative methods include survey methods, laboratory experiments, formal methods and numerical methods. These methods and techniques tend to specialize in quantities in the sense that numbers come to represent values and levels of theoretical constructs and concepts and the interpretation of the numbers is viewed as strong scientific evidence of how a phenomena works. The researcher may use archival data or gather it through structured interviews and the research is motivated by the numerical outputs and how to derive meaning from them (Straub et. al, 2004).

Qualitative research methods enable researchers to study social and cultural phenomena. These can be action research, case study research and ethnography. Qualitative data sources include observation and participant observation (fieldwork), interviews and questionnaires, documents and texts, and the researcher's impressions and reactions.

By the nature of my case study, I will adopt the qualitative research method.

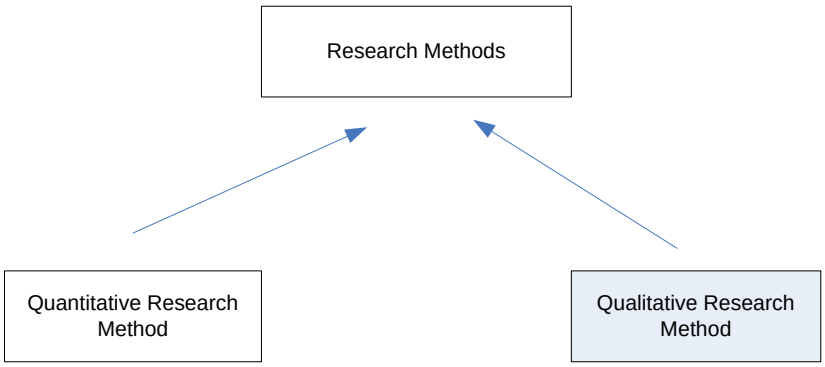


Figure 3.1 – Classification of research methods

Qualitative research may be positivist, interpretive or critical (Yin (2003), Klein and Myers (1999:69), and Chua (1986) as cited by Falconer and Mackay (1999:288)). The choice of a specific qualitative research method is independent of the underlying philosophical position adopted; for example, case study research can be positivist (Yin, 1994), interpretive (Walsham, 1993), or critical. It is for this reason that I now explain the philosophical position in which I used qualitative research. A comparison of the different paradigms is given in Table 1.

IS research can be classified as **positivist** (Orlikowski and Baroudi, 1991) if there is evidence of formal propositions, quantifiable measures of variables, hypotheses testing, and the drawing of inferences about a phenomenon from the sample to stated population. Examples of a positivist research are Yin's (1994) work on case study research – design and method and Benbasat et. al's (1987) work on case study research in studies of IS.

IS research can be classified as **critical** if there is a evidence of a critical stance towards taken-for-granted assumptions about organisations and information systems, and a dialectical analysis that attempted to reveal the historical, ideological, and contradictory nature of existing social practices (Orlikowski and Baroudi, 1991). Examples of a critical research are Forester's (1992) work on critical ethnography and Ngwenyama and Lee's (1997) work on description of how hermeneutic field studies can be used together with critical theory research.

Philosophically, this study follows the **interpretive studies,** which assume that people create and associate their own subjective and inter-subjective meanings as they interact with the world around them. Interpretive researchers, thus attempt to understand phenomena through assessing the meanings that participants assign to the phenomena; interpretive studies reject the possibility of an 'objective' or 'factual' account of events and situations, seeking instead a relativistic, albeit shared, understanding of phenomena. IS research can be classified as interpretive (Orlikowski and Baroudi, 1991) if there is evidence of non-deterministic perspective where the intent of the research is to increase understanding of the phenomenon of interest was examined in its natural setting and from the perspective of participants, and where researchers did not impose their outsiders' a priori understanding of the situation. The aim of all interpretive research is to understand how members of a social group, through their participation in social processes, enact their particular realities and endow them with meaning and to show these meanings, beliefs and intentions of the members help to constitute their social action (Orlikowski and Baroudi, 1991). Interpretive methods of research in IS are 'aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context' (Walsham (1993, pp4-5) quoted in Myers and Avison (2002:6)).

Examples of the interpretive IS research, is Boland's (1991) work on use of hermeneutics and Walsham's (1993) on contextualism theory as a starting basis for the study of IS strategy and its implementation.

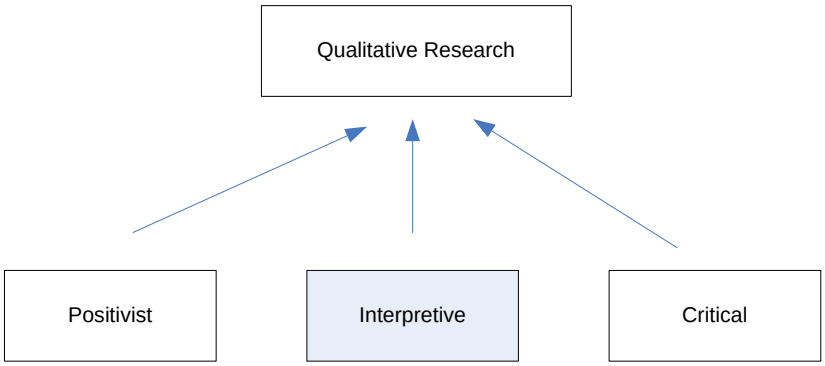


Figure 3.2 – Philosophical positions

There are three categories of assumptions underlying the interpretive research philosophy (Chua, 1986):

- With respect beliefs about physical and social reality, ontologically, the interpretive emphasizes the importance of subjective meanings and social-political as well as symbolic actions in the processes through with humans construct and reconstruct their reality (Morgan, 1983:396, such as cited by Orlikowski and Baroudi, 1991:15). For example, this tradition does not presume that organisation structure or social relations are objectively known and unproblematic, but attempt to understand how and why individuals, through their socialization into, interaction with, and participation in, a social world, give it a certain status and meaning. Interpretive IS research assumes that the social world (that is, social relations, organisations, division of labour) is not 'given'. Rather, the social world is produced and reinforced by humans through their action and interaction. Interpretive researchers believe that social reality can only be interpreted and they recognize that as meanings are formed, transformed, transferred, and used, they are also negotiated, and hence that interpretations of reality may shift over time as circumstances, objectives, and constituencies change. In the Malaria program there is interaction between the health system and other health programmes. Additionally, the health sector interacts and is impacted by many of the other Ministries, such as Ministry of Agriculture, Finance, Education and Culture and, Information Directorate. As the decisions taken in the Malaria programme do not only impact the malaria programme, there must be an involvement, for example, of other levels within the government, MISAU, such as health centres that are responsible for the gathering of data, districts and provinces who compile the data and send to the malaria programme in order for decisions to be taken.
- In respect to beliefs about knowledge, 'social process is not captured in hypothetical deductions, covariance, and degrees of freedom; instead, understanding social process involves getting inside the world of those generating it' (Rosen, 1992 quoted by Orlikowski and Baroudi, 1991:15). Interpretive techniques allow participants to use their own word and images, and to draw on their own concepts and experiences. The primary endeavour is to describe, interpret, analyse, and rigid a priori researcher-imposed formulations of structure, function, purpose and attribution are resisted (Glaser and Strauss, 1967 quoted by Orlikowski and Baroudi, 1991:16). In this study to try to obtain knowledge which could be considered valid I used interviews, observations and document analysis.
- The relationship between theory and practice is that the research can never assume a value-neutral stance, and is always implicated in the phenomena being studied. Researcher's prior

assumptions, beliefs, values, and interests always intervene to shape their investigations (Orlikowski and Baroudi, 1991:16).

Table 3.1 – Differences between the philosophical perspectives (**Based on Orlikowski and Baroudi, 1991)**

	Interpretive	Positivist	Critical
Key concept	✓ non-deterministic perspective ✓ Aim of research is to increase understanding of the phenomenon of interest ✓ Examine phenomena in its natural setting from the perspective of participants	✓ formal propositions ✓ quantifiable measures of variables ✓ hypotheses testing, ✓ Draw inferences from the sample to stated population	✓ critical stance towards taken-for-granted assumptions ✓ dialectical analysis to reveal historical, ideological, and contradictory nature of existing social practices
Ontology	✓ world is socially constructed	✓ An objective reality exists	✓ Social reality is historically constituted,
Epistemology	✓ A subjective meaning of reality is constructed through the researcher participating in the human and social world	Investigation of truth can be objective (independent of the researcher)	✓ A subjective meaning of reality is constructed through the researcher is grounding it in social and historical practices
Research Methods and Techniques	✓ Case studies; ✓ Interviews; ✓ Documents review; ✓ Observation; ✓ Discussion.	✓ Sample surveys; ✓ Controlled experiments; ✓ Questionnaires.	✓ Long –term studies (historical and ethnographic) of processes and structures;
Models of analysis/ Data analysis method	✓ hermeneutic, ✓ iterative ✓ semiotics (text analysis) ✓ metaphor and narratives	✓ Inferential statistics	✓ Hermeneutic ✓ iterative ✓ semiotics (text analysis) ✓ metaphor and narratives
Role of the researcher	✓ subjective;	✓ objective ✓ Independent	✓ implicated
Example of research following this perspective	✓ Walsham (1993) ✓ Orlikowski and Baroudi (1991) ✓ Boland (1991)	✓ Yin (1994) ✓ Benbasat et. al (1987)	✓ Forester (1992) ✓ Ngwenyama and Lee (1997)

Within this interpretive paradigm I adopted a case study strategy to address the research questions I have posed in Chapter 1. The reasons for this selection are outlined in the next section.

3.3 Case Study Research

The case study research is a way of collecting and analysing empirical evidence. It examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or few entities like people, groups, or organisations, (Benbasat et. al, 1987).

The case study as a research strategy comprises an all-encompassing method covering the logic of design, data collection techniques, and specific approaches to data analysis (Yin, 2003:14). The case study is not a data collection tactic nor merely a design feature alone but a comprehensive research strategy (Stoecker, 1991 cited by Yin, 2003). Research questions are specified prior to the study by researchers who are observers/ investigators rather than participants (Benbasat et. al, 1987). Yin (2003:2) suggests that to get some knowledge in how to define the research setting, how to determine the relevant data to be collected and, how should be done with these data once collected, the case study is ideal research. Though Yin is referring to positivist research, his statement is equally applicable to the interpretivist paradigm. These key characteristics of case study research are summarised in Table 3.2.

There are three types of case studies *exploratory* or *casual* case studies, *descriptive* case studies, or *explanatory* case studies (Yin, 2003:3). **Exploratory case studies** are considered as a prelude to some social research. In exploratory case studies fieldwork and data collection may be undertaken prior to definition of the research questions and hypotheses. **Explanatory cases** are suitable for doing causal studies. **Descriptive cases** require the investigator to begin with a descriptive theory, or face the possibility that problems will occur during the project. This is an **explanatory case study** as its intention is to understand the process of decision-making in the malaria programme and then I form a theory to explain the decision-making process by some models of decision-making: knowledge-driven model, problem-solving model, iterative model.

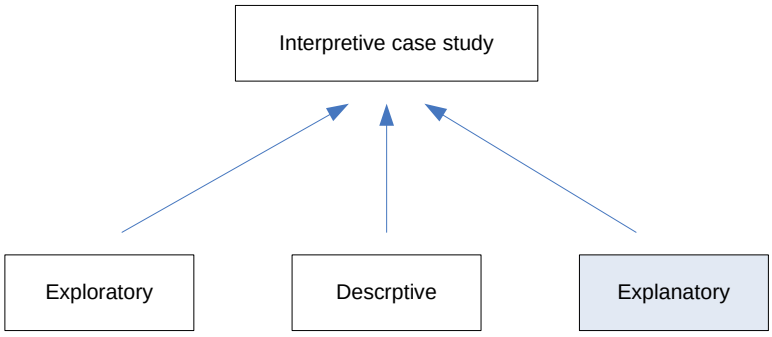


Figure 3.3 – Types of Interpretive case study

Case studies can also be either *single-* and *multiple-case* designs according to their number. ***Single-case studies*** are appropriate: (i) to confirm or challenge a theory, or to represent a unique or extreme case, and; (ii) for revelatory cases where an observer may have access to a phenomenon that was previously inaccessible. This approach requires careful investigation to avoid misrepresentation and to maximize the investigator's access to the evidence. These studies can be holistic or embedded. Embeddedness occurs when the same case study involves more than one unit of analysis. ***Multiple-case studies*** follow a replication rather than a sampling logic. In the sampling logic, the selection is made out of a population, for inclusion in the study. Each individual case study consists of a "whole" study, in which facts are gathered from various sources and conclusions drawn on those facts. The case studies can also be holistic as well as embedded. This study is based on one case study; the case is based in one setting (Maputo - Mozambique) and analyze the decision-making process in the malaria programme – thus is by nature a single case study.

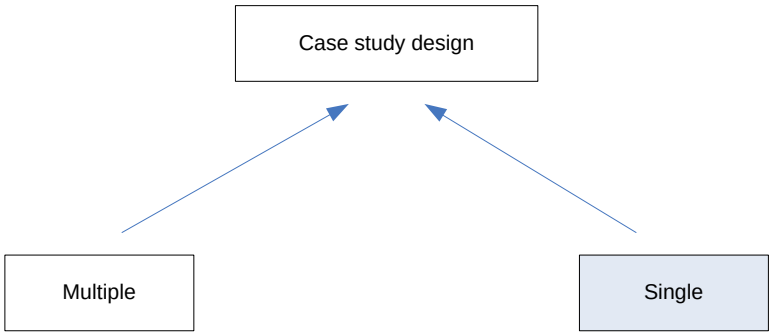


Figure 3.4 – Case study design

Table 3.2 – Key characteristics of case studies

Item	Characteristics
1	Phenomenon is examined in a natural setting
2	Data are collected by multiple means
3	One or few entities (person, group, or organization) are examined
4	The complexity of the unit is studied intensively
5	Case study are more suitable for the exploration, classification and hypothesis development stages of the knowledge building process; the investigator should have a receptive attitude towards exploration
6	No experimental controls or manipulation are involved
7	The investigator may not specify the set of independent and dependent variables in advance
8	The results derived depend heavily on the integrative powers of the investigator
9	Changes in site selection and data collection methods could take place as the investigator develops new hypotheses
10	Case research is useful in the study of 'why' and 'how' questions because these deal with operational links to be traced over time rather than with frequency or incidence
11	The focus is on contemporary events

Source: Benbasat, et. al (1987)

Thus in this study, a single, explanatory case study was adopted as a strategy to obtain the relevant data to address the research questions posed in Chapter 1. How this data was collected is now addressed.

3.4 Data Collection

The empirical fieldwork was conducted between 29th of September 2006 to 8th of November 2006 and 21st of June 2007 to 14th of August 2007.

The case study explores the decision making process at different levels in the health system. The national malaria programme in the national level in MISAU (Ministério da Saúde, such as designated the Ministry of health in Mozambique) was obviously included in this study and one of 11 provinces of Mozambique was selected, Maputo. The Maputo province is located in the Southern part of the country. One of 11 districts of this province was selected, the district of Matola. In

Matola, 2 health facilities were also selected. Thus, the process of gathering data was conducted at four organizational levels in the health system:

- Facility – health center of Matola II and Machava II.
- District – Matola District;
- Province – DPS of Maputo;
- National – Malaria programme, department of epidemiology

The criterion for selection of the Maputo province and the Matola district was based on incidence of malaria. I chose one district in one province because I want to look at the decision-making in the malaria at all levels of health system; so I have explored the decision-making process at National, Provincial and District level based on the incidence of malaria. I selected the areas with higher malaria incidence because they would have more interest in analysing the benefits of free treatment. Based on the 2006 annual reports from the malaria programme when the decision of offering free malaria medicine for the Mozambican population was implemented Matola is the district with the highest malaria incidence (61297 registered cases from 151772 nationally).

The purpose of collecting data at all these levels is to understand the data collection process in terms of the data flows, accuracy and reliability of the data in the IS for the malaria programme in order to understand the malaria situation in Mozambique. This was important as additionally, the decision-making process at each level was investigated, but it was also important to understand how these decisions related to the access and flow of data.

My key respondents were health workers, statisticians in the heath centres and DDS, DPS, workers of malaria programme (Manager, Analyst programmer), such as is detailed in table 3.

Table 3.3 – Key respondents

Interview number	Profession/ Position	Location	Date	Purpose of interview
1	Manager	MISAU – Malaria programme	29/09/06	View in the decision implemented recently in offering the free charge of malaria medicine in order to understand how this decision was made.
2	Analyst programmer	MISAU – Malaria programme	08/11/06	To Understand how the data used to decision-making is accessed
3	Person responsible for compiling the report (BES)	MISAU – Epidemiological department	29/09/06 14/08/07	To Know the source of information

4	Pharmacy agent	Centro de Saúde Matola II	21/06/07	To comprehend the process of lifting / getting free medicines of malaria
5	Laboratory agent	Centro de Saúde Matola II	21/06/07	To understand the routine of the laboratory, to know the different tests / examinations of malaria done in the health facilities
6	SMI Nurse and Health unit responsible	Familiar Planning - Centro de Saúde Matola II	22/06/07	To understand how the statistics of malaria data regarded to the Matola II are done
7	Health unit responsible	Centro de Saúde Machava II	02/07/07	To understand how the statistics of malaria data regarded to all the health facilities of Matola District are done
8	SMI Nurse	Centro de Saúde Machava II	06/07/07	To understand how the statistics of malaria data regarded to the Machava II are done

In this study, the primary source of data is interviews; these were supplemented by documentary evidence such as annual reports and minutes of meetings, such as suggested by Myers (1999:4).

Each of the data collection methods is now described.

Table 3.4 – Data collection methods

Data collection Method	Purpose	Who/ Provider	Why
Interview	To comprehend the decision-making process in the malaria programme and to understand the malaria IS.	Malaria programme; Matola II, Machava II, Matola district, Matola province	To help in describing the malaria situation, cases and deaths.
Document analysis	To find out formal, informal	Malaria programme, Departamento de	To complement the interviews and

		Epidemiologia - MISAU	observation
Observation	✓ To know the interactions with stakeholders ; ✓ To check the time in each activities; ✓ To understand the accessibility of data	Matola II, Machava II, Malaria programme	Get a view of routine activities

3.4.1 Interviews Conducted in the Case Site

Interviews are important means of obtaining case study information. As a data collection technique for research, an interview can be used for three purposes: as an exploratory device to help identify variables and relations, as the main instrument of the research, or as a supplement to other methods (Kerlinger, 1986). This study conducts interviews for the second purpose: as the main instrument of the research in order to comprehend the decision-making process in the malaria programme and to understand the malaria information flow at all health levels.

I conducted mainly face-to-face interviews, but also had email exchange with some key respondents. Formal appointments were made for each of the interviews with the key respondents such as malaria programme workers, health workers and persons dealing with statistics.

I scheduled semi-structured interviews in all the case study sites, such as health facility, district level, provincial level, and malaria programme located in the national level. Each interviewee signed an informed consent form which explicitly detailed aspects of confidentiality, my research purpose, risks and scientific benefits. This is attached in Annex A.

Two face-to-face interviews were conducted in the malaria programme with the IT-manager and manager of malaria programme. I conducted semi-structured interview with the IT-manager in order to know which data are used in decision-making in the MISAU, its accessibility, the malaria information flow. An in-depth interview was held with the director of malaria programme with the intention of gaining an understanding of the decision implemented recently in offering the free malaria medicine. Additionally, I wanted to understand the strategies used to decrease the malaria incidence in Mozambique, the procedures used to enable the improvement of decision-making and how this decision was made. Some questions were asked on the role of data in decision making.

I conducted interviews with health facilities, DDS and DPS in order to understand the Malaria information systems such as the information flow, the resources involved, the software used to store and share information. In both cases I conducted semi-structured interviews with the technicians of Health who collect and analyse data, which are later used at the national level for decision-making.

In general, each interview took about 30 minutes. Before each interview, the researcher provided the guidelines for the interviewee in order to facilitate the interviews' process. In some of the interviews, I was able to use tape recorders and in others I was not able to use because the participants were not comfortable with such devices. Instead, to ensure optimum recall regarding the interview content, during the meeting extensive notes were taken and I wrote up the full interview immediately afterwards (Kelliher, 2005:126). All the interviews were conducted in Portuguese. The

transcribed interview was sent to each interviewee to ensure that all information which I have written was accurate. Also, I was allowed to use a camera to take photographs of some data collection tools and health workers working in their posts with malaria information.

Each working day was followed by compiling analytical memos in the evening in order to compile and reflect on the work done and to establish new lines of research for the following working day.

3.4.2 Organizational Document Analysis

Document analysis is the gathering of information used in a formal description of the text and studying and analyzing from the content and then processing and understanding of the contents in the documents so that conclusions may be drawn. (Springer, 1998 and Bryman, 1989 quoted by Mandava and Knowles, 2004:2). The materials employed in document analysis comprise of a number of different types of information, written material such as letters, reports to shareholders, memorandums and chief executive speeches, company records which provide data on absenteeism, profitability, size, budgets, newspaper articles, company newsletters, closing plans and contracts.

During the empirical work, I reviewed documents related to Malaria in order to find out the malaria situation in Mozambique. These documents included the annual reports relating to Malaria, documents on the management strategy of the National Malaria programme, and organisational documents. In addition to helping in the selection of the province and the district to investigate, the documentation also helped with an understanding of the profile of Malaria in the country.

Table 3.5 lists the major documents I collected, their name and a brief description of them.

Table 3.5 – Documents collected during the empirical work

Name of Document	Description of Document	Source
Annual Report	This is a document of 9 pages referring to report of the year of 2005 that describes the organisational development of the PNCM in terms of his technical capacity, formation, activities; it displays also the suspect cases and deaths for malaria between 2004 and 2005 in Mozambique and, analysis of the obtained results.	Manager of malaria programme
Operational annual plan	Provide an overview of epidemiology and endemics diseases. Regarding malaria, this article describes the priorities for the combat of the disease for the year of 2006 such as: ✓ Pulverizations; ✓ Expansion of the malaria control; ✓ Expansion of the access of	DAG – Direcção de Administração e Gestão do MISAU

	the population to a diagnosis and correct handling of the malaria cases; ✓ Free distribution of ITNs.	
Strategic document for the malaria control in Mozambique	This document includes the malaria situation in Mozambique, taking into account the following aspects: ✓ Analysis and answer of the malaria ✓ Strategies for the reduction of the malaria ✓ Policy of malaria treatment; And, also it describes objectives and background of the Malaria programme.	Manager of malaria programme
Weekly Epidemiological Bulletin (BES)	I received several documents inside a folder: BES of the district (SIS – C03), BES of the post sentry (SIS – D04) and BES of the health facility (SIS – C04).	Departamento de Epidemiologia - MISAU
Montly Epidemiological Bulletim (BEM)	I received several documents inside a folder: BEM of 2007 and BEM of 2001	Departamento de Epidemiologia - MISAU
User Manual of SIMP software	Training document; also I have access of the software in use in the MISAU - SIMP software	Departamento de Epidemiologia - MISAU

3.4.3 Observation in the Case Site

Observations provide researchers with ways to check for non verbal expression of feelings, determine who interacts with whom, grasp how participants communicate with each other, and check for how much time is spent on various activities (Schmuck, 1997 quoted by Kawulich, 2005).

In order to get impressions of routine activities of health workers and to understand the accessibility of malaria data, it was important to observe their routine activities at various levels of the health system - malaria programme, health facility, district, and provincial level. The way the health workers presented, interpreted, analyzed, reported, and disseminated information were observed. This included:

Health facility: I observed the routine activities of all the health services, which collect or register malaria data such as emergency services, laboratory, SMI, and pharmacy. I observed the officials of health in registering patients' data in the books; the statistician counting the registered cases in the books of registers of outpatient consultations, collecting data and filling out the weekly summary forms; the pharmacist in the service of patients and registering the receipts of medicines in the book of internal statistics; the laboratory technicians taking the results of malaria tests (HTZ and PF) and registering the incidences in the form of laboratorial statistics. This process of registering the incidences in the form in the laboratory is done daily after taking care of all the patients and, in each

form are registered data regarded to one month. Observations were conducted in two facilities that the researcher visited for an average duration of 3 hours.

District: I observed Matola district statisticians and statisticians of malaria programme in the District analysing the received data from all the health facilities and processing it.

Province: I observed the person responsible for compiling the report (BES) compiling the received data from Matola District and when he was processing it in order to be sent to the national level.

National level: I observed the person responsible for compiling the report (Epidemiological Weekly Bulletin, also called *Boletim Epidemiológico Semanal* - BES) entering data and calculated the annual indicators and compared these indicators between different facilities using the malaria module; this module is integrated in the SIMP software (*Sistema Integrado de Planificação* – Planning Integrated System) and it helps to evaluate malaria progress and also calculates the mortality rate (general mortality rate in the hospital, medicine, paediatrics and surgery), admission movements (hospital, rises, deaths), cause of admissions and death, intervention of great surgery (interventions, interventions number, deaths, mortality rate).

Photo 3.1 – Malaria medicine and other diseases medicines

(Photographer: Nercénia Mbie, june 2007)

Also, during the phase of gathering data the researcher had the possibility to be in 2 meetings. These meetings took place in the health centre of Matola II and Machava II. The principal objective of participating was to understand the decision-making process in the Malaria programme.

In the Matola II heath centre these meetings happen once a week. The participants are the patients, who have consultation on that day and the health staff. The patients are not given notice of the meetings (the days are chosen by the health centre). The meetings are used to explain how to avoid contracting malaria; what the symptoms are, and; to advise the population to do a malaria test whenever they suspect they have malaria. On the other hand, in Machava II health centre, the meetings are restricted to the health staff and occur once a month to outline strategies to minimize the incidence of the main diseases in the country. Nationally, meetings occur quarterly and are conducted to discuss new strategies to minimize malaria incidence in Mozambique. I was not allowed to participate in this meeting, because the meetings were opened only for the workers of malaria programme.

My presence in these meetings gave me an inside view of the decisions taken in the health facilities and district level.

3.5 Data Analysis

Data analysis is a way of interpreting qualitative data. There are many different modes of analysis in qualitative research such as hermeneutics, semiotics, narrative and metaphor. In this study I used the hermeneutics, which suggests a way of understanding textual data. During the empirical work, field notes were taken. After each day of work, using the principles of hermeneutics, I compared findings across different respondents, documents and observations, within the context of decision-making process related to the case of offering malaria medicine to the population. The analysis occurred continuously when the data was collected and led to further data collection and analysis. The collected data were summarized according to themes based on the research objectives. The description of the malaria programme included: a description of activities being observed; health variables and indicators; and the data when the activity occurred. The analysis of data was improving continuously as the study progressed.

3.6 Ethical Considerations

Ethical considerations were an important factor in conducting the field study of this research. “The researcher has a moral and professional obligation to be ethical, even when the research subjects are unaware of or unconcerned about ethics.” (Neuman, 1997:443). So, ethics define what is or is not legal to do, or what moral research procedures involve.

In the preparation of this work I followed the ethical rules proposed by the universities of Oslo and Eduardo Mondlane. This implied that the thesis proposal needed to be submitted and accepted by the research boards in the Universities of Oslo and Eduardo Mondlane. In order to conduct the fieldwork, permission from the MISAU was obtained.

The ethical issues were maintained during the fieldwork, for example, through the submission of the thesis protocol for the ethics commission in MISAU so as to ensure that there are some ethical constraints in the work to be developed by the researcher which can obstruct its realization.

Privacy of participants was respected. I requested permission to photograph participants, but respected their rights when the participant refused. I give only official titles in this thesis and not names of individuals. When asked not to photograph some material or to switch off the tape recorder during the interview I complied with the requests. For example, while I was recording an interview the participants' cell phone rang and he asked to disconnect the tape recorder in order to talk and I disconnected immediately.

The confidentiality was maintained. I maintained the confidentiality of the organisation by consulting all the organisations documents (registers books) in private and closed office.

I respected the organisational settings, for example, by doing interviews at appropriate times. For instance, one day at the one health facility an interviewee had to finish taking care of the patients, and I waited for the interview to be conducted after the consultation. However, as the consultation took longer than expected we postponed the interview to the following day rather than asking the interviewee to remain after normal working hours.
When the respondents did not like me taking notes or using a tape recorder I respected that request. For example, in one health facility, one interviewee did not like the fact that I was writing up immediately (notes) at the same time she was giving the explanation and she advised me to make my own summary at the end.

3.7 Limitations Related to Research Methods

Access to the health services was not easy. I presented the credential in Portuguese and the protocol in English for the DPS of Matola (annexe A) in order to have the permission to conduct the fieldwork, but it was requested for the protocol to be translated into Portuguese. After that, I had to apply for ethical clearance from the Minister of the Health for ethical clearance. The ethics committee comprise 5 people who are geographically dispersed and meet on a monthly basis. Based on the approval of this committee, the DPS gave me permission to conduct the research, but some of the health facilities did not like that the credential was not directed to them. The process of getting clearance took 4 months and delayed the commencement of the field work.

I did not record some interviews because the participants did not give me permission, so in some cases I only took notes. It was thus difficult to remember all the details while taking notes.

I was allocated a short period of time to conduct the interviews in the national malaria programme. This minimised the amount of information I could obtain from that level.

3.8 Chapter Summary

This chapter presented the single case study site located in malaria programme and the time frame of the research. The chapter also described and explained the methodology and strategy used in this research. The philosophical positions were briefly reviewed, on which the choice of the interpretive case study were based. In order to achieve the research goals, various instruments are used for collecting primary data, namely, interviews, analysis of organizational documents, and observations in case site. The qualitative research was employed to study the decision-making process in the malaria programme. This case study is described in the next chapter.

CHAPTER FOUR

EMPIRICAL SETTINGS

4.1 Introduction

This chapter starts with the reflection of the situation analysis of Mozambique followed by the analysis of Matola District and Malaria programme; Finally, I present the malaria IS and the connection between malaria IS and overall HIS.

4.2 Profile of Mozambique

The profile of Mozambique is presented around 5 aspects: (1) Geographical profile; (2) Population, culture and the demographic context of the poverty; (3) Political profile; (4) Economical profile; and (5) Health profile. The aim of this chapter is to contextualize the reader in relation of the life of the population of Mozambique in general.

4.2.1 Geographical Profile

In this section, I briefly explain the geographical situation of Mozambique, including the climatic situation in order to illustrate in which period of the year the malaria is predominant in the country and in what regions.

Mozambique, officially the Republic of Mozambique, is located on the eastern coast of southern Africa. It is bordered by Zambia and Malawi to the northwest, Tanzania to the north, Zimbabwe to the west, Swaziland and South Africa to the southwest and, Indian Ocean to the east. Mozambique has approximately a land size of 799,380 km^2 and water size of 17,600 km^2. Administratively, Mozambique is divided into eleven provinces: Cabo Delgado, Niassa, Nampula, Tete, Zambezia, Manica, Sofala, Inhambane, Gaza, Maputo Province and Maputo City, as the Map 4.1 shows. The capital of Mozambique is Maputo (Lourenço Marques during the Portuguese colonization).

Map 4.1 – A Mozambique Map showing the geographical distribution, administrative division and the case site

Source: Wikipédia

In terms of the geographical relief of Mozambique, around 44 % of the territory is constituted by plains, whereas the tablelands account for around 43 % of the surface of the country; the remainder 13 % constitutes the mountainous zones with an altitude above 1.000 meters (Métier, 2004).

In terms of fertility, the land in the northern region are of average fertility, whereas in the south sandy grounds, with corresponding low fertility, are predominant, with some areas of high alluvial fertile plains.

The climate in Mozambique is differentiated, being tropical in the north, with influence of the summer monsoon and with two different seasons: the winter, dry and cold station and the summer, hot and wet station with rains that are extended from October up to March. Mozambique enjoys a

favourable climate, fertile land and appropriate rains, except the south region that suffers of cyclical droughts.

The climate of the country favours the transmission of malaria during the whole period of the year, reaching its highest point after the rainy (December up to April). The intensity of the transmission varies from year to year and from region to region, depending on the precipitation, altitude and temperature. Some dry areas of the country are inclined to the epidemic.

4.2.2 Population, Culture and the Demographic Context of the Poverty

In this section, I focus the situation analysis of the country in terms of population, culture and the demography. These aspects have impacts on health and show that, even with the difficulty of understanding of the Portuguese language, the malaria programme manages to create ways to reduce the impact of this disease disseminating the information in the community.

Mozambique is a country of African cultural roots; it was influenced by the Arab, Portuguese and Indian culture, which makes it able to harmonize several ethnics, religions and more than 70 dialects.

In accordance with the projection of the population made by census of 1997 indicates that the total of the population in 2007 should be 20.366.795 inhabitants, of which 9.842.760 are men and 10.524.035 are women. The population density is quite variable in accordance with the geographical areas, being more elevated in the city of Maputo and in the provinces of Zambézia and Nampula, where 44 % of the total population of the country live.

The Official language of the country is Portuguese, though it is the mother tongue of only 6.5 % of the population, according to the census of 1997. The most common mother tongue in Mozambique are: emakluwa (26.3 % of the population), in second place, Xichangana (11.4 % of the population) and in third the Elomwe (7.9 % of the population).

The government, with the support of partners, such as the Malaria Consortium (MC), has been using a variety of ways to transmit messages in Portuguese, the official language, as well as in the local languages, on the free distribution of insecticide-treated nets to pregnant women in the centres of prenatal health. Due to the elevated levels of illiteracy, communication is essentially made verbally, through the radio or through visual explanations, such as posters used by the nurses (figure below), who were specially trained in the control of malaria. Although, data of the MISAU show that the traditional medicine is, for many people, the only resource available in case of disease, since most of the population of the country reside in rural areas. More than half of the Mozambicans live 20 kilometers away from the nearest health facility (PNCM, 2006). The population has limited capacity in recognizing important symptoms and signs of malaria, as well as the existence of cultural damaging practices to the search of health cares (the mothers resort to the witch doctors when the child has feverish convulsions alleging spiritual disease).

Photo 4.1– Posters to help in the communication process between health centres and population

Source: Malaria Consortium

4.2.3 Political Profile

This section explains the progresses of the malaria programme in spite of the political instability.

Mozambique faced a long period of internal armed conflict and the majority part of Mozambicans was lived in the shelters and, these conflicts finished after internal reconciliations.

The process of **internal reconciliation, the political stability and good economic growth have enabled Mozambique to establish a larger international profile, especially in the region.** Alongside this historical and political process, the health situation in the country also progressed. In 1977 Mozambique had a compulsory weekly notification of major diseases for all the health facilities of the Country in operation. A re-formulated system was established in 1985 in order to update the diseases to be notified and in recognition of the diagnostic capacity of the health facilities in the country (DNS, 2004). This system was computerised in 1977 from the provincial level up to National level. In 2004 it was revised again according to the prevalence of the notifiable diseases and the demands at international, regional and National level. With this computerized system, it is possible for the malaria programme, after introducing data of the districts, to prepare graphs and maps of incidence of diseases and other analyses which the user could need.

4.2.4 Economical Profile

This section describes the economical situation of the country and also explains that great part of the population of the country has not economical conditions to pay for the treatments of some diseases; for example the cost of the malaria treatment that was adopted in the country was very elevated.

After a prolonged period of war, Mozambique emerged in the beginning of the decade 90, as one of the poorest countries of the world.

In spite of a base of development enough decrease, the economical transformation of the last years was visible, and the country reached, in the second half of the 1990s, one of the rate of relative faster growth of the world. In this period, the GDP[3] grew, on average, 8.5 % year, the inflation fell for middle levels of a digit, and the private investment had a notable growth.

Mozambique has varied natural resources, a rich basement, and energetic considerable capacities to an extensive maritime border. In spite of the great economical potentialities, the country faces the problem of poverty, both in the country and in the city.

The release of the economy and the end of the war improved the situation of the food production but the constraints that obstruct the growth were still not resolved and, extension of this activity and of the rural commerce.

The wealth is translated into the existence of gold, diamond, iron, uranium and natural gas. However, only the coal is intensely explored. The activities of the secondary sector come down to some industries of tobacco, foods, textiles, cement and fertilizers. Mozambique holds a great refinery of oil in the town of the Matola, located in the capital of the country.

Independently of the risks for the health, the malaria imposes a heavy financial cost on the individuals and to the country. It reaches the poorest and maintains them vulnerable. The children who suffer from malaria lose days of classrooms; the adults lose days of work; losing to the economy immeasurable expenses in cash to countries more poor of the world.

4.2.5 Health Profile

Mozambique, after a long period of war, where the economy of the country was seriously affected and the rural population abandoned the subsistence system, to unfavourable conditions (refugees centres, refugees in bordered countries and peripheral zones of the cities), transformed in favourable environment to the explosion of infectious and contagious diseases such as malaria, diarrhoeal diseases, Tuberculosis, Hepatitis, Tetanus and so on.

The principal diseases that devastate our country are namely, HIV/AIDS, malaria, tuberculosis, leprosy, passion, and meningitis.

AIDS affects many people in Africa Sub-Saharan, it is responsible for around 3.2 million of deaths only in 2003 (WHO, 2005). AIDS contributes to the reduction of life expectation which current average is 47 years; the disease reaches the more productive age group of the population; and it affects the economical growth and the social stability.

On the other hand Malaria causes many deaths in Africa. For instance, in Mozambique malaria is endemic. According to the WHO, malaria kills an African child each 30 seconds, and many children who survive severe cases suffer cerebral serious damages and have difficulties of apprenticeship.

[3] Gross Domestic Product

The table below (Table 4.1) presents the background on the cases and deaths of malaria in the last 6 years before the decision of offering free malaria medicine in Mozambique.

Table 4.1 – Malaria cases and deaths in the last 6 years

Source: BES Nacional

Year	Cases	Deaths
2001	3947335	3400
2002	4592799	4214
2003	4952769	3562
2004	5610884	4150
2005	5896441	4209
2006	6335757	5042

There are 3 sorts of plasmodium in Mozambique in use such as: plasmodium falciparum, plasmodium malariae and plasmodium ovale. In agreement with DNS (1992:22) the plasmodium falciparum is the most prevalent parasite, being responsible for around 90 % of all infections of the malaria, whereas the plasmodium malariae and the plasmodium ovale are responsible for 9 % and 0.5 % of all malarial infections, respectively.

Figure 4.1 – Mosquito

4.3 Matola District

This section provides a brief background of the Matola district. The study was conducted in Matola district, or simply Matola. It is a capital of Maputo province. This province is constituted by 8 districts namely, Magude, Moamba, Manhiça, Marracuene, Matola, Boane, Namaacha and Matutuine (Map 4.2). Matola is bordered with the districts of Marracuene, Moamba and Boane.

Map 4.2– A Map of Maputo province showing the districts

Source: http://www.stop.co.mz

Matola has approximately a land size of 312.38 km^2 and about 490.611 inhabitants. Administratively, it is divided into 42 municipal districts. Matola is a compulsory point of passage, from the capital of Mozambique to South Africa borders (about 90 Km, for auto road) and to Swaziland (about 70 km).

The monthly average precipitation and the temperature places Mozambique and also Maputo province in the tropical to subtropical climatic zone.

The health is a competence of the province; the Health Directorate of the District (also designed as DDS of Matola) is subordinated to the Provincial Directorate of the Health that is responsible and protects this area. According to the information collected by the researcher in the DDS of Matola, the inhabitants of this district are served by 15 health facilities - 12 health centres with 6 offering maternal health service and 3 health posts. Besides these health facilities, there is a general hospital (General Hospital of Machava) that is specialized in tuberculosis medicine and 4 private clinics (clinic of Liberdade, Fomento, Matola and Mapinhane). The Government's health facilities of the

DDS and the respective distance people have to travel to them are shown in Table 4.2. The distance to the nearest health facility would be relatively long (around 8 km) and public transport is poor.

Table 4.2 – Health units of the DDS and the distance between DDS and each health facility

Source: Matola II health centre

Comparison point	Health facility	Distance
DDS	Centro de Saúde de Boquisso	**30 Km**
	Centro de Saúde de Khongolote	**17 Km**
	Centro de Saúde de Ndlavela	**8 Km**
	Centro de Saúde de Matola II	**8 Km**
	Centro de Saúde de Matola I	**10 Km**
	Centro de Saúde de Liberdade	**6 Km**
	Centro de Saúde de Tsalala	**7 Km**
	Centro de Saúde de Bedene	**2.5 Km**
	Centro de Saúde de Matola-Gare	**10 Km**
	Centro de Saúde de Machava I	**5 Km**
	Centro de Saúde de Fasol	**6 Km**
	Centro de Saúde de Machava II	**0 Km**
	Posto de Saúde T-3	**7 Km**
	Posto de Saúde Unidade A	**4 Km**
	Posto de Saúde Cadeia Central	5 Km

The coverage of health facilities is deficient in terms of space, attending that one health facility serves about 35.044 patients. The distances made by the patients and users up to the nearest health facility would be relatively long (around 8 km) and, for any health facilities there is no coverage of public semi-collective transports (Município da Matola, n.d.:41).

Regarding human resources, the nurses are the base of the whole health system. In each health centre there is at least one nurse who is chief and is responsible for the health facility. In Matola II, there are 27 health staff and one nurse is a head of the team (these Table 4.3).

Table 4.3 – Health staff in Matola II health centre

Health Staff	Number of staff
Laboratory Technician	1
Psychiatry Technician	1
Medical Doctor	2
Technician of preventive medicine	1
Nurse (general / basic / elementary)	6
Technician of general medicine	1
Agent of preventive medicine	1
Agent of general medicine	2
Agent of pharmacy	2
SMI nurse	6
Elementary midwife	3
Agent of stomatology	1
Total	27

Almost the same scenario was repeated in all the health facilities that the researcher visited. However, in one of the health facilities (Machava II) there were 3 statisticians who are responsible for the analysis, aggregation and compilation of the data. This is largely due to the fact that they receive data from other health facilities subordinate to the DDS of Matola and are required to send the reports to the DPS who works in Machava II.

Normally all the health centres and posts have a small pharmacy where the patients can collect the malaria medicine free of charge. According to the interview carried out with the pharmacy agent, in Matola II, the malaria medicine can only be received from the pharmacy attached to the health centre visited by the patient and where the diagnosis took place.

Table 4.4 - Cases of malaria in the districts of Maputo province according to epidemiological classification – 2001 up to 2004

Source: Departamento de Epidemiologia - MISAU

	2001		2002		2003		2004	
Districts	C	D	C	D	C	D	C	D
Boane	55586	16	41968	8	47396	3	42704	-
Matola	176662	-	158340	-	138079	-	121008	-
Magude	37788	2	36506	12	38628	18	35357	5
Manhiça	85399	-	90475	2	94631	12	86281	83
Marracuene	23198	-	25049	-	22052	-	19198	7
Matutuine	14004	5	14194	4	12661	4	5774	3
Moamba	47876	2	47124	6	30207	13	42429	14
Namaacha	17919	6	22218	5	21729	1	10662	8
Total of the year	458432	31	435874	37	405383	51	363413	120

C = cases D = deaths

In the table above it is clearly seen that Matola presents more cases of Malaria from 2001 up to 2004.

4.4 Malaria Programme

This section presents the background to the malaria programme, outlining the strategies created by this programme in order to reduce the malaria incidence and the data collections tools which they use.

In the provision of healthcare many decisions are made. In Mozambique, decisions are made affecting the population by healthcare managers and about how to prevent the population against malaria by clinicians. For instance, to know which medicine can be applied for them and so on; which local/ regions has priority to receive Insecticide-treated Nets (ITNs) and Indoor Residual Spraying (IRS). Decision-making in the provision of healthcare has a direct influence on the cost of delivering a health service. In Mozambique, the changes in the malaria medicine can increase the cost of the treatment because it is very expensive and is not accessible for all. Therefore, the malaria programme is an organization created to take decisions related to the provision of healthcare.

4.4.1 Background on Malaria Programme

The malaria programme was created in 1982 with the main purpose to reduce the mortality rate for malaria in the population in generally, and particularly in the pregnant women, children under 5 and in the poorest people. The malaria programme is implemented by coordinating and supporting the instalment of efficient interventions of the malaria control. In accordance with the objectives drawn by malaria programme, the following are the main strategies:

- ***Diagnosis, Handling of Cases and Supply of Medicines:*** to improve the quality of the health services based on treatment, with emphasis on the integrated attention of the diseases of childhood and prenatal cares of the women; to guarantee the supply of efficient medicines to the health facilities; to improve the malaria diagnosis in the health facilities; and, rural areas where the access of healthcare is very difficult, promote the prevention and malaria treatment working together with the authorities, through the recognition of the symptoms and stimulating the attitude of immediate search for treatment in the community (for the case of simple malaria) and in the hospital (for case of severe and complicated malaria);

- ***Vectorial control:*** the aim of malaria programme and its partners is the prevention of malaria by running houses in order to apply the IRS in some areas and to reach large coverage with the ITNs in other areas. The resources are not enough in order to offer free ITNs to everyone; the priority is given to those populations that are biologically more vulnerable: the pregnant women and the children under 5.

- ***Answer of emergence:*** it refers to the capacity to answer timely to the outbreaks of malaria and emergencies. In order to minimize the mortality associated to malaria, and good preparation in terms of contingency plans, emergence stocks and prior allocation of stuff for malaria control (equipment, insecticides and medicines).

- ***Management of the Program and Systems Development:*** reinforce the new partners and the existing partnerships even at community level in order to implement actions for malaria control in Mozambique.

A- Insecticide-treated Nets (ITNs)

B- Indoor Residual Spraying (IRS)

Photo 4.2 – Actions taken with malaria programme to combat malaria

4.4.2 Strategies of Malaria Programme

The correct diagnosis and handling of the malaria cases appoints of one the priorities of malaria programme, because it manages to reduce significantly the mortality for malaria. In areas of stable transmission of the malaria, the pregnant women, the children under 5 and travellers which are not immune, are typically those who are in high risk of serious disease and death for malaria. Therefore, an efficient handling of cases of simple malaria can reduce significantly the incidence of severe malaria.

Mozambique has certain sensitivity to outbreaks of malaria as consequence of the favourable conditions which are resultant from cyclonic activity and floods, such as happened in 2000 and 2001. The malaria programme must have capacity to predict epidemic outbreaks through the use of the routine data and meteorological data. The appropriate preparation of contingency plans for districts and provinces, supported by the prior support of emergence equipment are essential for management of emergences. For instance, in February of 2000, torrential rains in the southern region of Africa caused enormous floods in the south of Mozambique, with 950.000 persons in need of humane assistance; up to April of 2000, approximately 250.000 persons, were living in accommodations' field in the affected zones of the Provinces of Maputo, Gaza, Inhambane and Sofala and, a similar situation took place at the ends of January of 2001, when the torrential rains caused enormous floods in the provinces of the Zambézia, Tete, Manica and Sofala (PNCM, 2006). The answers to these emergences included the IRS in the accommodation centres, temporary change of the antimalarial policies, distribution of ITNs and active vigilance in the sentinel posts.

The malaria programme is subordinated to the Epidemiological and Endemics Department and it is a component of the sector of the transmittable diseases, which aims at the integrated implementation of a set of strategies of control of these diseases. The malaria programme collaborates actively with other areas of the MISAU, particularly with the Reproductive Health and with the strategy of Integrated Handling of Diseases of Childhood (AIDI). The malaria programme is also connected with the Education Sector for the Public Health (RESP) and with the Laboratorial Section of Medical Assistance, with the National Institute of Health, besides the co-ordination that it maintains with the Pharmaceutical Department and with practically all the departments of the MISAU. In

2005, the National Commission of Struggle against the Malaria (CNLM) was created that is supported in technical groups of the malaria programme for each specific strategy in order to answer specific questions. Besides this, there is a forum of partners who include the WHO, UNICEF, USAID, Malaria Consortium, PSI, CISM (Manhiça Health Research Centre), IDEL and INS. The main sources of sponsorship of malaria programme are the OE, PROSAÚDE, USAID, DFI, AECI, Italian Cooperation and the WHO.

The malaria programme is responsible for the planning, measuring the impact, effectuating specific evaluations, taking decisions for the reduction of the malaria in Mozambique at national level. Quarterly, this programme meets with NGO to discuss problems caused by malaria and to find out the possible solutions.

4.4.3 HIS Structure

This section describes the levels of HIS and explains which decisions are taken in each level.

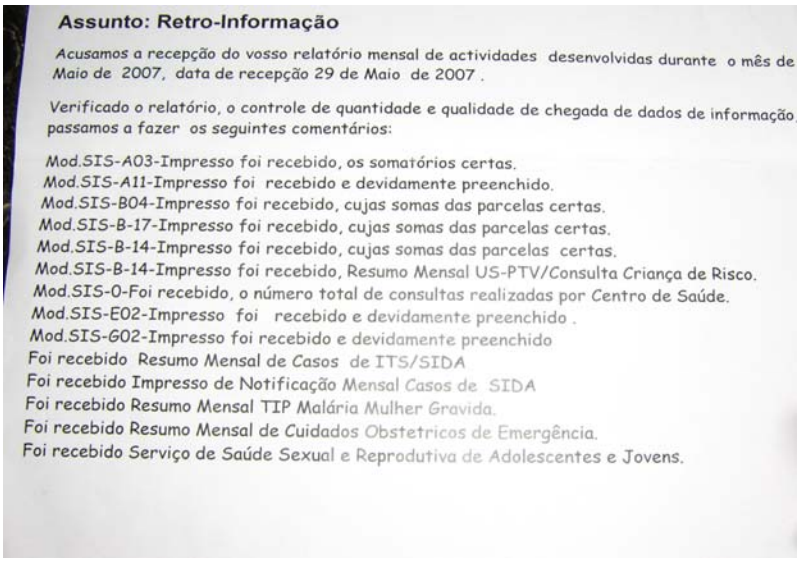
The HIS in Mozambique is organized into four levels: ***primary level*** (health facility), ***secondary level*** (district), ***Tertiary level*** (provincial) and ***quaternary*** (national level), and is designed to report activities of the various health programs such as immunization, family planning, drug distribution and other planning and management activities at all levels.

a) **Primary level:** is the level I of health system, includes the health centres and health posts and provides care to patients and communities in the peripheral areas. The base of the functionality of this level is nurse. It is dedicated to establish contacts between the patients and services. At the level of patients and communities, information is needed for effective clinical management and for assessing the extent to which services are meeting the needs and demands of communities. In this level, decisions on the care of individuals are made; the managers of this level are required to report vast quantities of data to higher levels but rarely, receive any feedback. The nucleus for the planning and statistic of the DDS is responsible for the sending of the retro-information for the health centres (Figure 4.3).

b) **Secondary level:** is the level II and corresponds to the rural and general hospitals; it includes the provision of healthcare to the communities in the districts. This level contain data about the activities given with the available resources and satisfaction of accounts rendered. At the level of district, health information enables health planners and managers to take decisions regarding the effective functioning of health facilities and of the health system as a whole. The malaria data is collected in the health facilities and is aggregated in order to be sent to the tertiary level.

c) **Tertiary level:** is the level III and provides health care to the provincial hospitals. In this level the previous functions are important but it is necessary to effect the evaluation of the results and the definition of the local priorities. All the provinces send the statistical information and present it in Epidemiological Weekly Bulletin (BES) to malaria programme in order to help the national level to see the malaria evolution. The following indicators are included: mortality rate, admission movements, cause of admissions and death, intervention of great surgery.

d) **Quaternary level:** is the level IV and corresponds to central and specialized hospitals, which provide specialized services. At this level, health information is needed for strategic policy-making, resource allocation and definition of national priorities. The malaria programme is located in the national level and its responsibility is to plan, to monitor the activities, to measure the impact, to effect specific evaluations; in this level broader policy-making takes place and promotion of the health for the community is planned.



Assunto: Retro-Informação

Acusamos a recepção do vosso relatório mensal de actividades desenvolvidas durante o mês de Maio de 2007, data de recepção 29 de Maio de 2007 .

Verificado o relatório, o controle de quantidade e qualidade de chegada de dados de informação passamos a fazer os seguintes comentários:

Mod.SIS-A03-Impresso foi recebido, os somatórios certas.
Mod.SIS-A11-Impresso foi recebido e devidamente preenchido.
Mod.SIS-B04-Impresso foi recebido, cujas somas das parcelas certas.
Mod.SIS-B-17-Impresso foi recebido, cujas somas das parcelas certas.
Mod.SIS-B-14-Impresso foi recebido, cujas somas das parcelas certas.
Mod.SIS-B-14-Impresso foi recebido, Resumo Mensal US-PTV/Consulta Criança de Risco.
Mod.SIS-O-Foi recebido, o número total de consultas realizadas por Centro de Saúde.
Mod.SIS-E02-Impresso foi recebido e devidamente preenchido .
Mod.SIS-G02-Impresso foi recebido e devidamente preenchido
Foi recebido Resumo Mensal de Casos de ITS/SIDA
Foi recebido Impresso de Notificação Mensal Casos de SIDA
Foi recebido Resumo Mensal TIP Malária Mulher Gravida.
Foi recebido Resumo Mensal de Cuidados Obstetricos de Emergência.
Foi recebido Serviço de Saúde Sexual e Reprodutiva de Adolescentes e Jovens.

Figure 4.2 – Example of retro-information

Each level has specific functions, implicating a series of specific decisions to be made, ultimately leading to improvement of the health of the population (Lippeveld and Sauerborn, 2000:18). The health management information system in Mozambique consists of a range of health facilities, institutional centres, and their staff such as health facilities, health district offices, province health offices, the national health office, and a health information infrastructure. These health facilities and institutional centres are inter-connected in order to provide services such as health care and the reporting of health data. The figure 4.4 describes the organizational model of Mozambique health system, which allows us to identify at each level what the specific management functions are, who the information users are, and what decisions they have to make. This model enables us at each level, to define information needs and to develop or restructure data collection methods and instruments, data transmission and processing procedures, as well as appropriate feedback reports.

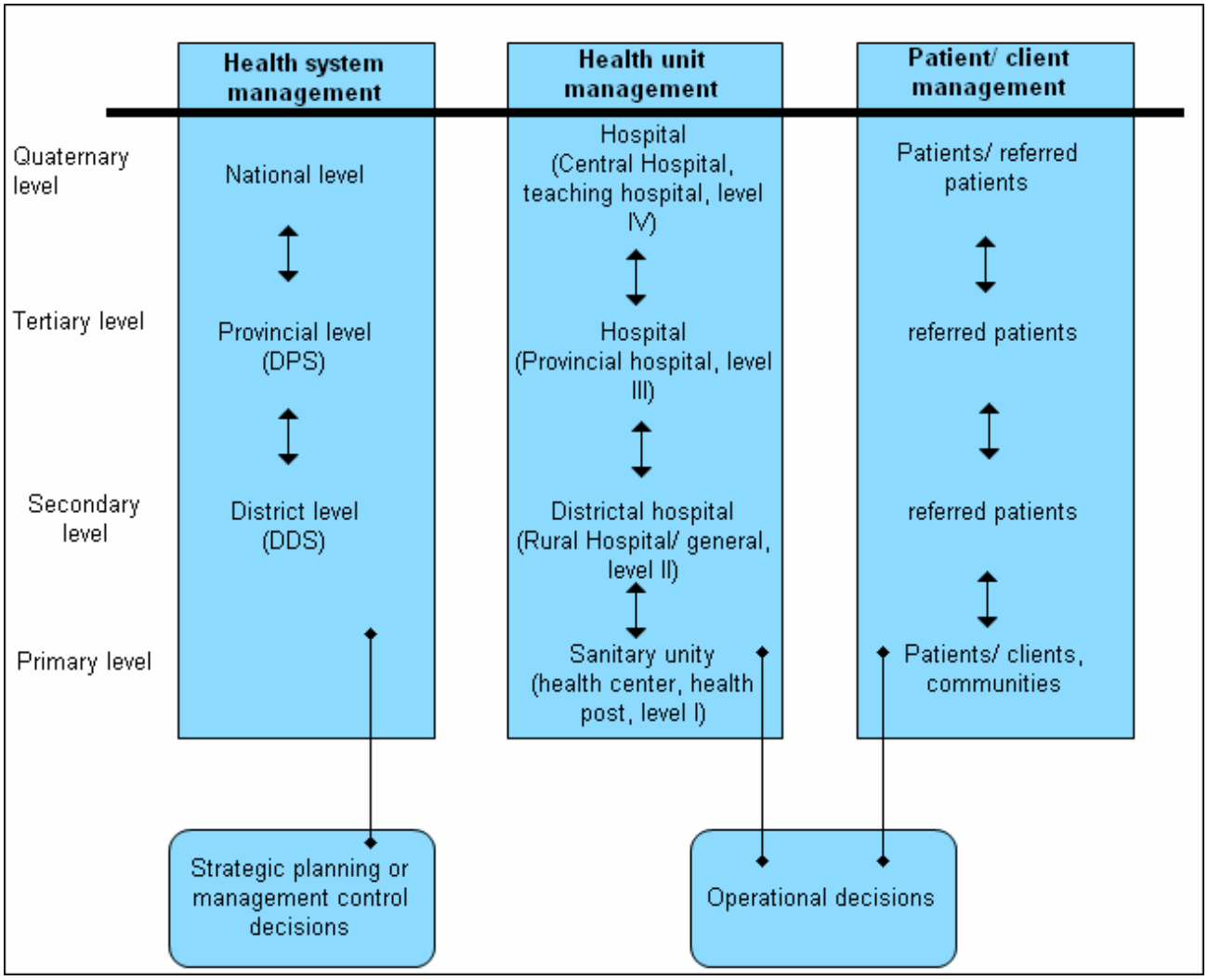


Figure 4.3 – Organisational model

Source: Adapted from Lippeveld and Sauerborn, 2000:18

4.4.4 Malaria Information Flow

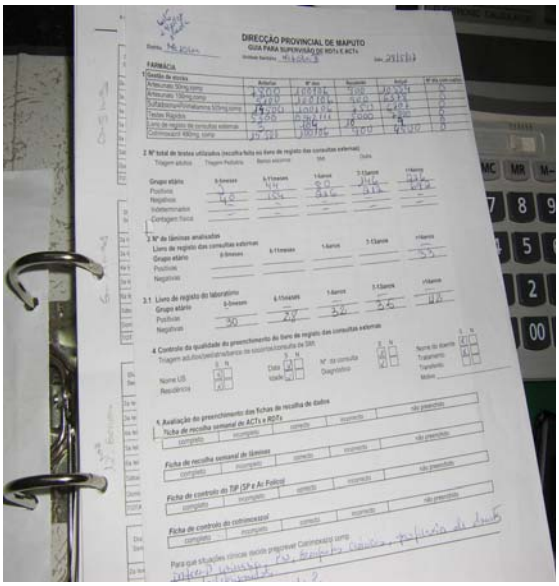
The HIS works in accordance with the health system levels: first for the health facilities which are primary producers of data that are registered, gathered, processed, analyzed and, finally, sent to the national level or at the district level. MISAU holds a system of epidemiologic vigilance which covers all the HIS of Mozambique (from health facilities to national level).

Health facilities

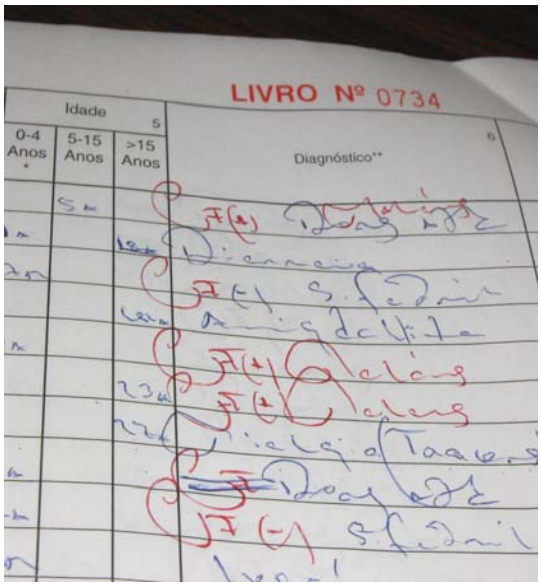
The process of data gathering in the health facilities is divided in 2 phases:
During the Week "X", each health worker of the services related to the malaria like emergency service, SMI, Elate, service of adults, pediatrics and others (PNCTL, medical consultation) are responsible for: (a) counting of number of malaria cases (this refers to the cases of diseases of compulsory notification and outpatient consultations) in the book of outpatient consultations; (b)

register of malaria cases in the form of weekly gathering (supervision guide of Rapid Test Diagnosis - RDT).

In the following week (Week X+ 1), on Monday, the person responsible for compiling the report (BES) in the health facility, joins all the forms of counting of the malaria, he/ she prepares the BES and the copy of it is archived in the health unit and, on Tuesday, he/she sends the BES to the district. It is of the responsibility of the responsible of the BES in the health facility to check regularly that the sent BES was received.



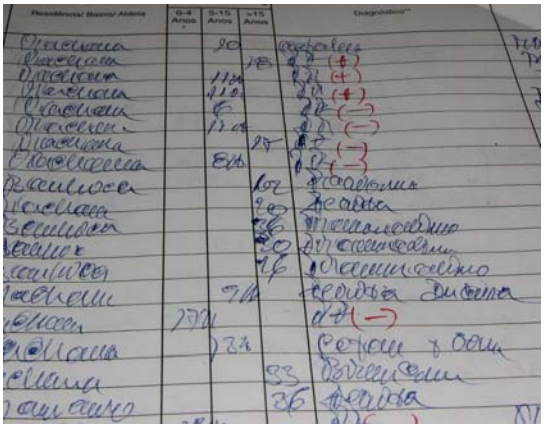
Supervision guide of RDT



Book of outpatient consultations. The diagnosis written in red pen referee to malaria diagnosis (positive or negative)

Book of medicines' request

Book used to register the receipt



Outpatient consultation's book

Photo 4.3 – Registers' tools

(Photographer: Nercénia Mbie, June 2007)

District level

In the week "X +1", the responsible for the district prepares the BES, controls daily the reception of the BES of the different health facilities using the map of control of reception (Annex A).

In the week "X + 2", on Monday, the person who is responsible for the BES in the district prepares the BES of the district. In this process must be indicated the number of the health facilities in the district, number of the health facilities included in the BES, number of health facilities that sent the BES at time and one copy is filed to the district. On Tuesday, the person responsible for compiling the report (BES) sends the BES for the DPS and checks regularly that the sent BES was received. It is of his/ her responsibility to do linear graphics of the most frequent diseases and he/ she uses the visits of the persons responsible for the health facilities to ask for the BES in lack.

Provincial level

In the week "X + 2", the responsible of the BES in the Province controls, daily, the reception of the BES of the districts using the map of control of reception and introduces the BES in the computer.

In the week "X + 3", the responsible of the BES has the following responsibilities: to prepare the provincial BES. The copy of this document is archived in the province; to send the BES to the epidemiologic department – MISAU; to check regularly that the sent BES was received; to send the retro-information to the districts of the province, at least with provincial BEM (Monthly Epidemiological Bulletin); to draw linear graphics of most frequency diseases; and to do the Backup, monthly, of the Database and send it to the epidemiologic department.

National level

In the week "X+3", the person responsible for compiling the report (BES) in the national level, controls daily the reception of the provincials BES using the map of control of reception and introduces the data in the computer, such as is presented in the Annex A.

In the week "X+4", the person responsible for compiling the report (BES) in the national level has the following activities: to prepare the national BES; to send the retro-information to the other institutions exchange information with MISAU, using BES, BEM e BE-PS; to prepare the epidemiologic newsletter; and to create graphics of compulsory diseases and interpret the data.

Routine HIS reports

The malaria programme has the routine data, monthly summary of admissions and provinces annual reports available, such as is described below:

Routine data: is referred to Epidemiological Weekly Bulletin (BES); this bulletin presents the districts for each province, number of cases, deaths and suspects for each disease (Measles, Tetanus, Convulse Cough, Paralysis, Malaria, Rage, Diarrhea, Passion, Plague, Dysentery and Meningitis). The malaria programme is responsible for the information referring to malaria in the whole country.

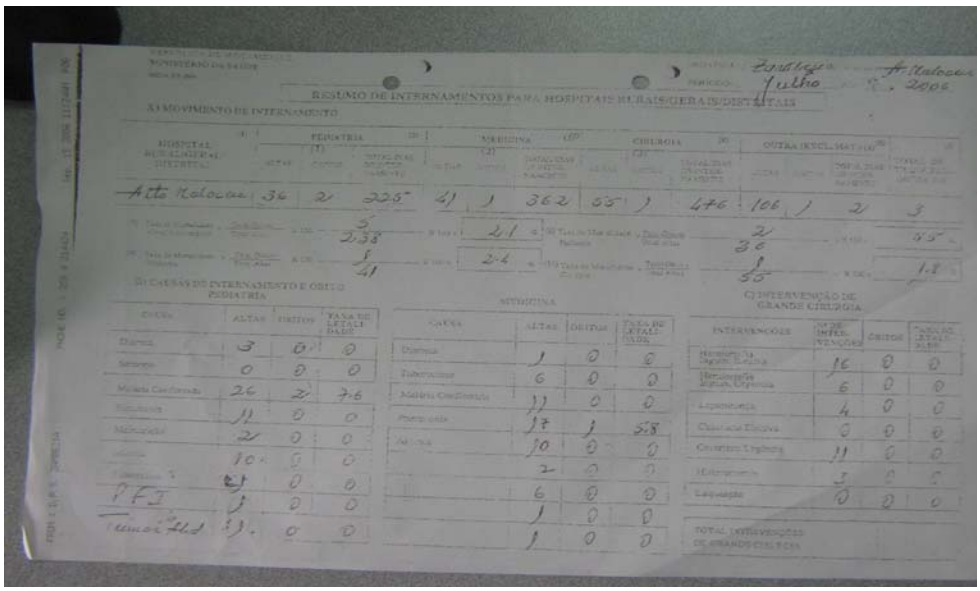
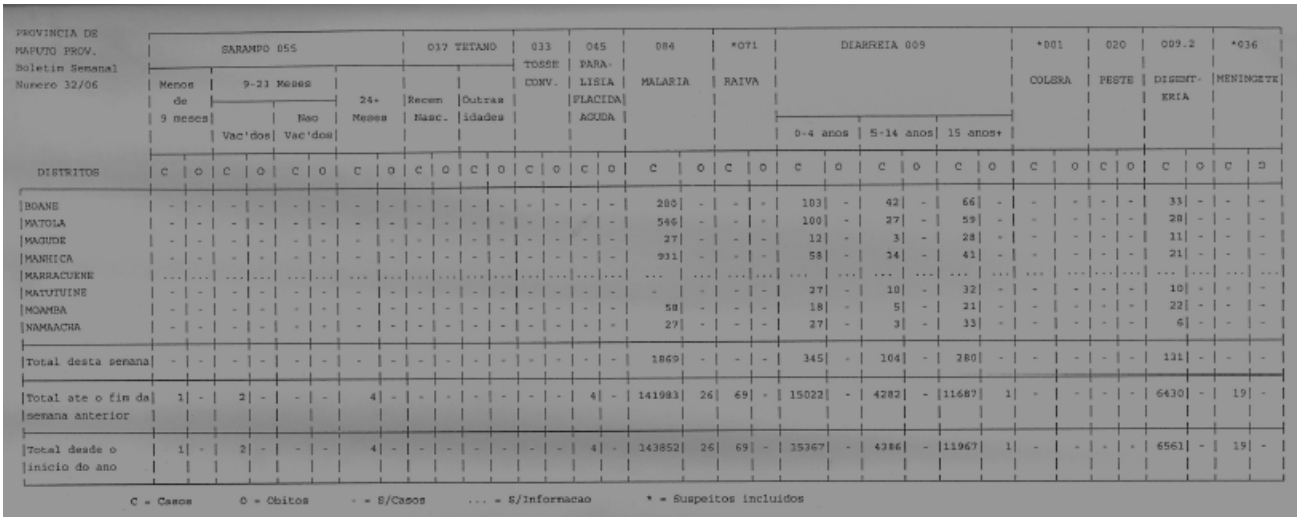


Figure 4.4 – Monthly summary of admissions of Zambézia province

Weekly summary of admissions: this is used in rural/general hospitals with the following variables: admission movement (rises and deaths for pediatrics, medicine, surgery), calculation of indicators like mortality rate in several areas (general hospital, medicine, pediatrics and surgery), cause of admissions and deaths (causes, rises and deaths, lethality rate), intervention of great surgery (interventions, number of interventions, deaths, lethality rate).



PROVINCIA DE MAPUTO PROV.
Boletim Semanal
Numero 32/06

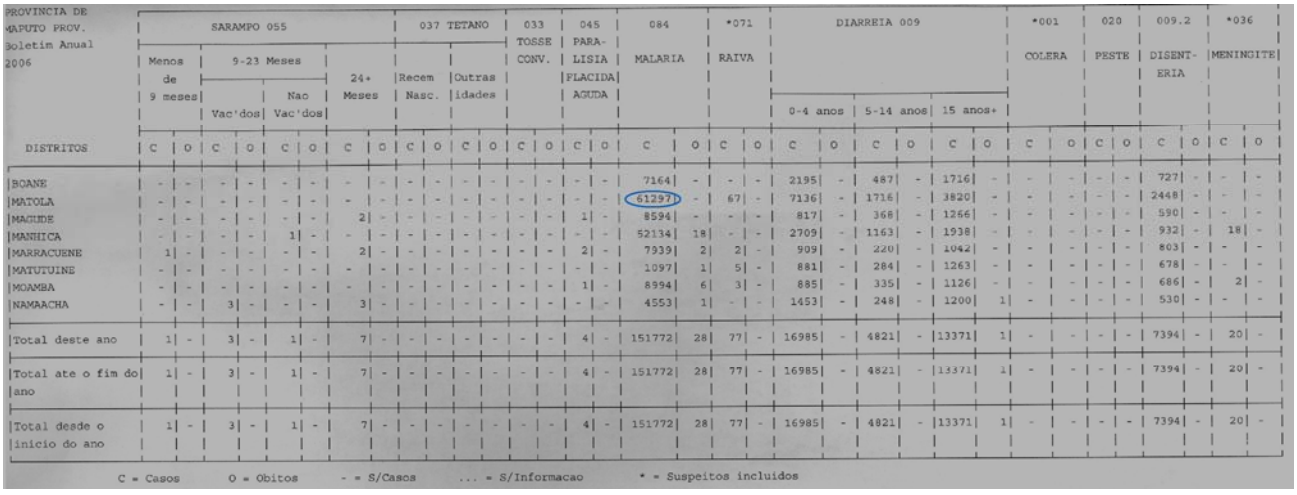
DISTRITOS	SARAMPO 055 Menos de 9 meses C	O	9-23 Meses Vac'dos C	O	9-23 Meses Nao Vac'dos C	O	24+ Meses C	O	037 TETANO Recem Nasc. C	O	037 TETANO Outras idades C	O	033 TOSSE CONV. C	O	045 PARA-LISIA FLACIDA AGUDA C	O	084 MALARIA C	O	*071 RAIVA C	O	DIARREIA 009 0-4 anos C	O	DIARREIA 009 5-14 anos C	O	DIARREIA 009 15 anos+ C	O	*001 COLERA C	O	020 PESTE C	O	009.2 DISENTERIA C	O	*036 MENINGITE C	O
BOANE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	280	-	-	-	103	-	42	-	66	-	-	-	-	-	33	-	-	-
MATOLA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	546	-	-	-	100	-	27	-	59	-	-	-	-	-	28	-	-	-
MAGUDE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27	-	-	-	12	-	3	-	28	-	-	-	-	-	11	-	-	-
MANHICA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	931	-	-	-	58	-	14	-	41	-	-	-	-	-	21	-	-	-
MARRACUENE	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
MATUTUINE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27	-	10	-	32	-	-	-	-	-	10	-	-	-
MOAMBA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	58	-	-	-	18	-	5	-	21	-	-	-	-	-	22	-	-	-
NAMAACHA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27	-	-	-	27	-	3	-	33	-	-	-	-	-	6	-	-	-
Total desta semana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1869	-	-	-	345	-	104	-	280	-	-	-	-	-	131	-	-	-
Total ate o fim da semana anterior	1	-	2	-	-	-	4	-	-	-	-	-	-	-	4	-	141983	26	69	-	15022	-	4282	-	11687	1	-	-	-	-	6430	-	19	-
Total desde o inicio do ano	1	-	2	-	-	-	4	-	-	-	-	-	-	-	4	-	143852	26	69	-	15367	-	4386	-	11967	1	-	-	-	-	6561	-	19	-

C = Casos O = Obitos - = S/Casos ... = S/Informacao * = Suspeitos incluidos

Figure 4.5 – Epidemiological Weekly Bulletin of Maputo province

Annual Report: this presents the malaria situation in each province of the country aggregated by districts. For example, Maputo province (Boane, Matola, Magude, Manhiça, Marracuene, Matutuine, Moamba and Namaacha); for each district, it is written down the number of cases, deaths and suspects for each disease. The malaria programme only analyzes malaria data.

The figure below indicates the malaria situation in Maputo for 2006 when the decision of offering free charge of malaria medicine for the Mozambican population was implemented and is clearly seen that from the first week of 2006 up to the week 35. Matola is the district with most malaria incidence with 61297 registered cases although this district has not registered any death caused by malaria.



PROVINCIA DE MAPUTO PROV.
Boletim Anual
2006

DISTRITOS	SARAMPO 055 Menos de 9 meses C	O	9-23 Meses Vac'dos C	O	9-23 Meses Nao Vac'dos C	O	24+ Meses C	O	037 TETANO Recem Nasc. C	O	037 TETANO Outras idades C	O	033 TOSSE CONV. C	O	045 PARA-LISIA FLACIDA AGUDA C	O	084 MALARIA C	O	*071 RAIVA C	O	DIARREIA 009 0-4 anos C	O	DIARREIA 009 5-14 anos C	O	DIARREIA 009 15 anos+ C	O	*001 COLERA C	O	020 PESTE C	O	009.2 DISENTERIA C	O	*036 MENINGITE C	O
BOANE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7164	-	-	-	2195	-	487	-	1716	-	-	-	-	-	727	-	-	-
MATOLA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	61297	-	67	-	7136	-	1716	-	3820	-	-	-	-	-	2448	-	-	-
MAGUDE	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	8594	-	-	-	817	-	368	-	1266	-	-	-	-	-	590	-	-	-
MANHICA	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	52134	18	-	-	2709	-	1163	-	1938	-	-	-	-	-	932	-	18	-
MARRACUENE	1	-	-	-	-	-	2	-	-	-	-	-	-	-	2	-	7939	2	2	-	909	-	220	-	1042	-	-	-	-	-	803	-	-	-
MATUTUINE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1097	1	5	-	881	-	284	-	1263	-	-	-	-	-	678	-	-	-
MOAMBA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	8994	6	3	-	885	-	335	-	1126	-	-	-	-	-	686	-	2	-
NAMAACHA	-	-	3	-	-	-	3	-	-	-	-	-	-	-	-	-	4553	1	-	-	1453	-	248	-	1200	1	-	-	-	-	530	-	-	-
Total deste ano	1	-	3	-	1	-	7	-	-	-	-	-	-	-	4	-	151772	28	77	-	16985	-	4821	-	13371	1	-	-	-	-	7394	-	20	-
Total ate o fim do ano	1	-	3	-	1	-	7	-	-	-	-	-	-	-	4	-	151772	28	77	-	16985	-	4821	-	13371	1	-	-	-	-	7394	-	20	-
Total desde o inicio do ano	1	-	3	-	1	-	7	-	-	-	-	-	-	-	4	-	151772	28	77	-	16985	-	4821	-	13371	1	-	-	-	-	7394	-	20	-

C = Casos O = Obitos - = S/Casos ... = S/Informacao * = Suspeitos incluidos

Figure 4.6 – Annual Bulletin of 2006 (malaria situation of Maputo province in 2006)

Therefore, data are collected first at health facilities and aggregated at the district health offices, where they are transmitted to the provincial directorate and then to the national levels. The district level processes and uses the data for the management of its area of health and sends the reports at

the provincial level that it uses and sends at the Central Level. The Central Level analyses and uses the data for the National management.

The figure 4.7 displays how the information which is used by decision-making in malaria programme flows from health facilities until the national level and, which health services and collection tools are used in each level of the health system.

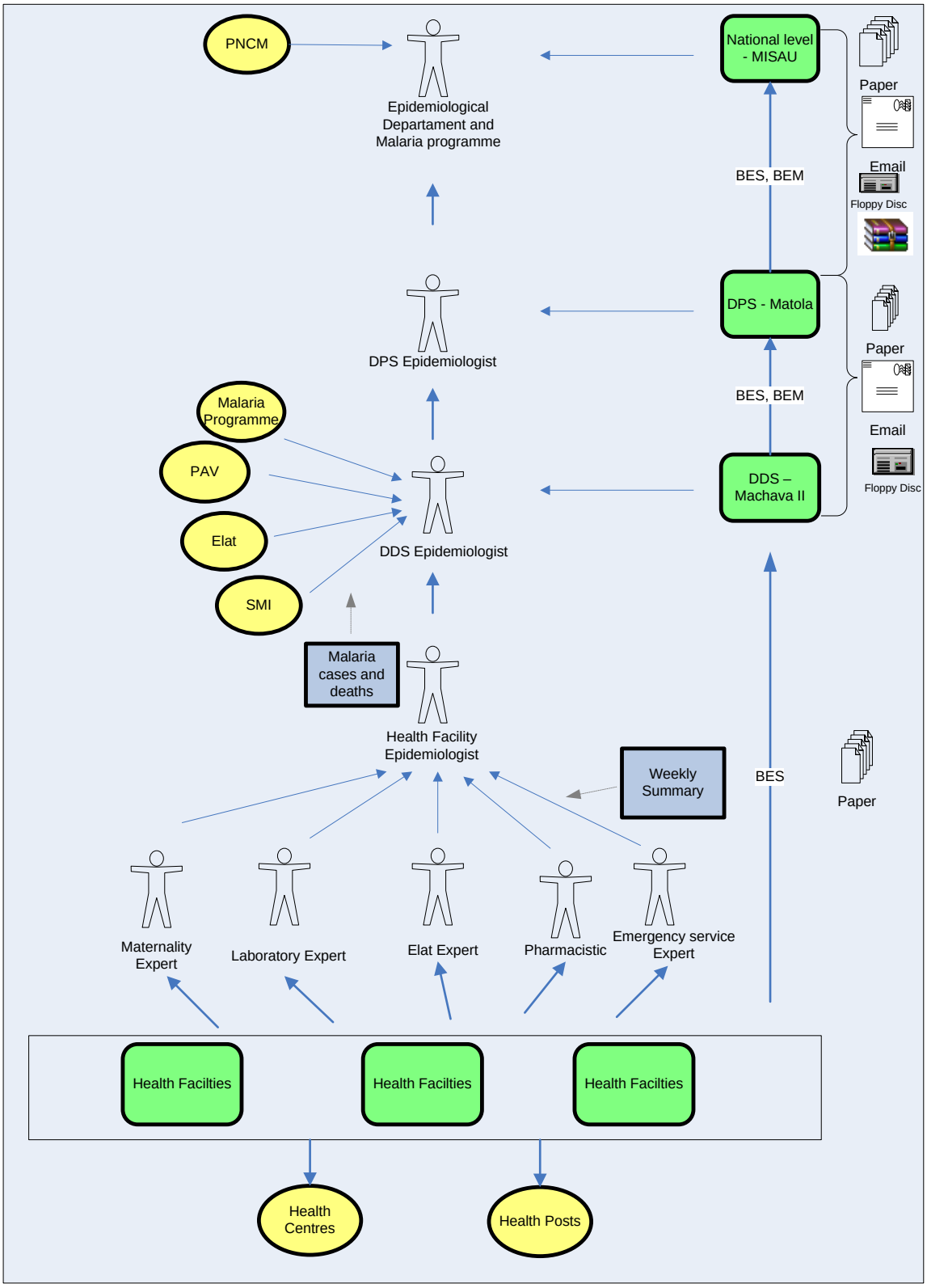


Figure 4.7 – Information Flow

CHAPTER FIVE

IMPLEMENTATION OF THE DECISION OF OFFERING FREE MALARIA MEDICINE

5.1 Introduction

The decision of offer free malaria medicine was part of series decisions. The malaria contributes to the motherly mortality, mainly when allied to other diseases and conditions such as tuberculosis, HIV and malnutrition. In order to achieve the possible improvement in the health situation related to malaria, the PNCM uses national resources, as well as resources mobilised from other parts. And, thus, the government support the malaria control in order to make that: all population who suffer from malaria must access quickly to suitable and economic treatment; everyone who is at risk to get the malaria, particularly children under 5 years of age and pregnant women, they benefit from ITNs and other interventions to prevent them against infections; and, the pregnant women who are at risk to catch the malaria, they have access to an Intermittent Preventive Treatment (IPT). Many drugs which are used in Mozambique to treat malaria offer resistance and, in order to improve the treatment, it was introduced recently the Combined Therapy of Artemisinin (AS) as treatment of first line extended to the whole country. This medicine is expensive and is not accessible to all population and, in order to reduce the problem of medication accessibility, the government of Mozambique decided to offer free malaria medicine; how it was made and which actors were involved in the decision-making process are explained in this chapter.

5.2 Treatment, Prevention and Influence of Routine HIS

Nowadays, many endemic diseases such as HIV/AIDS, Tuberculosis, malaria which, constitute the bulk of infectious disease burden in developing countries. Many of these infections are potentially treated with drugs. For example, malaria is a disease which causes fevers and, when it is not treated can lead to the death. And, there are many available drugs against malaria. This disease intensifies the consequences of the poverty in Africa, making the disease into a global problem, even in terms of security, or of migration. Based on the 2005 population projection of 19.4 million and the assumption that approximately 1 million residents live in central Maputo City where the risk of malaria is low, vulnerable populations in Mozambique comprises an estimated 3.600.000 children under five and 900.000 pregnant women. There are also estimated 1.500.000 persons living with HIV/AIDs, some of them also fall within the two previous groups. The MISAU confers high priority to the control of malaria and was made progress in terms of treatment, control, prevention and social mobilization (UNICEF, 2007:17).

Addition to that, the 2006 strategic plan for malaria control of the MISAU and RBM[4] (Roll Back Malaria) partners places considerable emphasis on vector control and recommends IRS, ITNs, as well as larval control through environmental management and biological and chemical control, which may be used singly or in combinational way, depending upon the epidemiological setting.

ITNs: It is priority intervention for MISAU in Mozambique, particularly in rural areas. This kind of intervention was introduced in Mozambique in 2000 and has been delivered through a variety of channels and partners including: free as part of an emergency; free of charge to children under 5

[4] Is an movement which has the aim of improve the intuition about the malaria and to mobilize resources to the malaria control in most affected countries.

years of age in Manica and Sofala provinces; subsidized and free ITNs through health facilities to pregnant woman and children under 5 years of age in Zambezia, Gaza, Tete, Inhambane and Cabo Delgado; community-level distribution through a variety of NGOs, and strengthening sustainable private, commercial sector distribution in collaboration with PSI and the Malaria Consortium (Flightingmalaria, 2007:15). According to this source, the Malaria Consortium, with Department for International Development (DfID), United Kingdom funding, is currently supporting commercial business and networks to increase the market availability of ITNs in Mozambique.

In January 2006, the MISAU declared that malaria is national emergency and, such, malaria prevention and treatment services must be provided free of charge to at-risk populations through the public sector health services. As a result, beginning 2007, all ITNs were distributed free of charge through the health system to children under 5 years of age and pregnant woman. And, this is done on a district by district, province by province (Flightingmalaria, 2007:16).

IRS: it is a priority vector control intervention of the MISAU in Mozambique. This method is considered by the PNCM to be most appropriate in areas of higher population density, such as urban and peri-urban areas and areas of economic importance. Three major efforts are currently underway in Mozambique (Flightingmalaria, 2007:18):

- ✓ The MISAU has been supporting IRS in peri-urban and urban areas for several years (spraying commenced during the eradication area), although this program has been under-resourced;
- ✓ The LSDI has supported large-scale IRS in Maputo province since 2000. This program is expanding into Gaza province in 2006, beginning in 3 districts but eventually expanding province wide; and
- ✓ Based on the success of the LSDI program, the MISAU was piloting IRS in 3 districts of Zambézia province in 2006 to assess the feasibility and impact of IRS in a more highly-endemic rural area, with a plan to expand to a total of six districts in the province.

Larval control: the MISAU has expressed strong interest in larval control. However, much uncertainty exists regards the costs and effectiveness of this intervention relative to IRS and ITNs.

And, allied to these mentioned methods, the treatment for malaria constitutes one of the basic human rights of all the population living in areas where malaria is endemic, besides their socioeconomic situation (PATH Malaria Vaccine Initiative, n.d.:4).

And, attending that the pregnant women are one of the priority in the treatment, the government approved the IPT for pregnant woman as a national policy in Mozambique in May 2004. Thus far, implementation is limited to health facilities in provincial and district capitals.

The next section outlines the decision made in the substitution of malaria medicine to any medicine which offers less resistance to the patients.

5.3 Decisions Made in Terms of Malaria Medicine

The definition of the medicine to be adopted in certain country is largely influenced by WHO. This organization, offers recommendations to support the decision-making about the policies of malaria

control in certain area, from the treatment to effective prevention to the vector control and prevention and answer to the outbreak of epidemics (PATH Malaria Vaccine Initiative, n.d.:4). Due to resistance of the parasite which causes the malaria (Plasmodium fasciparum) to the chloroquine (CQ), the medical decision-makers of Mozambique with the influence of the WHO decided to abandon the importation and use of the medicine. This section explains the procedures and policies of acting about the malaria medicine.

From the beginning of the malaria control using new strategies, decided in a Health Ministers' conference in 1992, a great progress was made in the resource mobilization for the malaria control by government as well as by the private sector.

There are many available drugs for malaria and, most of the national policies indicate one of them as the medicine of first line. The WHO recommends that the medicine has to be changed when the proportion of resistance cases increase over ten per cent. Between 1998 and 2001, a drug efficacy study of CQ, Amodiaquine (AQ), and Sulfadoxine-Pyrimethamine (SP) monotherapy were conducted in Manhiça, using the WHO standardized protocol and, researchers reported resistance levels of 80% for CQ, 26% for AQ, and 21% for SP (Flightingmalaria, 2007:30).

Before changing the first line of malaria medicine is important to observe 3 factors (PATH Malaria Vaccine Initiative, n.d.:4): (1) to ensure that over ten per cent of cases are resistant for medications used at present; (2) involvement of government and politicians in the decision-making process; (3) availability of malaria medicine (for instance, ACT) in order to fit it in the country's needs.

In 2002 with approval of the change of the national policies of malaria treatment in Mozambique, the process of implementation of these policies began. At that time, it was established that the malaria treatment would consist of the following (PNCM, 2006:12):

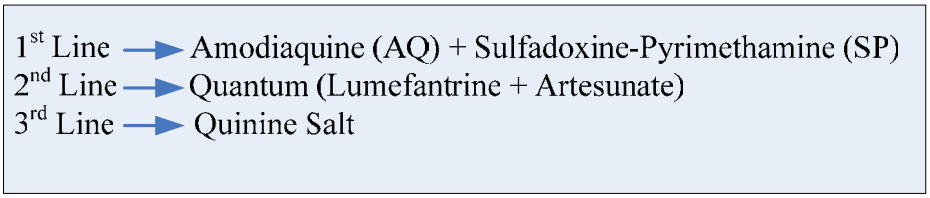


Figure 5.1 – Malaria medicines approved in 2002 (AQ + SP)

Source: PNCM, 2006

In spite of the proved ineffectiveness of the CQ, the above-mentioned policies were extolling the use of CQ in the treatment of the malaria in the community. For this reason, this antimalarial makes part of the kit C destined for the communitarian health facilities.

In late 2004, from the decision of the Minister of the Health, the policy was changed, the malaria medicine was altered again, the Artesunate (AS) to substituted the AQ in the therapeutic combination of first line, which started to consist of AS-SP as the first-line treatment, with the second and the third line unchanged. SP was chosen over AQ because of the side effects of AQ and the potential for cross resistance with CQ. Quinine is the third-line drug and is recommended by the PNCM for the treatment of severe Malaria. PNCM has stated that AS rectal suppositories can be

used for the emergency treatment of severe malaria in children in settings in which intramuscular or intravenous quinine can be administered, as recommended by the WHO (Flightingmalaria, 2007:30).

The implementation of AS-SP started in Maputo Province in late of 2002 as part of the LSDI. The MISAU began to scale up implementation of AS-SP in the remainder of the country beginning in early 2006, but the level of ACT roll out varies from province to province, being most advanced in Maputo, Gaza, Sofala, Zambézia, and Nampula Provinces. The malaria coordinators in each province were trained on the new policy in 2006 in workshop and they were then made responsible for training health workers at the district and health facility levels.

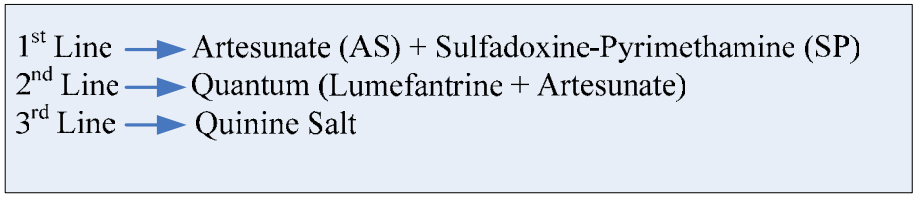


Figure 5.2 – Malaria medicine in use at present in Africa (AS + SP)

Source: PNCM, 2006; Fieldwork

According to the controversy in which the AQ was involved, in years before, it had been banned by the WHO for causing severe effects, allied to the fact of referring an analogous of the CQ, resistance crossed between the two medicines was expected, that was considered in the board of the MISAU in 2002, the idea in which the first new line would be temporary until the country was in conditions of adopting a first line of ACT, which, in agreement with Dr. Chow (Voanews, 2004), this is the most indicated medicine in Africa and in combination with other medicines, guarantees 90 per cent of the cure; but on the other side it advanced not to be a treatment of easy access to most of the patients.

After the approval of the introduction of the strategy of the prenatal cares for women at the ends of 2004, it followed a preparatory prolonged period, which only at the end of the first quarter of 2006 was finishing the production of support instruments to introduce this strategy in the country.

The ACT was selected to substitute the CQ and AQ. When is rigorously administrated it has the following advantages (PNCM, 2005):

- Reduction of the parasitic effect quickly than other drugs;
- Improvement of the rate of clinic treatment and;
- Delay on the resistance appearing.

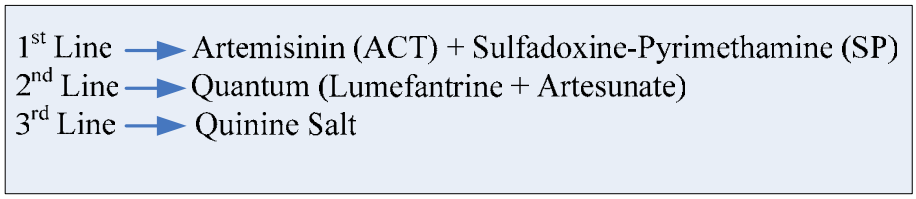


Figure 5.3 – Malaria medicine approved by WHO (ACT + SP)

Source: PNCM, 2006

This policy is being officially implemented in whole country since May of 2006, being the degree of the implementation varied from province to province.

The adopted medicines for the malaria treatment in three lines are very expensive and are not accessible for most of the Mozambican population. The poorest is particularly vulnerable because they have fewer instruments to protect them against malaria and, due to the bad conditions of their dwellings they are more exposed to the malaria. Other groups of the population are more vulnerable due to biological reasons, for example pregnant women, children under five years and persons who live with HIV/AIDS. A person who lives with the HIV is vulnerable to malaria, as soon as his/her organism begins to weaken and furthermore, he/she responds less quickly to the treatment. In addition, according to Flightingmalaria (2007:57), in 2006, the Common Fund financed only one-half of the estimated antimalarial drug needs for that year.

So, ***the MISAU announced that the malaria treatment will be free in all public hospitals and health facilities***, in the context of the combat to the disease that, annually, kills four thousand persons in the country (Agencia Lusa, 2006). This decision was announced on Tuesday 25 of April of 2006, during the commemorations of the African day of the fight against malaria and insert in a vaster campaign against the focuses of infection, what includes pulverization door-to-door and elimination of marshes.

The next section explains how the decision of offering free malaria medicine was implemented and who were involved in the decision-making process.

5.4 Decision of Offering Free Malaria Medicine

The decision of offering free malaria medicine was made in the national level and implemented in all health services (posts, centres, rural and general hospitals). This decision is a strategy created in order to reduce malaria incidence in the country and comes from partnership between the United State Government with malaria programme as most Mozambicans have no financial resources to pay for the medicine and, almost all regions are propitious for malaria transmission.

This initiative was based on the indicators collected in the health sector and analyzed by malaria programme workers and subsequently submitted to decision-makers.

The decision-making process was not done only by decision-makers of malaria programme, but also other key participants are involved in the process. These are, for instance, government and politicians, malaria programme techniques (or health promoters), NGO and malaria programme partners (such as WHO, USAID, Malaria Consortium, UNICEF, MEDICUS MUNDI and LSDI), health technicians, malaria service providers, institutions, pharmacies, media and, community.

The health promoters collect malaria cases from routine data, monthly summary of admissions, and provinces annual reports and analyze the incidence of the disease in each region and present it to decision-makers of malaria programme. In that sense, the decision-makers, government and politicians evaluate the impact of malaria and create strategies in order to minimize its incidence.

After health promoters have identified the problem from what they observed in each region (high mortality rate, for example) several options for addressing problem are developed taking into account the benefits and coasts. The interventions of malaria control, in general proposed by malaria programme, include: (a) to prevent the population against prick of mosquitoes; (b) to prevent the procreation of mosquitoes, through environment sanitation; and (c) to destroy the larva and adult mosquitoes. This is referred to the use of treated mosquitoes-net with insecticide and mosquitoes repellent products, to inner domiciliary pulverization and environment management and, to the diagnosis, advanced medication and check by malaria contamination.

The WHO helps in the decision-making process offering recommendations about the policies of malaria control in the country, from medication up to the prevention's cares. Inside these policies, it is included the malaria medicine (such as displayed in the figure 5.3, medicine in use in Africa) proposed by WHO and, which was implemented in Mozambique because the cases of malaria were increasing.

In order to continue having the malaria as the priority in the public health, is it necessary to apply the sensitization actions to the most varied segments of the Mozambican society. So, the active participation of the community can develop the efficiency of the efforts of the malaria control and make it easy the sustainability of the interventions.

Besides the partners, the media is an important way used to disseminate information to the community in Mozambique because it can play a crucial role in the support of the actions of the Government and partners in the combat to this endemic disease, spreading the current interventions and informing the communities about the best practices of hygiene and of prevention, and the available options of treatment. The malaria is one of the subjects most reported in the media, what concerns the subjects related to the health, with distinction in the statistics regarding the malaria cases, admissions in the hospitals and deaths due to the malaria, the different methods of prevention promoted by the MISAU and partners, and, the participation of the communities in the actions of prevention. For example, in the first six months of 2007, malaria was the second most reported subject of health, after the HIV/AIDS (UNICEF, 2007).

Although the malaria medicine implemented in Mozambique is not accessible for all the population; this decision is fitted in Government efforts in order to promote the health cares to the population. According to the interview conducted to the manager of malaria programme:

"This decision is a measure that aims to avoid the incident of many deaths and admissions cases in hospitals as malaria consequence however, this malaria is a disease of compulsory notification and, of the principal diseases like HIV/AIDS, Tuberculosis was the one that was being paid and this decision was a corrective measure."

(Malaria programme manager)

The supply of malaria medicine enable to the underprivileged population to treat the disease. According to the interview carried out in the Matola II (Pharmacy agent), before the adoption of this policy, the underprivileged population, after being confirmed malaria, they have to submit an application declaring his financial situation with the approval of the head of the residential quarter and submit it to the health facility in order to have the permission of medical chief to collect the

malaria medicine gratuitously. So this process, it was taking much time to be approved and not always the answer is positive.

This decision now in implementation in the public hospitals and health facilities, the Mozambican authorities are going to continue with other actions aiming at the reduction of cases of deaths and admissions due to this disease, through the education and conversations with the population about the preventive measures to take (Noticias, 2006).

The Government of Republic of Mozambique (GRM) has the support of some organizations to provide capital for the health in Mozambique. The next section explains the budgetary constraint influenced by donors for the provision of free malaria medicine.

5.5 Budgetary Constraints

Countries of small and medium incomes often face lack of resources and an elevated weight of the disease. The budget of Mozambique is deficient assuming that most of it is provided with external support, whenever the donors delay in delivery of expenditure conduct the delay on the engagement, for instance, to buy the drugs. And, when it occurs the government of Mozambique has difficulties to buy the drugs and they do not offer free drugs.

In order to reduce the burden of malaria especially on the most vulnerable groups, three pooled funds for the health sector have been established: (1) a common general fund known as PROSAÚDE; (2) a provincial common fund; and (3) a common for drugs and medical supplies. In 2005, the total health budget for Mozambique was $348 million, with approximately 30% coming from the GRM, 30% from the 3 common funds, and 40% from vertical funds, which include the United States Government contributions (Flightingmalaria, 2007:9).

Also in July 2005, the United States Government announced a new five-year, $1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions in high-burden countries in sub-saharan Africa in order to reduce malaria related mortality by 50% after three years of full implementation (Flightingmalaria, 2007:6).

The Government of the United States through the USAID is working with the Malaria Programme in order to implement strategies, including interventions to improve the access to a timely and efficient treatment, to reduce and to prevent malaria during the pregnancy, to promote and to distribute ITNs, domiciliary pulverization with insecticides and to extend the formation for a national coverage of the Integrated Management of Childlike Diseases (GIDI). In Mozambique, the GIDI is the key mechanism to detect and to treat malaria in children and newborn babies. The impact of this disease in Mozambique took the agency of North American cooperation (USAID) to announce that it is going to treble the financing that annually grants to the country to reduce the malaria, which will pass from 1,75 to 5,05 million euros (EMBAIXADA DOS E.U.A., 2006).

According to ARC (n.d:1), the American Red Cross have expanded the scope of their work to support the distribution of more than 29 million ITNs. These nets are an effective and inexpensive way to prevent malaria, which kills an African child every 30 seconds.

In addition, Mozambique is the recipient of a $28 million malaria grant from the Global Fund to Flight AIDS, Tuberculosis and Malaria (Flightingmalaria, 2007:4).

5.6 Applying the Series of Decisions Made in MISAU in the Theories of Knowledge Utilization

During the study, the researcher identified four major models including; knowledge-driven model, problem-solving model, iterative model and enlightenment model which, suggest different strategies to achieve knowledge utilization. After studying these models, the researcher fitted them in the malaria case study but in different perspectives. The decision-makers of malaria programme, that is, anyone who makes decisions about group of patients or population, will have to adopt a decision-making approach. Every decision will have to be based on an approach of the best model, each problem, available according to organisational settings and resources.

These series of decisions can be compared to the four models of knowledge utilization that, to this case study, no single theory could account for the range of observations attending to its complexity.

The Knowledge-driven Model derives primarily from natural sciences and considers a linear sequence that produced knowledge reaching users through institutes or individuals, and at least it is used by user. Looking at malaria case study, the target stakeholders are the populations living in favourable places for the reproduction of mosquitoes and, some examples of this research utilization can be presented: scientific research laboratory makes malaria drugs available; manufactures of mosquito-net make it available. It is clear that the stakeholders were not involved in the research; they can only express a value of the end product of final conclusion about drugs and prevention methods that might develop as a result of the science passing through several evolutionary stages (basic research to applied research and development to application). So, this model follows linear sequence from the research source until the utilization. The researchers are the source of ideas for directing research, and the users are simple receptible of the result. It would be an error to reject this model because the malaria medicine is the result of scientific knowledge.

Solving problems is important in every area of society. Problem-solving Model also follows a special sequence and considers user as an active role. In contrast of knowledge-driven model, this model suggests that the results of specific studies are used directly by stakeholders. A situation starts with identifying a problem; then, the researcher is seeking to solve it or to provide probabilistic answers. In fact, the researchers identify and examine alternatives options, and ultimately, user selects one solution among generated solutions. Certain aspects of this model can be observed in the context of offering free malaria medicine in Mozambique. An example of the application of this model, such as the advertising alerting to the population that the mosquitoes transmit malaria, the health promoters list the alternative solution in order to help the population in the prevention of malaria infection like inner residual pulverization and environmental management because the inner residual pulverization is the most efficient way of avoiding the outbreaks of malaria; diagnosis, treatment and abolition anticipated of the infection from malaria, malaria treatment appoints to the basic human rights of all the populations in areas where malaria is endemic, independently of their financial situation; environment sanitation; use of insecticide-treated nets and repellent products against malaria. Then, the population has to select one of these methods to prevent themselves against malaria.

Like the knowledge-driven model, the problem-solving model describes part of the complex events in this case study, but only provides a partial or incomplete view of the overall situation.

In the Iterative Model, there is a collective effort to make sense of the problem, and the results of scientific research comprise only one piece of complicated puzzle. This model suggests an incremental process in the decision-making. For example, there are many available drugs to treat malaria, and most of the national policies nominate a determined medicine as treatment of first line. And, this medicine has to be substituted when the investigations appoints that over ten percent of malaria cases are resistant. To take this decision, many factors and stakeholders must interact in the process, for instance:

- The government or the person who are responsible in the rules of acting policies have to be involved in the decision-making process in order to regulate the medicine administration;
- The researcher who studies the medicine evolution in each region, to analyse the appropriate alternatives (for instance, to the base of artemisinin) has a therapy of combination to be available and to fit in the necessities of the country;
- The communication between the entities responsible for the implementation of the National Programme of Malaria Control and other interested parts in the decision-making process is important in order to disseminate the information.

In the Enlightenment Model, research diffuses through multiple channels over time, offering new ways of thinking about issues. This model suggests that neither the research findings from a particular study, nor the results of a series of studies, are used directly by stakeholders. There is no assumption that stakeholders seek specific research conclusions.

In this model, research can drastically revise the way that policy makers define issues, for instance, in regions which are susceptible to malaria transmission, the population can develop any immunity capacity where the prick of mosquitoes does not constitute any risk.

This model, such as iterative model, relate to the production of scientific knowledge in a given line of research, fostering a build-up of knowledge that gradually informs action (Almeida and Báscolo, 2006:8).

Observations in this case study indicate that each model has something to offer in terms of describing the events, however, no single model can account for the overall decision made in the malaria programme. So, I note particularly that the role of the researchers and decision-makers in the decision-making process is very important. I think that adopting the four models, the malaria programme will attempt to perform a complete analysis.

Therefore, the analysis of the series of decisions in the malaria programme is expressed using the four models of knowledge utilization; knowledge-driven model, problem-solving model, iterative model and enlightenment model. There are interactions with all the stakeholders of decision-making process.

The malaria programme uses the routine data to take decisions. So, the source of data are health facilities where the data are collected and subsequently aggregated in the districts; for that reason, the way in which the data are collected is very important. Therefore, in order to take good decisions

in the malaria programme, it is necessary to ensure that the information has value for the decision-makers; the next section describes the quality of data used in the decision-making process.

5.7 Chapter Conclusion

This chapter presents the decision made in terms of the changing of malaria medicine to a medicine which is appropriate to the country, as well as the decision of offering this medicine gratuitously to the populations. Also, the chapter describes the acting plan, the key stakeholders involved in the decision-making process. The series of decisions taken in MISAU follow a methodology which is fitted in the models of knowledge utilization presented in the literature review; therefore, this chapter presents the applicability of the four models of knowledge utilization in the Malaria programme.

In order to take decision with confidence, it is necessary to ensure the quality of data. The next chapter discusses the improvement of routine data.

CHAPTER SIX

DISCUSSION

6.1 Introduction

The study aimed at identifying the nature of the decisions taken in the malaria programme regarding the offer of free malaria medicine. This chapter describes how routine data plays role in decision-making and why routine data needs to be improved.

6.2 Role of Routine Data in Decision-making

The routine data plays an important role in the definition of strategies to control the malaria. From the routine data, the health sector can define the type of decisions which must be made in terms of interventions methods. For instance, looking at the table 4.4 from 2001 to 2004, Matola district presents many cases of malaria compared to other districts and, based on this data, PNCM can investigate why this region present annually more cases in relation to other districts and which decisions they can take in terms of health promotion such as offering ITNs, IRS and, verify if the drugs offer or no resistance to the parasite.

In MISAU is defined which type of decisions are made in each level of health system. In the health facilities are taken decisions on the care of individuals. In this level is important to ensure that the patient can be tested, medicated and to ensure that the stock of malaria medicine is available; in the district level, decisions are taken with respect to the effective functioning of health facilities and of the health system as a whole; at the provincial level, the evolution of the malaria cases is analysed using the routine data and; at the national level are taken decisions to promote the community health, offering interventions methods to the population.

So, in order to ensure the functionality of the health services, the data people should receive feedback. For example, the health facilities report the malaria cases to the district level and urgently the district has to react on them.

Also, information has to be sent on time in order to guarantee the completeness of it. The completeness of the information could be defined in two different ways; one is the coverage of a routine HIS and another is the level of completion in data collection and report. It is important to know whether all facilities submitted the last month reports in the district directorate or what percentage of facilities submitted the reports on time.

The delay in sending the information influences the decision-making process. The weekly/ monthly health data presented in the health facilities must be sent regularly after the aggregation of the data for the district to province and subsequently from province to the national level.

In order to be made decision in confidence, it is required the improvement of routine data in terms of quality. The next section describes the quality of data in the health sector.

6.3 Quality of Data used to Decision-making

Malaria cases are based on clinical (clinical malaria or suspected) or laboratory diagnosis (confirmed). In all the visited sites, malaria cases are confirmed because the patient is tested, laboratory and rapid diagnosis test. In one facility, it is adopted only laboratory diagnosis since March of 2006. The number of malaria cases taking into account the diagnosis of the malaria can be easily adulterated because the clinical diagnosis is based on symptoms, which some times are confused, for example, to symptoms of pregnancy, fever and flu. In the table 1, in January and February malaria cases were based in clinical (suspected) and laboratory (confirmed) diagnosis. It is clearly seen that the number of suspect cases is lifted up regarding the confirmed cases.

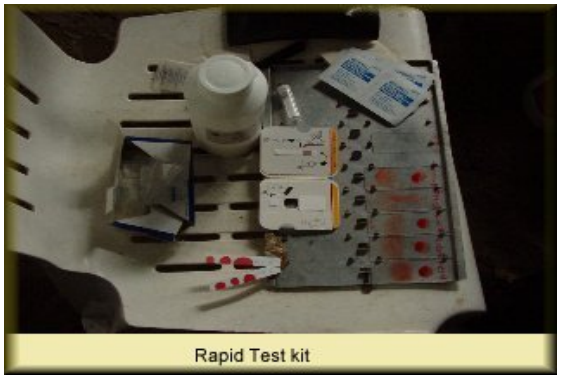


Figure 6.1- Rapid Test Kit

Source: Lubombo

6.3.1 Gaps in the Health Facilities

The health facilities hold data collection tools which they use to collect data related to many diseases. During the analysis of these tools (books of outpatient consultations[5] and forms[6]) in the case sites, the researcher pointed out several problems:

- *The sum of the cases presented in the forms has mistakes in calculating;*
- *Some forms are not identified by period;* this fact can create difficult in the process of counting of the cases;
- *The forms in use in the health unities are different;* For instance, in 2006 it was used forms with the following parameters of age group (6-11 months, 1-6 years, 7-13 years,> 14 years) and, at present the parameters of age group are 0-5 months, 6-11 months, 1-6 years, 7-13 years and > 14; therefore, in the first forms there were not included the age between 0-5 months and the health centre does not include the cases which are in this age group;
- *Sometimes, the statistics of the month do not include all the malaria cases of the health facility;* **t**his is related to the fact of lack of uniformity in the delivery of the data, so not even all the health services which collect malaria data hand over the statistics of the month on time;

[5] This book is used to register the malaria cases and displays the counting of these cases per week;
[6] Is used to aggregate the data of each month by age group

- *Illegible handwriting;* in some cases, it is difficult to read the diagnosis made by health worker;
- *Bad filling out of the columns of the age group*; for example, in the column referring to age group of the 5-15 years appears an age that does not correspond to this column (3 years) and in the column of more than 15 years (> 15), it is launched 4 years, 8 years; and sometimes the health worker puts X in the corresponding age group or simply he/ she does not fill out the column of the age group (see table 6.1); and, this practice makes difficult the analysis of data taking into account other intervals of age, which was not defined previously.
- *The health workers presents unclear diagnosis (negative or positive);* The tests of laboratory of malaria can be done by PF or HTZ, so the health worker writes PF on the collection tools without any information which describes the result of the malaria test (such as displayed in the figure 6.2).
- *Bad filling out on the books;* Sometimes the health technicians write in the diagonal what makes difficult the gathering of data.

Table 6.1 – Gaps in the case sites

Service	Description/ Gap	Health centre	Age group		
			0-4 years	5-15 years	> 15 years
Emergency services	Cases without clear diagnosis[7]	Matola II	12	2	8
Adults selection	Bad filling out of the columns of the age group	Matola II	1	6	31

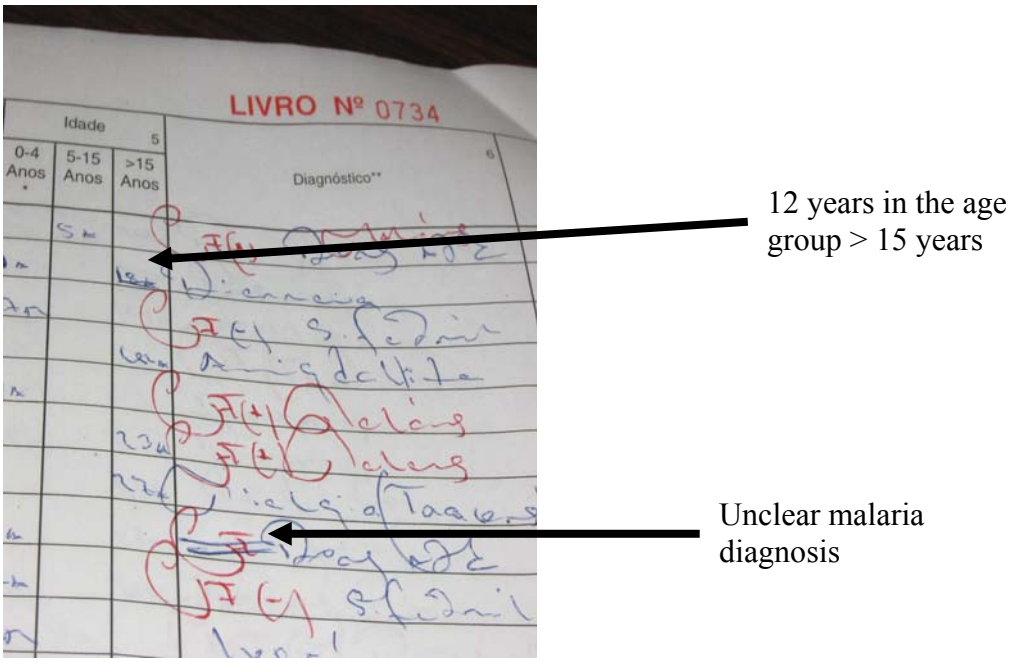


Figure 6.2 – Some gaps in the book of external consultations

[7] the health workers writes only PF but do not write if the test of malaria was positive or negative – photo 3

Source: fieldwork, 2007

6.3.2 Gaps in the Malaria Programme

The malaria programme has problems related to statistics because some provinces send the data of monthly summary of admissions very late and this delay influences the statistics of the month (see the appendix C).

6.4 Chapter Conclusion

This chapter presents the findings of the study in terms of the quality of data which are subsequently used for decision-making process. The next chapter outlines the answers of research questions and proposes recommendations for future researches.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

7.1 Introduction

This chapter presents the answers of research questions described in chapter 1. For each research question, it is presented the related literature and fieldwork findings and the link between the two activities.

7.2 Answers of the Research Questions

This research is intended to answer the following research questions:

- **How the decision of offering free malaria medicine was made in MISAU?**

The decision of offering free malaria medicine in Mozambique was taken just after the health authorities, WHO, experts, clinical decision-makers and other partners of health sector decided to substitute the malaria medicine.

The malaria medicine, now in use in Mozambique is very expensive; the cost of its importation to the country is high, for instance, according to WHO (2006:2), part of the cost of the switch has been offset by Mozambique importing the drug through WHO at a discount and the cost of the change is also supported in some regions by the Global Fund to Fight AIDS, Tuberculosis and Malaria and, the GRM has not conditions to cover the cost of the malaria medicine. The GRM needs the support of sponsors to ensure the availability of the medicine in Mozambique. So, considering that the cost of the importation of the malaria medicine is expensive, the cost of malaria medicine would be consequently expensive to purchase in the hospitals. The Mozambican population have not conditions to pay for the medicine.

Therefore, this decision is a strategy to help the population which do not have conditions to afford their treatment. In order to take this decision, MISAU consults with key stakeholders – scientists, WHO, communities and, the group which was involved in decision-making of offering free malaria medicine including participants with expertise in malaria medicine, government, policy, planning and finance, researchers, malaria programme decision-makers and donors.

All of these stakeholders have important involvement in the decisions made in the MISAU. For instance, WHO recommends the use of malaria medicine more effective in curing malaria and the parasite is highly unlikely to become drug resistant; the government regulates the administration of the medicine; the media collaborates with the health sector in the support of the intervention to this disease, in the community education about the better hygiene practices, prevention and drugs available; the donors provide funding to support the decision of offering free malaria medicine; the MISAU, with the support of UNICEF and other partners, work to prevent and control the malaria incidence and supply malaria medicine to unprivileged population; the population is one of the source about malaria situation and they can support in the promotion of IRS coopering with health promoters; the PNCM promotes the health services; the health authorities are responsible to monitor the performance of the decision of offering free malaria medicine and evaluate its impact and, after the implementation of this decision, they monitored the pharmacies of public hospitals such as the pharmacies of health posts, health centres, rural and general hospitals to guarantee that the medicine

is not charged for the patients in public hospitals and also to ensure the adoption of the new medicine.

- **Based on what sources of data are decisions made in the malaria programme at the National level?**

The source of data in use in the malaria programme is routine data which is received from all the Provinces of Mozambique. These data are collected in the health facilities and are subsequently sent for the DDS through the BES and, a DDS joins the data of all the health facilities inside the district and sends to the DPS (province level).

All the provinces have a Database which contains the module of the BES and BEM. Regularly the provinces send information for the office of epidemiology and, the malaria programme has the information available in this department.

The decision-making taken in each stage can change according to the incidence of malaria cases related to each region; for instance, when the district presents frequently more malaria cases, the decision-makers can urgently decide to implement different strategies to control the disease in the endemic district. And also, the administrative points can influence the decision- making in the endemic regions; in spite of the necessity of health sector in the implementation of different strategies to control the disease, it is dependent on the financial resources.

- **What data is available, and in what format, to decision-makers in the Malaria programme?**

The decision-makers take decisions based on the summary of routine data which presents the main indicators of malaria such as the number of malaria cases, lethality rate, number of deaths and suspicious cases. These summaries are presented through BES, BEM and annual report.

The above mentioned summaries are presented to decision-makers on paper format and the decision-makers discuss the malaria situation in all the country. In the National level, decisions related to all the country are taken and strategies to answer several emergencies of the country are defined.

The routine data can affect the decision-making depending on its quality. So, the quality of data influences the decision-makers in the decision-making process; if the presented data has not quality can conduct the decision-makers to take wrong decisions.

- **How does the access to data impact the decisions made by programme managers and decision-makers in the Malaria programme?**

Nowadays, the organizations need reliable data on time in order to take decisions; when this does not take place, it contributes for to damage of the good progress of the organization. This research question intends to diagnose the impact that the access to data produces in the decision-making process.

Through the analysis of the data collected, it is possible to draw some considerations related to internal environment as well as to the position of malaria programme regarding the external environment.

In order to obtain a possible and sustainable growth of malaria programme, it is necessary that the decision-makers/partners/government and all the intervenient in the decision-making process find out a way to plan, to organize, to drive and to control continuously the activities. The malaria programme must focus also in the supervision of the activities of the workers, checking if they are in the right way to reach their objectives, besides effectuating the proper corrections if it is necessary.

Also, the other levels of the health system have main role in the decision-making process because the malaria programme depends on this data to take decisions. The health facilities is responsible in sending information on time to the district level and this level has to check the authenticity of data and send it to the provincial level and, subsequently, this level coordinates the activities with districts in order to have all the information on time and send it to the national level in order to make decision.

The way in which the data are accessed by the decision-makers, it may have impact in the success of the decision-making and this impact can benefit the MISAU, the decision-makers, partners, community, individual or group that will interact with the malaria programme. In order to have the ability of accessing the malaria data, producing reports, maps, the MISAU must create mechanisms to allow all the levels of the organization in the whole country to have access to the technologies and provide them with software which is able to respond to the necessities of the organization.

7.3 Research Contributions

This study makes theoretical and practical contributions which are now discussed.

7.3.1 Theoretical Contributions

The literature review presents several models of decision-making used in the organisation such as knowledge-driven model with focus on researcher, problem solving model with focus on decision-maker, iterative model with focus on researcher and decision-makers and, enlightenment with focus on education.

The knowledge-driven and enlightenment models cannot account for the complexity of interactions and events observed. In order to decide in a malaria treatment as well as the laboratorial test to be applied to the population, it requires scientific knowledge with rational components. An example of scientific knowledge having an impact on decisions taken in the MISAU was the increase of the mortality rate in Mozambique mainly on children under 5 and pregnant woman being determinant in assigning the free malaria medicine in the public hospitals to the community and, in this model the experts in the subject of the malaria (for instance, the decision-makers of malaria programme) can decide without external influences of other stakeholders of the health system like politicians, government, and so on.

Problem-solving model: certain aspects of this model can be observed in the case of the implemented decision in the malaria programme. The increase of the malaria cases and mortality

rate leads the MISAU, government, decision-makers, scientific experts, partners, private sector, media or a combination of these to find solution.

Iterative model: in this model, there is interaction and discussion with all the stakeholders involved in the decision-making process in order to produce scientific knowledge to respond the necessities of the organisation and this knowledge should be available on time to all the interested and community on time using media. This model applies to many observations in this research, which involved many interactions between key persons in the implementation of decision of offering free malaria medicine to the community, in the offering of free domiciliary fumigation, in offering of treated nets. There are multiple interactions in the area of malaria in Mozambique.

The research applies the above mentioned models (knowledge-driven model, problem-solving model, iterative model and enlightenment model); so no isolated model would manage to reach the objective of exploring the decision made recently that the malaria medicine would be free in public hospitals in Mozambique. As the joining of four models give the decision-makers the ability of deciding in confidence.

7.3.2 Practical Contribution

In order to support the decision-making process in the MISAU at national level, this thesis explains how the routine data can be presented to improve the decision-making process in terms of relevance and timely data, as well as information and knowledge.

7.4 Further Research

This study explored decision-making process and access to data in the malaria programme in Mozambique. For further research in practical level, it requires to find out how data for decision-making can be available through the problems observed, such as data quality, gaps in data collection tools, delays in sending data. In the theoretical level, further empirical research on decision-making can be explored, exploring the individual and group decision-making in the health organizations; and also to answer the following questions: Which knowledge and skills are necessary to be a better/good decision-maker? Are there characteristics that make one a better decision-maker? What are those desirable characteristics developing? What is the relationship between the decision-maker, the environment and the "thing" being decided? How do these affect the decision-making processes and how will that change our view of the environment in the MISAU?

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A. Ethics Approval Notification

Analysis of decision-making process and access to data in the Ministry of Health; Case study: Free malaria medicine in Mozambique

I **Francisco Saúte** hereby voluntarily grant my permission for participation in the research as explained to me by **Nercenia Salomão Mbie.**

The nature, objective, possible safety and health implications have been explained to me and I understand them.

I understand my right to choose whether to participate in the project and that the information furnished will be handled confidentially. I am aware that the results of the investigation may be used for the purposes of publication at the faculty of Medicine, Eduardo Mondlane University.

Upon signature of this form, you will be provided with a copy.

Signed: _____ Date: _____

Witness: _____ Date: _____

Researcher: _____ Date: _____

B. Interview Guide

B.1 Interview Guide for Malaria programme manager

1) Background

- Describe your position within malaria programme.
- Which type of malaria data do you have access to?
- For which purpose do you use malaria data?

2) General information on the free treatment of the malaria

- Can you describe the recent decision on the free treatment of malaria?
  - ✓ How and when was the decision of offering free treatment of malaria in Mozambique made?
  - ✓ How is it proposed to be implemented and in which districts?
  - ✓ Which procedures were used to put this decision in practice?
  - ✓ Who were involved in the making of this decision?
  - ✓ What motivations/ factors contributed to the implementation of this decision? (For example, treatment price, mortality rate, beneficiaries).
  - ✓ Does this decision cover all the line of malaria treatment?
  - ✓ How do they propose to monitor and evaluate this decision and, who is responsible for this?
  - ✓ Does this decision imply any changes in the existing information system?

3) Health Management Information Systems/ Data access/ Decision-making process

- Can you describe how data is collected and used in the malaria programme?
  - ✓ What data on malaria are used in decision-making process and is it accessible to all decision-makers?
  - ✓ Does the information pass easily between all the actors in the malaria programme?
  - ✓ How is this information presented to the decision-makers?
  - ✓ Do you have all the data needed to measure objective/ make decision?
  - ✓ Are there practices carried out by the malaria programme of implementation of new strategies and how they are made? (For example, periodic meetings)
  - ✓ Where do you get your data on malaria from?

- ✓ Have you experienced any problems in making decisions due to the lack of data?
- ✓ How to solve these problems?
- ✓ Which general aspects facilitate or obstruct the implementation of decisions referring to malaria in particular?
- ✓ The new strategic plan has these indicators and the evaluation system.

B.2 Interview guide for Laboratory

1) Background

- Describe your position within malaria programme.
- Which type of malaria data do you have access to?
- For which purpose do you use malaria data?

2) Malaria tests

- What are your daily activities?
- What is the laboratory information flow?
- Who is responsible of grouping analyzing malaria data from laboratory?
- Which type of malaria diagnosis does the laboratory regist?

B.3 Interview guide for IT of malaria programme

1) Background

- Describe your position within malaria programme.
- Which type of malaria data do you have access to?
- For which purpose do you use malaria data?

2) Access to data

- Describe the process of data collection and how the data are used in the malaria programme?
  - ✓ What data on malaria are used in decision-making process and is it accessible to all decision-makers?
  - ✓ Does the information pass easily between all the actors in the malaria programme?
  - ✓ How is this information and how is it presented to the decision-makers?
  - ✓ How are the data shared within malaria programme, between provinces and districts?
  - ✓ What is the malaria information flow?
  - ✓ From where you get your data on malaria?
  - ✓ Have you experienced any problems in making decisions due to the lack of data?

- ✓ How to solve these problems?

B.4 Interview guide for pharmacy technician

A. Background

- Describe your position/ sensibility related to decision taken in 2006 of offering free malaria medicine?
- Explain your daily activity.

B. Free malaria medicine

- Does the Matola II health center implement this decision?
- How many people benefited from this decision in this health center (by looking at the pharmacy data)?
- To what extent is the medicine considered free?
- Do you face problems after the implementation of this decision?

B.5 Interview guide for Matola II nurse

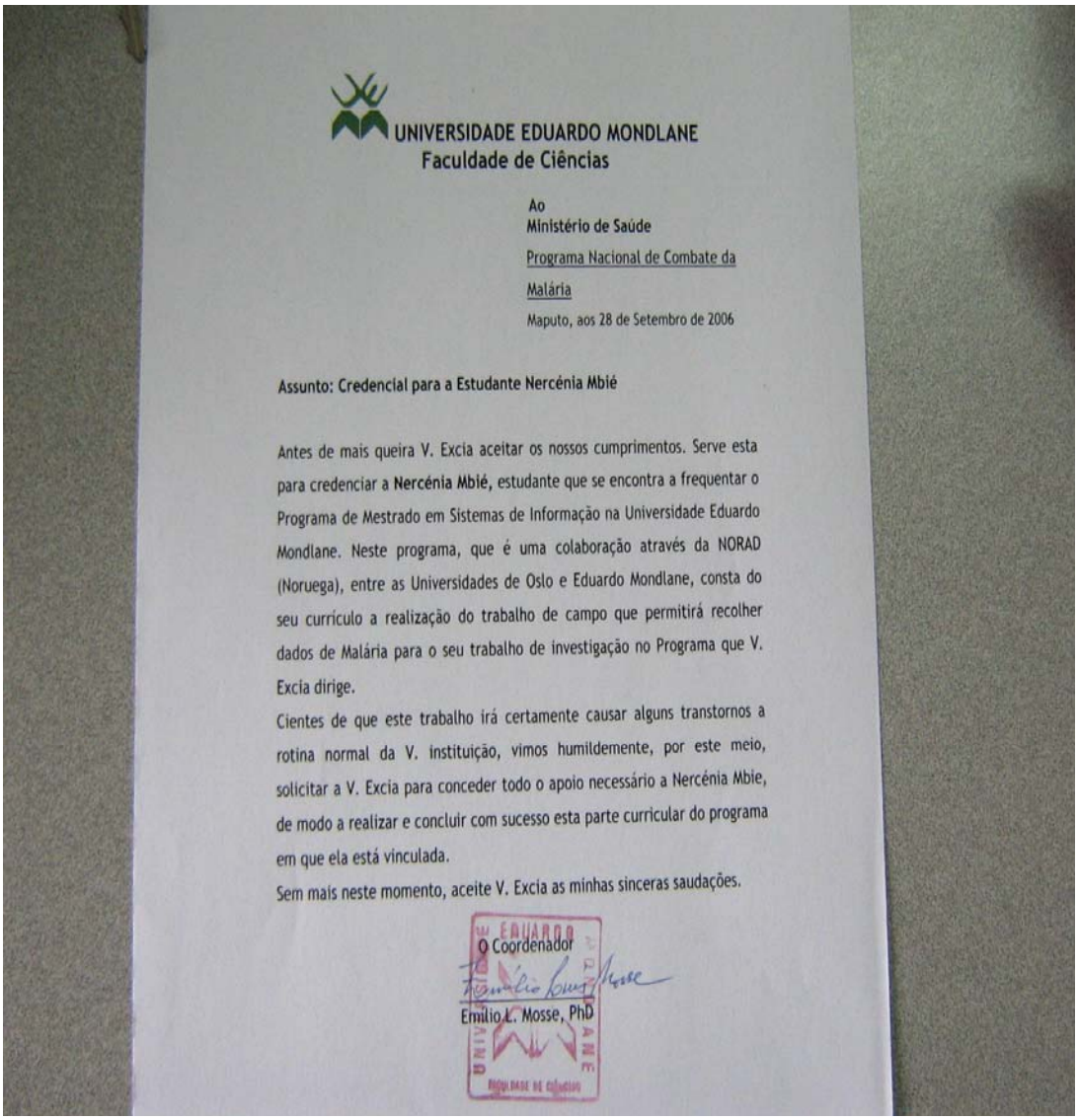
A. Background

- Describe your position in the Matola II health center.
- Which type of malaria data do you have access to?
- For which purpose do you use malaria data?
- Which are the responsibilities of this entity in the malaria data?
- What are the Matola District health centers?
- Which areas collect malaria data in the center?

B. Free malaria medicine

- Are there problems after the implementation of this decision in the health center?
- Which type of malaria is predominant in Mozambique?
- Are there any projects related to the improvement of malaria service?
- Are there regular meetings?

C. Ethical Approval Letter



UNIVERSIDADE EDUARDO MONDLANE
Faculdade de Ciências

Ao
Ministério de Saúde
Programa Nacional de Combate da Malária
Maputo, aos 28 de Setembro de 2006

Assunto: Credencial para a Estudante Nercénia Mbié

Antes de mais queira V. Excia aceitar os nossos cumprimentos. Serve esta para credenciar a **Nercénia Mbié**, estudante que se encontra a frequentar o Programa de Mestrado em Sistemas de Informação na Universidade Eduardo Mondlane. Neste programa, que é uma colaboração através da NORAD (Noruega), entre as Universidades de Oslo e Eduardo Mondlane, consta do seu currículo a realização do trabalho de campo que permitirá recolher dados de Malária para o seu trabalho de investigação no Programa que V. Excia dirige.

Cientes de que este trabalho irá certamente causar alguns transtornos a rotina normal da V. instituição, vimos humildemente, por este meio, solicitar a V. Excia para conceder todo o apoio necessário a Nercénia Mbie, de modo a realizar e concluir com sucesso esta parte curricular do programa em que ela está vinculada.

Sem mais neste momento, aceite V. Excia as minhas sinceras saudações.

O Coordenador

Emilio L. Mosse, PhD

Figure C.1 – Ethical Approval letter

D. Map of control of the reception of epidemiological bulletins for all Mozambican provinces

Table D.1 – Controle da recepção dos Boletins Epidemiológicos Provinciais de MOÇAMBIQUE, 2007

Source: Epidemiology Department

PROVÍNCIA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	% a Tempo
CABO DELGADO	X	X	X	X	11	10	9	8	7	6	5	5	4	3	2	X	X										23.1
GAZA	X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	X	X	X	X	X						76.9
INHAMBANE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	X	X	X							73.1
MANICA	X	X	X	X	X	X	X	X	X	X	2	1	X	2	1	X	X	X	X	X							61.5
MAPUTO CIDADE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							76.9
MAPUTO PROVÍNCIA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							76.9
NAMPULA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							73.1
NIASSA	X	2	1	X	6	5	4	3	2	1	x	X	X	X	X	X	X	X	X	X					X		50.0
SOFALA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						80.8
TETE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							76.9
ZAMBEZIA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							76.9

X = Chegou a tempo. Número = Semanas de atraso. Total de 67.8% a tempo.

PROVÍNCIA	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	% a Tempo
CABO DELGADO																											0.0
GAZA																											0.0
INHAMBANE																											0.0
MANICA																											0.0
MAPUTO CIDADE																											0.0
MAPUTO PROVÍNCIA																											0.0
NAMPULA																											0.0
NIASSA																											0.0
SOFALA																											0.0
TETE																											0.0
ZAMBEZIA																											0.0

X = Chegou a tempo. Número = Semanas de atraso. Total para o ano de 63.0% a tempo.

E.SIS-C04 - Boletim da Unidade Sanitária

CÓPIA A ENVIAR AO DISTRITO

REPÚBLICA DE MOÇAMBIQUE
DISTRITO _____

MINISTÉRIO DA SAÚDE
UNIDADE SANITÁRIA _____

Mod. SIS-C03
SEMANA _____/_____ A _____/_____

BOLETIM EPIDEMIOLÓGICO SEMANAL	Nº

SARAMPO 055								037 TÉTANO RECÉM NASCIDOS		*MALÁRIA 084				045 PARALISIA FLÁCIDA AGUDA		*071 RAIVA	
Menos de 9 meses		9-23 meses				24 meses e mais				0-4 anos		5 anos +					
		Não Vacinados		Vacinados													
C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O

DIARREIA 099						009.2 DISENTERIA		001 CÓLERA		020 PESTE		MENINGITE *036			
0-4 anos		5-14 anos		15 anos +								0-4 anos		15 anos +	
C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O

C = Casos O = Óbitos — = Sem casos … = Sem informação * = Suspeitos incluidos †C = Mordedura de animal

……
……

F. ORIGINAL – PARA O ARQUIVO DA UNIDADE SANITÁRIA

REPÚBLICA DE MOÇAMBIQUE
DISTRITO _____

MINISTÉRIO DA SAÚDE
UNIDADE SANITÁRIA _____

Mod. SIS-C03
SEMANA _____/_____ A _____/_____

BOLETIM EPIDEMIOLÓGICO SEMANAL	Nº

SARAMPO 055								037 TÉTANO RECÉM NASCIDOS		*MALÁRIA 084				045 PARALISIA FLÁCIDA AGUDA		†071 RAIVA	
Menos de 9 meses		9-23 meses				24 meses e mais				0-4 anos		5 anos +					
		Não Vacinados		Vacinados													
C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O

DIARREIA 099						009.2 DISENTERIA		001 CÓLERA		020 PESTE		MENINGITE *036			
0-4 anos		5-14 anos		15 anos +								0-4 anos		15 anos +	
C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O

C = Casos O = Óbitos — = Sem casos … = Sem informação * = Suspeitos incluidos †C = Mordedura de animal

G. SIS-C03 - Boletim Epidemiológico Semanal do Distrito

REPÚBLICA DE MOÇAMBIQUE
DISTRITO_____
MINISTÉRIO DA SAÚDE
SOMATÓRIO DE TODAS AS UNIDADES SANITÁRIAS DO DISTRITO

Mod. SIS-C03

SEMANA _____/_____ A _____/_____

BOLETIM EPIDEMIOLÓGICO SEMANAL	Nº

SARAMPO 055								037 TÉTANO RECÉM NASCIDOS		*MALÁRIA 084				045 PARALISIA FLÁCIDA AGUDA		†071 RAIVA	
Menos de 9 meses		9-23 meses				24 meses e mais				0-4 anos		5 anos +					
		Não Vacinados		Vacinados													
C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O

DIARREIA 099						009.2 DISENTERIA		001 CÓLERA		020 PESTE		MENINGITE *036			
0-4 anos		5-14 anos		15 anos +								0-4 anos		5 anos +	
C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O

C = Casos O = Óbitos — = Sem casos … = Sem informação * = Suspeitos incluidos †C = Mordedura de animal

(1) Nº de U/S no distrito	(2) Nº total de BES recebidos	(3) Nº BES chegaram a tempo	Percentagem a tempo
			$\frac{(3)}{(1)} \times 100 =$

……
……

H.Mod. SIS-C03

REPÚBLICA DE MOÇAMBIQUE
DISTRITO _____
MINISTÉRIO DA SAÚDE
SOMATÓRIO DE TODAS AS UNIDADES SANITÁRIAS DO DISTRITO

SEMANA _____/_____ A _____/_____

BOLETIM EPIDEMIOLÓGICO SEMANAL	Nº

SARAMPO 055								037 TÉTANO RECÉM NASCIDOS		*MALÁRIA 084				045 PARALISIA FLÁCIDA AGUDA		†071 RAIVA	
Menos de 9 meses		9-23 meses				24 meses e mais				0-4 anos		5 anos +					
		Não Vacinados		Vacinados													
C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O

DIARREIA 099						009.2 DISENTERIA		001 CÓLERA		020 PESTE		MENINGITE *036			
0-4 anos		5-14 anos		15 anos +								0-4 anos		15 anos +	
C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O

C = Casos O = Óbitos — = Sem casos … = Sem informação * = Suspeitos incluidos †C = Mordedura de animal

(1) Nº de U/S no distrito	(2) Nº total de boletins recebidos	(3) Nº que chegaram a tempo	Percentagem a tempo
			$\frac{(3)}{(1)} \times 100 =$

I. SIS-D04 - Boletim Mensal do Posto Sentinela

BOLETIM MENSAL Nº ….. / ……. DO POSTO SENTINELA …….		TOTAL		TOTAL DESDE O INÍCIO DO ANO		
DOENÇAS TRANSMISSÍVEIS		CASOS	ÓBITOS	CASOS	ÓBITOS	TAXA DE MORTALIDADE*
PARALISIA FLÁCIDA AGUDA						
DÍFTERIA						
HEPATITE INFECCIOSA						
MENINGITE MENINGOCÓCICA	0-4 ANOS					
	5 ANOS +					
MENINGITE OUTRAS FORMAS						
TUBERCULOSE EXTRA-PULM.	MAL DE POTT					
	OUTRAS FORMAS					
TRACOMA						
FEBRE TIFOIDE						

* Taxa de mortalidade = 100 x (Óbitos/Casos)

DOENÇAS NÃO TRANSMISSÍVEIS		TOTAL		TOTAL DESDE O INÍCIO DO ANO	
		CASOS	ÓBITOS	CASOS	ÓBITOS
HIPERTENSÃO ARTERIAL					
AVC / TROMBOSE					
DIABETES MELLITUS	ID (T1)				
	NID (T2)				
TRAUMA					

ASMA				
NEOPLASIAS MALIGNAS				

ID = Insulina Dependente NID = Não Insulina Dependente

BOLETIM DE NOTIFICAÇÃO DE DOENÇAS TRANSMISSÍVEIS

POR TODAS AS UNIDADES SANITÁRIAS DO PAÍS

BOLETIM EPIDEMIOLÓGICO MENSAL Nº 5/2007

O DIRECTOR

Província	Nº de Distritos na Prov.	Nº de BES recebidos	Nº de BES a tempo	% a tempo
Maputo Cidade	4.0	4	4	25.0
MAPUTO PROVÍNCIA	8.0	8	8	25.0
GAZA	15.0	12	12	20.0
INHAMBANE	15.0	12	12	20.0
SOFALA	14.0	28	28	50.0
MANICA	...	...	...	*
TETE	14.0	28	28	50.0
ZAMBEZIA	18.0	36	29	40.3
NAMPULA	...	...	...	*
NIASSA	...	...	...	*
CABO DELGADO	...	...	...	*

* = IS NOT POSSIBLE TO CALCULATE THE PERCENTAGE

OBSERVATIONS: