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Drugs Logistics Management Information System in Mozambique: Challenges and Opportunities

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ABSTRACT

***Key words*: logistics management information systems, information systems as social systems, decentralization, institutionalization, computerization, adaptations and customizations.**

The reported research is concerned with the difficulties and barriers that the Mozambican health system is facing in drugs logistics management, especially relating to its information and drugs flows. The research focuses on understanding the existing information flows in relation to stock imbalances of medicines in the health care facilities. In what ways does the current logistics management plan designed by the Ministry of Health respond to the needs of the health facilities? What are the constraints of the health logistics information system regarding managing the supplies of medicines? And lastly, what role do information and communication technologies play in the health logistics management information system? Answers to these questions are explored through an empirical analysis, and some recommendations for action are developed.

The research took place in two districts in Mozambique. To approach the problem, interviews and literature review were performed.

The problems in the drugs logistics management information systems (DLMIS) are concerned with the existence of small budgets to sustain the growing demand of the country. Medicines supplied to health facilities are normally what exists in the main storages of the country and not what is requested. Lack of culture of information, the scarce existence of human resources, and other resources such as transport, adversely influence the functioning of the logistics system and the logistics information system. Although the Mozambican logistics system is considered as one of the best in Sub-Saharan Africa, it is extremely ineffective.

The policies of the country and the social system are some of the factors why the DLMIS are in such a situation, specifically the hierarchical structure of the health department and the centralized way of functioning.

The study adopted the approach that an effectively functioning DLMIS can support the more effective drug flows to the health facilities. However, making improvements in the DLMIS is a complex task, since it is influenced by many cultural-political factors. A social system perspective was adopted to study the functioning of the DLMIS, existing constraints, and identify points of action.

DEDICATION

To my mother and my father.

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ALPHABETICAL LIST OF FREQUENT ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
APE	Agentes Polivantes Elementares
BM	Banco de Moçambique
CMAM	Central de Medicamentos e Artigos Médicos
CTTF	Technical Commission and Pharmaceutical Therapy
DLMIS	Drugs Logistics Management Information Systems
DAG	Administration and Management Directorate
GDP	Gross Domestic Product
DHI	Department of Health Information
DPC	Planning and Co-operation Directorate
DNS	Health National Directorate
DPS	Provincial Directorate
FNM	Formulário Nacional de Medicamentos
HIS	Health Information Systems
HIV	Human Immunodeficiency Virus
ICT	Information and Communication Technologies
INE	Instituto Nacional de Estatísticas
IT	Information Technology
LMIS	Logistics Management Information Systems
LNCQM	Laboratório Nacional de Controlo de Qualidade de Medicamnetos
MCIT	Ministério de Comércio, Transportes e Comunicação
MEDIMOC	Medicamentos de Moçambique
MISAU	Ministério de Saúde
MPF	Ministério do Plano e Finanças
NEP	Núcleo de Estística e Planificação
NGOs	Non Governmental Organizations
OGE	Orçamento Geral do Estado
PAV	Programa Alargado de Vacinações
PESS	Plano Estratégico Sector de Saúde
PHS	Public Health Service

PIP	Population Information Program
PME	Programa de Medicamentos Essenciais
SMI	Saúde Materno Infantil
SADC	Southern African Development Community
WHO	World Health Organization

CHAPTER I

INTRODUCTION AND RESEARCH OBJECTIVES

1.1 INTRODUCTION

Health is an important indicator of the status of development of a society and country. While in the developed world citizens have access to both public and private health care services, typically the common citizens in the developing world are largely dependent on the public services. These countries are typically very resource strapped, both in terms of material and personnel, and struggle to combat rampant diseases. Managing these scarce resources effectively becomes a crucial task, and a significant aspect in this regard is the role of health information systems (HIS), which is the focus of this thesis. HIS can play a vital role in supporting effective health management, and more broadly contribute to the health of the population.

Health information systems include different forms of data, including the routine monthly data, epidemiological statistics, services, finances, human resources, and supplies of drugs or medicines (Mwaluko, 1996). The focus of this thesis is specifically on Logistics Management Information Systems (LMIS) related to medicines. For the rest of this thesis, I refer to this focus by the acronym DLMIS. DLMIS are aimed at producing information to decide which medicines to place where, when, for whom, and at what costs. Also, I refer to medicines by using the term drugs in the good sense of the word. The problem typically faced in DLMIS, especially in the context of developing countries, is that the flows of information and medicines are not well synchronized, leading to many problems, including stockouts, expiry dates, poor treatment of patients, and sometimes even death. The design and

development of good DLMIS is thus an extremely important aspect of health care.

Good information systems are desirable, but unfortunately as the World Health Organization (WHO), (2000) emphasize, they do not in fact exist. HIS, especially in developing countries, have typically been found inadequate in providing effective management support because of these systems being primarily “data”, rather than “action” driven. This implies systems that are typically aimed at filling endless registers, sending reports without obtaining adequate feedback, collecting data that is not very helpful for management decision making because they tend to be incomplete, inaccurate, untimely, obsolete and often unrelated to health priorities.

Data on the primary health care systems is collected at the community level and then is transmitted up to the levels of the administrative hierarchy where various decisions have to be made, including resources allocation. However, what is often found is that the transmitted data typically end up on the dusty shelves of an office at the upper level of administrative hierarchy and unused for decision-making. The gathered data typically has little relevance, is of poor quality, and is inadequately used. The lack of timely reporting and feedback, duplication and waste due to parallel existing HIS are some of the reasons why current systems in developing countries are not providing expected benefits (WHO, 2000).

The research presented in this thesis seeks to contribute to the theoretical and practical domains. Theoretically, it is targeted to the efforts of information systems researchers engaged in the study of HIS, and more specifically DLMIS, in the context of developing countries. Actually, the study seeks to contribute to the work of the Ministry of Health of Mozambique (MISAU) and various departments responsible for financial management, HIS, planning and logistics of medicines. Specifically, the thesis focuses on the problems related to how relevant information is being collected, stored, processed and then delivered to the upper levels of the health administration.

This can help to identify approaches to address the problems, and more broadly contribute to the thinking around the phase of restructuring and reform which the health sector in Mozambique is currently immersed in. One example of the reform is the emergence of the private health sector, so, a contribution could be focused on how the Ministry of Health (MISAU) can control the logistics of medicines for this new sector.

Allocation of any kind of products, in this case medicines, involves a diverse range of related activities, including planning, organising, control, communication and implementation of tasks associated with the storage, transportation and distribution of medicines and supplies. These activities together can be seen to represent ***the problem of logistics***.

> Logistics management can thus be defined as the task of trying to place the right good, in the right quantities and conditions, at the right place, at the right time, for the right customer, in the most cost-effective manner (DELIVER, 2001).

A good DLMIS has direct implications on the provision of medicines to hospitals and primary health care systems by supporting decisions to make required medicines and supplies available to provide care to people who are sick. The lack of medicines in the worst case, can lead to the death of people.

Hardon et al. (1998) argue that:

> Research into pharmaceuticals use and distribution needs to clarify the focus – whether it is user or provider oriented, and if the issue at stake is the illness or the drug.

The study reported in this thesis is provider-oriented, focusing on the governmental systems that are responsible for the provision of health care, and the issue at stake is neither a particular drug, nor an illness but the information flows relating to medicines and supplies.

The research adopts a perspective of ***information systems as social systems*** to emphasize the complex interlinking of multiple issues (Walsham, 1998). Such a social system perspective encourages us to see the DLMIS as being influenced directly and indirectly by a variety of aspects, including a weak information culture, inadequate human resources, the great physical distances over which the information has to circulate, inadequate policies surrounding HIS, and poor infrastructure.

1.2 RESEARCH OBJECTIVES

The research is concerned with understanding the flows of information through the different levels of the national health care system, and the various problems and challenges that are experienced. The aim of the research is to assess the existing logistics system in Mozambique and suggest ways to integrate the HIS more coherently with the physical supply of medicines. The basic assumption of this research is that improved DLMIS can help to strengthen the logistics systems around the delivery of medicines to health care facilities. Data and information if properly collected and sent on a timely basis to users - decision-makers could potentially be helpful, for instance, on deciding what medicines to deliver, how much, where and when.

Attempting to reach the main objective of the research of assessing the existing DLMIS in Mozambique, and its current problems and potential remedies, the following specific objectives are identified:

- Identify the problems of the current DLMIS and the relation of the DLMIS to support the flow of medicines;
- Identify the effects of these problems on the health system;
- Identify the existing and future potential role of information and communication technologies in the DLMIS;
- Identify and recommend solutions to the problems encountered.

1.3 PERSONAL MOTIVATION

In Mozambique, it is common for patients not to find the medicines prescribed by the doctor, in the pharmacies of the public health units. The wish to know why the medicines are not enough motivated me to write this thesis. I hope that with this thesis I will help the relevant decision-makers to try to reduce this problem by identifying some of the reasons for this and suggesting some recommendations. This will be done from an information perspective to the problem, given my background and experience as an Information Technology (IT) technician. More broadly, I want to contribute to making the people of Mozambique healthier.

1.4 RESEARCH SETTING

Mozambique is the setting of the research. Two districts situated in the south of the country were visited, namely Moamba and Chicumbane. Mozambique is situated in southern Africa, and it is described as one of the poorest countries of the world. Malaria, AIDS (HIV) and diarrhoea diseases are the main causes of death. The country is in the process of restructuring, after having been devastated by a terrible civil war. So, the health sector is one that was most affected by the war and it is in a stage of very serious reforms in order to provide all Mozambicans with basic health care.

1.5 PHARMACEUTICAL SUB-SECTOR

The pharmaceutical sub-sector within the National Health Service is the sector responsible for the provision of drugs for the public and private sectors in the country. Weak management, lack of resources, and existence of poor culture of information, are some of the patterns of the functioning of this sector that are described in a later chapter that focuses on challenges and opportunities.

1.6 RESEARCH METHODS

The research methods used were mainly based on interviews with managers and pharmacists at MISAU and in the two visited districts, Moamba and Chicumbane. The literature review was also another method used to acquire data for the thesis. This last method helped me to find what was already written about DLMIS in developing countries, so I could have a broader idea about the main problems in DLMIS in the developing countries.

1.7 STRUCTURE OF THE THESIS

The Chapter following the introductory chapter, Chapter 2, describes the logistics systems, situates the reader on what the logistics systems is and the importance of having a well functioning LMIS. This chapter also presents issues of information systems as social systems, logistics management information systems and health information systems more generally in developing countries. Chapter 3 describes the study context of Mozambique, including its profile, the health care system, and the health management information system. The objective is to situate the reader in the setting where the study has taken place. Chapter 4 describes the core of the research, which is the pharmaceutical sub-sector in Mozambique. After that, it is the research method chapter, Chapter 5, where the research methods and approaches used to perform the study are described. Chapter 6 provides the case study description, and

presents the findings of the research. Chapter 7 presents the analysis, and lastly Chapter 8 presents the discussion of the case studies, followed by the concluding Chapter 9.

CHAPTER II

LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, I present the key concepts related to LMIS, the expected benefits from improved LMIS, the need for a LMIS and how it should work. Most of the statements about the logistics systems in this chapter are based on the Population Information Program (PIP), (2002), which includes family planning LMIS. The second part of this chapter describes the findings of DLMIS from research already done in other developing countries, the problems encountered and solutions adopted.

2.2 LOGISTICS SYSTEMS

A consistent supply of medicines does not happen by itself. It results from a well-managed logistics system supported by adequate and reliable funding.

> Logistics management is not just a set of operations to move products from one place to another, but rather a key element on helping the patients to meet their needs and to achieve the goals of various health programs (PIP, 2002).

> Logistics refers to activities concerned with selecting, financing, delivering, and distributing supplies. The term ***supply chain*** describes the various organizations and activities that are linked to the delivery of supplies from the manufacturer to the different agencies involved,

> governmental and private, on to the end clients. Similarly the term ***pipeline*** refers to the flow of supplies through storage and transportation facilities – including port facilities, central and regional warehouses, province and district stores – to service delivery points and to end users. In fact the terms "***supply chain management*** "and "***logistics***" are often used interchangeably (PIP, 2002).
>
> Logistics systems are complex argue (PIP, 2002). Many local and international manufacturers provide medicines to developing countries as a part of their efforts to support the various health programs in the country, for instance, contraceptives for family planning programs. The delivery of contraceptives is facilitated through a variety of donors, government, policy–makers, and program managers who perform different functions. Central, regional, province warehouses and district facilities are responsible for the physical storage and different transportation systems for the distribution of contraceptives. At each stage of the supply chain, organizations and managers are expected to collect, analyze and share information and co-ordinate their activities.

For logistics systems to be effective there is a need for strong political commitment, leadership and management, and training and support for the people who are responsible for the functioning of the supply chain work. Key to effective LMIS is the need for good skills product selection, accurate forecasting and procurement, and reliable distribution, including storage and transportation processes. All these activities need to be supported by adequate and reliable funding.

Within the logistics system, each activity depends on and also supports all the other activities. For instance, the variety of medicines that the system delivers should reflect the needs of the clients and also help to implement the health policy of the government. The quantities of each medicine procured should reflect the consumptions and the prevalence of diseases in different areas. Also, each stage of the

logistics system should include monitoring and evaluation of the quality of the products themselves and of the performance of the supply chain.

> Today, many developing countries cannot obtain enough medicines for several reasons, such as incremental demand for medicines and the costs involved. For instance, more women are in their childbearing years today than in the past, and this increase is not matched by a corresponding augmentation of budgets for the purchase of required medicines. Improving the logistics management has become essential to make better use of existing supplies, by getting more realistic data on needs, and improving the resources and supplies to support the delivery processes (PIP, 2002).

2.3 EXPECTED BENEFITS FROM IMPROVED LOGISTICS

With improved logistics systems, better efforts can be made to avoid losses of medicines and respond more effectively to health demands. These improvements can lead to better availability of medicines and improvements in the quality of health care, by stretching the limited resources, a little further. For instance, in family planning programs by having adequate supplies of contraception, citizens can be helped to achieve their family planning intentions better, and with the overall health of the population.

> Improved logistics systems can provide better accountability and, thus, help strengthen the trust of the population towards policy-makers, donors and government. Getting more for less can cut program costs without sacrificing services. For example, a study in Bangladesh found that streamlining the distribution network by decreasing the number of levels in the supply chain from five to three would reduce logistics operating costs by 66%, transportation costs by 29% with no reduction in contraceptive supply (PIP, 2002).

A study done by Agência Suiça para o Desenvolvimento e Cooperação (SWISS), (2000), where they found that the non-existing of medicines at the health units is a barrier to the use on the health units. That is, when the patients know that the heath units are not well supplied, they prefer to go to witch doctors, because they are sure that there, they will find medicines and be healed. It means that a well-supplied health unit signals trust to the patients. Also, the survey found that the patients advice the pharmaceutical service to be the priority in the improvement of the health sector.

> A strong supply chain helps reduce program losses by minimizing waste and damage and preventing products from expiring on the shelves. For instance, in Kenya, introducing a new tracking and distribution system has helped to reduce overestimates of demand and improve forecast since 1995. For example, a US$6000,000 supply of KITs was projected to serve 143 sites for one year. When the new DLMIS was put into effect, program managers were able to use the same supply of KITs to serve more than 500 service sites for over two years (PIP, 2002).

> When programs, policy-makers, and donors recognize that logistics systems are important to ensure the continuous availability of medicines, they can do more to strengthen the supply chain. Improvements to every part of the supply chain can help. The overall DLMIS strengthening information systems, improving the management and staff performance, focus on meeting the needs of citizens, improving forecasting and procurement and getting supplies to the clients are crucial steps that have to be taken into account in the improvement of the supply chain (PIP, 2002).

After providing a brief overview of the logistics system, in the next section. I discuss more specifically the information system to support the logistics management, referred to as LMIS.

2.4 LOGISTICS MANAGEMENT INFORMATION SYSTEMS

A logistics management information system is necessary in order to provide management with the knowledge to make strategic and operational decisions about providing supplies.

> The information system must be capable of effective data retrieval and data processing, data analysis and report generation. The speed and quality of the information flows have direct impact on the cost and efficiency of the entire logistic system. Slow and erratic communications can lead to loss of clients or excessive transportation, inventory, and warehousing costs, as well as possible manufacturing inefficiencies through frequent line changes. The order processing and information system forms the foundation for the logistics and corporate management information systems (Lambert et al., 1998, p76).

> The LMIS may be fully automated or manual, and most of them are somewhere in-between. Depending on the sophistication of the system, the quality and speed of information flow will vary (Lambert et al., 1998, p90).

> Generally, manual systems are very slow, inconsistent, and error prone, with frequent information delays. A manual system seriously restricts a company's ability to reduce total costs while simultaneously maintaining or improving customer service. Some common problems include the inability to detect pricing errors, and lack of access to timely credit information, or difficulties in determining inventory availability. Timely and accurate information has value. Computerized systems can potentially help managers to integrate various aspects of the logistics systems and allows the reduction of costs through improved inventory and freight management. The communication network is clearly a key

factor in achieving effective logistics systems (Stock and Lambert, 2001, p165-166).

2.4.1 Data collection, recording and reporting

Limited essential data is adequate for managing the supply system argues (PIP, 2002), but that must be available for every product, at every level, and all of the time. The five essential types of data in the LMIS are:

- Stock on hand

Supply chain managers must know exactly what products and how much of each item are in stock and where the stock is located. Data about stock on hand should provide this information. At the service delivery level, data on stock on hand guides decisions, such has when should a new order be placed. A well-designed LMIS converts data on quantities of each product into information on how long current supplies will last (months of stocks on hand). To do so, managers need to compare available supplies with average rates of use that helps to make estimates about when to order new supplies.

- Consumption by clients

Various authors say that a top priority for LMIS is to collect and report accurate information about clients' consumption and use of various supplies. In LMIS terminology, this information is termed "*dispensed-to-client*". Program managers use the data to determine how many supplies to order and for each particular project needs.

- Losses and adjustments

Even the best logistics systems experience some supply losses due to expiration, theft, damage, or mishandling. Losses and any other adjustments in supplies – such as transferring supplies from overstocked locations – must be recorded and reported separately from data

consumption. These separate records allow managers both to deal with the causes of losses and adjustments and to develop more accurate forecasts of future client demand.

- Dates of orders/ receipts and amounts on order

Dated transaction records, usually called "***issue vouchers***" or "***requisition and issue vouchers***", govern the flow of supplies from one point in the supply chain to the next. For example to prevent contraceptives from being lost during shipment, both the facility sending and receiving are responsible to track the amount requested and the dates that the supplies were ordered and received. The interval between ordering and receiving products is known as "***lead time***". When managers know the lead times, they can set maximum and minimum inventory levels and can calculate when to reorder. Managers who wait too long to reorder, run the risk of stockouts, and those who order too soon spend more on interest costs, transportation and may be after stocking costs. Risking losses due to product expiration is another important consideration in ordering decisions.

2.4.2 Analysis and reporting

An LMIS can generate, for instance, inventory management reports (inventory status and losses), transportation administration reports (transportation history) and income from the sale of medicines. This information can enable decision-makers to evaluate the performance of LMIS and to make improvements.

LMIS data have to be very carefully analyzed at each level where it is collected, so that the information to be reported will be accurate and will enable decision-makers to make decisions based on secure information. Reporting should not be based only on filled forms, but also on calculating relevant indicators.

Analysis of data at the places they go through allows stakeholders of whole supply chain to be aware of what is happening and so make the decisions needed. Analysis and reporting are inter-related, as reports cannot be effective if not adequately analyzed. Analyzing is not possible without proper reports.

Recording, analyzing and reporting data are often difficult, especially where programs lack modern information technologies (PIP, 2002), and this is a typical problem of developing countries. In many developing countries LMIS reports move from the health unit level to the central level on a fixed timetable. A better approach suggested by (PIP, 2002) is to link reporting to re-supply. Improving the LMIS requires the commitment of various stakeholders.

2.4.3 Linking LMIS with other information systems

Health information systems (HIS) are essential to health service delivery organizations. In developing countries where HIS are currently being improved, there are many issues being raised related to LMIS, such as whether to include the LMIS contraceptive in an HIS umbrella, or to consider the LMIS contraceptives with their pharmaceutical LMIS (PIP, 2002).

Although the HIS and LMIS have different purposes, the two systems can be made compatible and complementary. For instance, summary data of LMIS on stockouts can be reported to the HIS for planning purposes. As for LMIS, HIS can collect service statistics, such as rates of health centre use of medicines and types of health problems.

In this chapter I have discussed some issues relating to the nature of DLMIS and the issues involved in its design and use. In the next section, information systems are described as social systems and then some LMIS case studies from developing countries are presented. The point on information systems as social systems will help to strengthen the discussion of DLMIS as social systems.

2.5 INFORMATION SYSTEMS AS SOCIAL SYSTEMS

This thesis emphasizes that information systems are essentially social systems of which information and communication technologies (ICT's) are part.

According to Land (1992), every information system is made up of a number of components. Some of the components are artefacts (pencil and paper, word processor, computers and communications networks, operating systems and procedure manuals), and people (customers, suppliers, managers, clerks, etc) to construct, work with, and operate such artefacts. Even completely automated information systems are made up of people. Information systems are influenced by the environment, history of the system, infrastructure (the organizational structure, apparatus, training, advisory and help facilities to support the information systems activities of the user community), the socio-cultural, and economic (financing) issues. In fact, information systems rely on people using and interacting with.

Taking into account just the data collection, processing and reporting process as information system without considering the components described above will not be enough to draw arguments as to whether the LMIS are "*weak*" or not, and how to improve them.

A person has to perform tasks in relation to the social world. The information user may be a manager taking a decision, perhaps a simple decision such as confirming an order, or a complex one concerned with some aspects of planning. Or the information user may be a clerk carrying out some tasks, perhaps recording details of orders of medicines or consumptions.

2.6 LMIS STUDIES IN DEVELOPING COUNTRIES

A review of existing literature in the area of LMIS in developing countries reveals that problems related to the components of an information system described above influence the performance of any LMIS. Also any assessment of the design and implementation of the DLMIS is to be carried out in order to identify the weakness and the strengths of the DLMISs. Such analyses lead to improvements that vary with respective customizations, adaptations, institutionalisations and decentralization attempted in different countries. My literature analysis helped me to identify three key sets of issues related to DLMIS in developing countries:

1. Organization related
2. Medicine stock related
3. Information system related.

Organization related

Normally, health information systems in developing countries are run by the Ministry of Health (MOH), which is typically a large bureaucratic organization, with a focus on elaborate and excessive rules, formal relationships and a very hierarchical structure. There are frequent changes in the leadership, which tend to cause major disruption in the logistics system (Chandani and Breton, 2001).

This point has also been emphasized by DELIVER, an organization that is being administrated by John Snow Inc. and promoted by USAID (John Snow Inc., 2000).

DELIVER argues the need to *decentralize the highly centralized logistics system in developing countries*. This will help freedom, scope and resources to achieve organizational goals. People will in effect lead themselves, empowerment, by the extension of democratization in management and the fading of the authoritarian leader (Sims et al., 1998). However, these decisions have to be thought carefully, because

decentralized decisions requires local managers to be provided with the resources to execute decisions. This, in turn, involves larger scale organizational transformations.

Medicine stock related

Chandani and Breton (2001) in their study of contraceptives distribution in the Philippines and Morocco emphasized that:

> The number of problems related to the stock levels with medicines being over or under stocked in the health facilities. The distribution of medicines often does not take into account the local needs, and often medicines sent are those, which are in the head office inventory, rather than what is required locally. Another problem concerns the shelf life of medicines, and many times medicines sent to developing countries are those that have expired and sometimes even banned in the western markets.

Wilson et al. (2001) have also noted similar problems in their study of family planning logistics management in Kenya there were frequent stock-outs, prolonged shortages in many districts and overstocking. There was a need of a computerized system that would rationalize distribution and ensure that districts were adequately stocked on a sustained basis.

Information system related

Chandani and Breton (2001) point out that:

> Logistics information is often not adequate for inventory management decisions. The information that lies at the heart of problem of stocks is that the logistics information produced consists only of summary information for consumption and stock levels are provided rather than the detailed information required. These summaries just give overviews of the "real" situation and in LMIS it is necessary to ensure that the

> managers at higher levels know in a detailed way of what is happening at the lower level. For example, the stock situation should be known at the facilities, rather than aggregated, and then it should be possible to anticipate facilities' needs and reduce the uncertainty and improve inventory levels.

The other problem that has to be taken into account, as discussed by Wilson et al. (2001), is that the informational infrastructure does not permit to get essential data about local needs to feed into the logistic system. For instance, in their study, they found that the content of the forms did not collect essential data, consumption information of the district was not updated. There were information delays on the way to the decision-maker, the distribution managers at the Ministry did not know what the actual district level of consumption (demand) was, nor what stocks were already available in the district stores.

To deal with these problems, the reviewed cases in the literature have emphasized the need to improve information flows and the management of the logistic system. It has been argued that Information and Communication Technologies can play an important role in the improvement of LMIS initiatives. For example, Wilson et al. (2001) argue that:

> Computerized systems can place the critical information needed for rational distribution at the fingertips of distribution managers. This will enable them to maximize routing efficiency and vehicle capacity, and thereby try to eliminate stockouts and prevent shortages.

But, these computerized systems cannot be taken as the main part of the improvement or the restructuring of the DLIMS in developing countries, because there is a lack of many essential resources, for example, electricity, and adequate infrastructures are not there.

2.7 ANALYSIS OF RELATED LITERATURE

The various studies referred to above (for example, Chandani and Breton (2000), Wilson et al (2001) and DELIVER (2001)) have argued that improvements in the LMIS in the respective countries have consequently leaded to improvements in the health systems.

> Although deploying information systems should not be viewed as a panacea for solving problems inherent in any country, an effective DLMIS that provides a flow of complete, accurate, and timely data can help health program managers improve their systems: by reducing commodity costs, enhancing program management, informing policymakers by providing decision-making data, providing better and more consistent customer service, allowing greater control of medicines, and accountability (Chandani and Breton, 2000).

In recent years, considerable interest has been focused on the need to reform information systems as a way of improving health care delivery. The impetus for the development of improved information systems for health has come simultaneously from several directions. Sandiford et al (1992) examines the motives behind each group's interest in the development of health information systems, namely health service managers, public health specialists and the information technologies experts and the mechanisms by which they expect these interventions to lead to improvements in health status:

> From the managers the promise is that the information is seen now as one of the keys to ensuring a rational allocation of resources and setting of priorities For the epidemiologists, in contrast to the economists and managers who are mainly concerned with the efficiency of the health system, the interest is in information as means to improve the

> effectiveness of the system. That is, the ability to deliver interventions which improve the health status of individuals and the equity of the system or its ability to ration those interventions according to the health benefit that can be expected from them. The information technologies experts believe that microcomputers will not only lead to improvements in the quality of decision-making and permit the more efficient and rational use of resources, but they will also lead to significant reductions in the cost of data processing. They see real solutions to many of the problems plaguing health information systems, lying with informatics applications.

For better solutions, the three groups should work together, as they constitute all the stakeholders of the health information systems. But what is really happening in developing countries is that they work separately, and maybe that is why many attempts to implement the new technologies in developing countries have failed, at least if the two first groups (managers and epidemiologists) could work together it would be a very good initiative and start on the progress of the HIS.

2.7.1 Decentralization

Developing countries face a number of obstacles of dearth of technical skills for designing and implementing LMIS, lack of resources, inadequate infrastructures for technical and communication services, and low literacy levels (Chandani and Breton, 2001). These challenges are exacerbated for organizations working in the public sector, which must also deal with such barriers as formalistic bureaucracies oriented toward control rather than service, rapid staff attrition, and an underdeveloped organizational capacity of management.

To deal with the problems, many countries are attempting to decentralize the health sector.

DELIVER (2001), advises that:

> Decentralized decision-making is only happens when local managers are given the resources to execute those decisions, beginning with a detailed, indicator-based logistics systems assessment to understand the strengths, weakness, and constraints of the current system, examining planning assumptions critically (e.g., funding, personnel, organizational constraints, and time frames), developing a detailed plan for effective functioning for all aspects of the logistics cycle, and to be prepared to change the plan. And also, strengthen, or at least protect, the LMIS at all costs, ensure that logistics training to support decentralization is competency-based and accompanied with periodic follow-up and include logistics' oversight in supervision efforts.
>
> On the other hand, if local managers are not given the resources to execute those decisions, the new decision-makers after decentralization will not be empowered to decide because they will not have the necessary resources, and somehow they will still try to get it from the entity, which owns the resources.

An assessment of the DLMIS before the decentralization will help discovering the weaknesses of the actual DLMIS, and so planning the better one.

Although decentralization efforts have succeeded in many countries in different degrees, it has been very hard to achieve this success because of many constraints that these countries have to deal with.

Decisions on the reforms of the health information system, in this case the LMIS, have to be well studied, because an information system should be treated as a social system. As a result, various components of the information systems, such as the

environment, history of the system, infrastructure, people, socio-cultural and economic (financing) issues have to be carefully considered on deciding the kind of changes to be done, for instance, a decentralization of the system, and how these relate to existing problems of the LMIS.

2.7.2 Design and implementation of LMIS

LMIS have to be designed and implemented in such a way that it will process essential data and help in the management of medicines.

According to Boerma (1991), health information systems can be defined as a combination of people, equipment and procedures organized to provide health information to health workers (and others) in the way that enables them to make informed decisions. Principles underlying a good information system that were emphasized by Boerma are:

- Data collection should conform with data requirements (only relevant data have to be collected) and to processing capabilities. Too often large quantities of data are collected on a day-to-day basis, but they are not processed or are marginally relevant to decision making processes.
- Information collected should be simple to obtain. Only minimum required information must be collected so that analysis can be done quickly.
- Feedback to motivate the data collectors
- Providers of health information or data collectors should not only feed the information into the district, regional and national health information system, but should also be users of their own data.

There are two ways in which to collect data, *routinely* and *periodicall*y. The choice of the method used depends upon the frequency of occurrence of the event being studied and depends too, on a great extent on the costs involved.

Recording and reporting data, for ease of analysis, and in order to make the data comparable in time and space, data collection is standardized. Sets of forms are designed on which the collected data can be recorded. The sources of common errors are:

Forgetting to tally, misclassification, miscalculation, “cooking” figures are common errors within the LMIS. The design and implementation was described to take place through a series of *customizations, adaptations and institutionalizations* in Morocco and Philippines (Chandani and Breton, 2000). As the need for information may change over time, these changes must *be constantly evaluated and modified according to the new changes*. For example, if a new policy is set in the health sector it means also that something has to be changed at the HIS to fit the new policy. For example, data may need to be recorded, or some of old data be left out.

In the design and implementation of LMIS, a participatory approach has been shown to be effective as information systems are most likely to be used if users express a high level of satisfaction.

2.7.3 Computerization

Land (1992) argues that information systems are essentially social systems of which information technology is one part.

A computer can perform filing, compiling, and analysing tasks, as well as produce reports, if it is given the required instructions. A computer is a tool, which assists in the processing of information. Under no circumstances can a computer improve the output of a health information system or a monitoring and evaluation system if the initial data collection is poor.

> A computer does not "think", but only carries out instructions at a very high speed. If garbage is entered, then garbage will come out, even though the format may be changed and the presentation looks good (Boerma, 1991).

If the implementing capacity of the health sector is low – e.g., if there are few health facilities, vehicles and shortage of staff – *then computers are probably inappropriate*. A computer can only provide better data for improved health planning and monitoring and evaluation.

> Computers do not implement a health programme, but they can improve implementation through more efficient and effective use of resources. Computers do not collect any data. When the system has been established there is a tendency to adhere rigidly to the guidelines set up for information gathering, while the whole purpose of data collection is forgotten. Data collection is a useless exercise if the data collected is not improved (Boerma, 1991).

The solution taken by some countries is not to computerize the whole LMIS at once, *it is something done gradually due to many constraints of resources*. What Heeks et al (1999) call *incrementalism*, slow and incremental manner of introducing a system. Many countries face problems of essential resources as described above, so running to computerisation only, would probably lead to a mess. The decisions-makers' levels and the ones who seem to have some reasonable resources are the ones that are computerized. *The computerization of the LMIS must not come alone, the*

computerization has to be accompanied by changes in the way people work and think, because these people can continue for instance to introduce errors in the automated system or just processing data and not analysing it.

2.7.4 Ways of working

> The collection of data tends to be a national task, apparently arising out of the planning needs of central government departments, which use information in developing social, health care, political and economic programs or defining and forecasting expenditure. Thus the information gathering system is first designed at the highest level of the bureaucracy and, in theory at least, serves its disclosed or undisclosed ends. Second, information may be presented so as to achieve political and social ends. The top-down approach has several harmful consequences. Firstly, seldom those who may want to use the information specify the data they wish to have. Secondly it is very difficult and expensive to validate the information, and consequently errors easily creep in. Thirdly, there is long time lag between clinical events and contacts and their analysis in an epidemiological or statistical useful way (Opit,1987).

So, there is a need to change the way "things" work now. The decision to decentralize, computerize and design and implement new LMIS has to be accompanied by changes on how people think and on how people do the "things".

People cannot still think, for instance, that data is filled in the forms for someone else to use. Information gatherers have to start to analyze these data, produce information from it and use it, at all levels of the supply chain. It is necessary to create in the workers the culture of information.

Also, people working with information systems have to be motivated to do whatever they are doing. So, there is the important need to ensure the satisfaction of self-realization, esteem and social needs of people. These issues can be accomplished by paying people well and giving them responsibilities for their own work, assign demanding tasks and provide training programs to help people develop their skills (Sommerville, 2001).

Land (1992) says that it is necessary in the LMIS to consider who is filling data in what environment, with what resources, to know why the LMIS are not performing well. How do the structures of the system influence the flows of information? How are decisions around the LMIS taken, and in which basis? Looking at the LMIS in developing countries and not considering these broader issues can be considered to be incomplete, since they are all deeply influenced by the environment. These issues form what can be considered the real world, not just the study of the flows of information but also have to be considered the social issues around it.

Key concepts of LMIS, and expected benefits from improved logistics were presented earlier in this chapter. And after that, a presentation of the key points of LMIS to be taken into account for improvements of LMIS were presented.

From similar studies related to DLMIS in developing countries, three key sets of issues were identified and analysed through the problems and solutions taken.

As we already have the description of the problem to be studied, similar studies on DLMIS in developing countries, we are now going to describe the setting, where our study was carried out, starting by describing the profile of the country in the following chapter.

CHAPTER III

STUDY CONTEXT OF MOZAMBIQUE

3.1 INTRODUCTION

After describing what LMIS are in general, this chapter presents the context and conditions in which this DLMIS is implemented. I then describe the profile of Mozambique and the national health system, which helps to understand the broader influences on the DLMIS.

3.2 GEOGRAPHY

Mozambique is situated in southeast Africa. It is bordered in the south by South Africa and Swaziland, Tanzania in the north, the Indian Ocean in the east and on the west by Zambia, Zimbabwe and Malawi (see picture 3.1). It has a total area of 801,590 square kilometers (309,496 square miles).

3.3 DEMOGRAPHY

According to population projections made for the entire country by Instituto Nacional de Estatísticas (INE) (1999), the population is estimated at 18,521,246 for the year 2003, distributed unevenly in ten provinces and in the capital city Maputo. The majority of the population, about 75%, live in rural areas. About 50% are under 15 years old. The annual growth rate is 2.4% and the life expectancy is 42.3 years. The population density is 20.1 inhabitants per square kilometers. Table 3.1 shows selected social indicators of Mozambique compared with other South African Developing Communities (SADC) in Sub-Saharan Africa.

Table 3.1 – Social Indicators in Mozambique compared with other SADC countries in the Sub-Saharan (SS) Region in 1997 (These data come from different sources)

	Mozambique	**Malawi**	**Zimbabwe**	**Zambia**	**SS Africa**
Infant mortality rate	147‰	134‰	56‰	109‰	91‰
Mortality rate < 5 years	219‰	234‰	74‰	197‰	Not known
Maternal mortality rate	$1083/10^5$ LB	$6209/10^5$ LB	$153/10^5$ LB	$649/10^5$ LB	Not known
Gross mortality rate	21.2	22.4	14.6	18	17.7
Low birth weight	20%	20%	14%	13%	Not known

Source (Plano Estratégico Sector de Saúde (PESS), 2001)

From the figures showed in table 3.1 we can conclude that the infant mortality rate, the mortality rate, and the maternal mortality are among the highest in the selected counties. Gross mortality is high, although a bit less than the country with highest mortality rate. It drives us to say that the Mozambican health situation is the poorest compared with some African countries and with the world in general.

3.4 POLITICAL AND SOCIAL SYSTEM

Mozambique is an independent and democratic country. Administratively, it is divided into ten provinces and Maputo city, the national capital, has the status of a province. Each province is divided into districts. The President is the head of the State and of the government, elected by direct, secret and individual universal suffrage (vote). The executive power is held by the Cabinet Council, which is the government. Legislative power is held by the democratically elected parliament and the judicial power belongs to the tribunal. For the health sector, the way the country is administratively divided corresponds to the existing levels of the health care in Mozambique, as presented in the next chapters.

Picture 3.1 – Map of Mozambique

3.5 ECONOMIC SITUATION

3.5.1 Overview

In recent years, the country has been in a constant process of restructuring and transition. This process can be seen as divided broadly into two time periods: post-independence after 1975 and the post-civil war period after 1992 (the current period).

3.5.1.1 Post independence period (1975-1992)

Mozambique is one of the world's poorest nations. Over 90% of Mozambicans survive on less than 1 US Dollar per day and 80% of the population is composed of rural dwellers.

After independence from Portugal on 25th of June 1975, the first post-colonial developmental plan aimed at transforming the country's socio-economic and political landscape into a socialist *modus vivendi*, this is, the policy was to divide the goods equally among all Mozambicans.

Before the peace agreement of October 1992, from 1975 to 1992, Mozambique's economy was devastated by a protracted civil war and socialist mismanagement. Many people were displaced from their goods, having to move to the main cities, leaving behind agriculture activity that was the main source of subsistence. In the cities, the number of unemployed people, bandits and disordering increased. Schools, health units and many other infrastructures were destroyed. Hunger and poverty increased among the Mozambican population.

3.5.1.2 Post-civil war period (after 1992)

In 1992, the peace agreement between the two main parts, FRELIMO and RENAMO was signed, to end the destabilization caused by war and to start the democratization of the country.

In 1994, Mozambique was ranked as one of the poorest countries in the world. Since then, Mozambique has undertaken a series of economic reforms. Almost all aspects of the economy have been liberalized to some extent. For example, the health sector and education are partly privatized. The country depends on foreign assistance to balance the budget and to pay for a trade imbalance in which imports outnumber exports by three to one.

Today, Mozambique youth is leading the process towards the consolidation of democracy and eradication of poverty, the two main challenges that the country is facing.

As part of the reform process, the government has been attempting to modify and upgrade the socio-economic infrastructure of the country. For example, the government is building more schools and hospitals. Another initiative has been the construction and reconstruction of roads and bridges to allow better communication between different parts of the country. Poor existing infrastructure has deprived many people living in remote regions of the country of access to hospitals, schools, food and employment. Currently, there are tremendous disparities amongst the different regions in the country.

The health sector is a fundamental aspect of ongoing transformation efforts of the government. In this process of restructuring, the challenge for the health sector is to have the health units working well in the way that they can give confidence to the citizens. According to the Minister of Health (Notícias, 29/10/2002), the Mozambican health system is currently considered as a referral system that is not working effectively because the hospital capacity is very weak. This weakness comes from a local national economic system. The limited level of natural earnings is not enough to cover demands of the health needs. As a result, the health sector is under extreme pressure. The next section provides a discussion of the economic figures of the country.

3.5.2 Economic Status

According to statistics of 2000, the Gross Domestic Product (GDP) purchasing power parity of Mozambique is 19.1 billion, the GDP real growth rate is 3.8%, the GDP per capita purchasing power parity is 1,000 USD, and the inflation rate is 11.4% (The World FactBook, 2001). Agriculture, manufacturing industries and commerce are the largest areas in the primary, secondary and tertiary sectors, respectively. Along the coast, fishing also represents an important source of household income.

Although the country's characteristics are favorable to agriculture, which is the main way of subsistence for most of the population, the country presents poor agriculture outputs as a result of frequent floods, cyclones and droughts that sometimes reach disastrous proportions. These disasters cause death of people, animals and vegetation, leading to direct negative effects on the infrastructures and national economy.

The level of poverty is extremely high. More than 70% of the population is living below the official poverty line. The variables that determine poverty according to MISAU (2001c) are:

- Slow economic growth until the beginning of the 1990s.
- High level of illiteracy.
- High rates of dependency within households.
- Low family agricultural productivity.
- Lack of opportunities both within and outside the agricultural sector.
- Poor development of infrastructure particularly in rural areas.

In summary, low incomes of the population, low productivity, and the existence of poor infrastructure influence the low health quality for the population because people do not have access to basic health care due to lack of money and the infrastructures do not provide them with proper living conditions.

3.6 NATIONAL DEVELOPMENT POLICY

The national development policy adopted by the Mozambican government aims to reduce absolute poverty through key interventions in the sustainable economic and social development of the country.

Table 3.2 and figure 3.1 show the low level of use of Information and Communication Technologies (ICTs) in Mozambique.

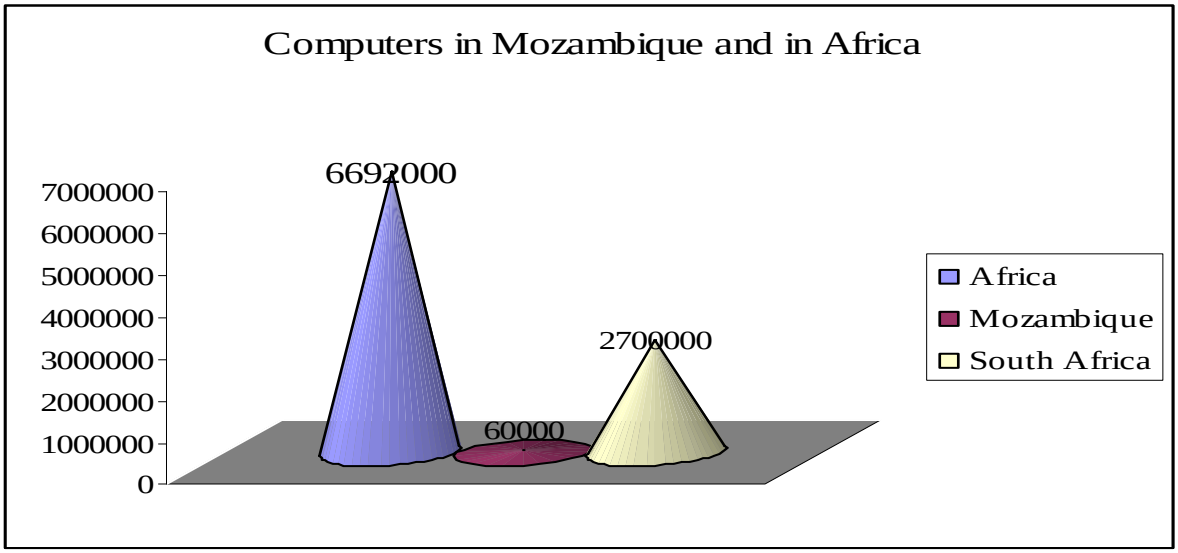
Table 3.2 – Selected Mozambican ICT indicators

Nº	**Description**	**Current Values**	**Projections**	
			Short Terms (2 years)	**Medium Terms (4 years)**
	ICT Indicators (Telecommunications, Internet and Computing)			
1	Teledensity (Fixed Lines) Number of fixed lines	0.5% 85,000	2% 340,000	4% 680,000
2	Mobile teledensity Number of mobile subscribers	1% 170,000	4% 680,000	6% 1,000,000
3	Number of computers Density (Computers/Inhabitants)	60,000 3/1.000	300,000 2/100	600,000 3/100
4	Number of schools connected to the Internet	13	25	200
5	Number of Internet Service Providers (ISPs)	18	20	50
6	Number of Internet Subscribers Density of Internet Users	2,536 2/10,000	10,000 6/10,000	2,000,000 11/100

Source (Chemane, 2002)

The use of computer and access to Internet is still very poor in Mozambique. The country has around 18,000,000 inhabitants but current values show that just 2 people in 10,000 are Internet users and 3 in 1,000 are computer users. It means that there is still a long way to go in the use of ICT.

Figure 3.1 – Computers in Mozambique and in Africa



Source (Chemane, 2002)

The absence of a policy or common reference led to the adoption of ICTs in a casual, disorderly and uncoordinated manner with all the negative consequences deriving from it: duplication of efforts, inadequacy and incompatibility of solutions, and unnecessary high costs. Thus, the general objective of the ICT Policy is to provide (i) points of reference for the harmonious development of the information society in Mozambique and (ii) a basis for legislation and plans of action in this field (Opoku-Mensah, 2002).

Mozambique's National ICT policy was approved by the Cabinet Council on 30th May 2000. The Information and Communication Technology Policy, provides principles and objectives that permit ICTs to be a motor force for various aspects of national development, contributing toward the country's participation in the global economy. The policy sees information and knowledge as the key basis to better governance, wide access by citizens to the information society, eradication of absolute poverty, improvement of the living conditions of Mozambicans, and the conversion of the country from a mere consumer to a producer of ICTs (Opoku-Mensah, 2002).

In the health sector, the ICT government policy will help to obtain information to make adequate decisions for health and increase the knowledge about healers and in this way improve the access to health care for the citizens in updated models and patterns.

After having described the profile of Mozambique, I next describe the health sector profile of the country.

3.7 THE HEALTH SECTOR IN MOZAMBIQUE

The general problem in the health sector is that primary health care services are not accessible to everyone. This problem is due to the lack of funds, human resources and infrastructure, difficult communication and access to the remote areas. Nurses run some of the health centres and posts and a number of them do not have adequate educational background. Some of the health facilities have been closed because of the lack of skilled people and patients are transferred to the health facilities, which have such resources.

Despite the health sector having significant funds allocated to it, given the magnitude of the existing problems, this allocation can be seen as limited. For instance, for the year 2002, the Ministry of Finance limited the budgets to the health sector (MISAU and the Provincial Directorates) to around 53,961 USD while the MISAU had estimated to spend nearly 62,454 USD (MISAU, 2001b). Although these numbers increased from the year 2001 in 11% and 23%, they do not cover the needs of the country. Another problem concerns the inequitable distribution arising from the concentration of the health care in the big cities, making it necessary for the majority of the population to travel long distances to find a health unit. As a result, more than half of the population do not have access to the benefits of the National Health Service, which is the main organization in Mozambique that provides health care.

The Minister of Health considered the health situation to be dramatic because there are many people that do not have access to the primary health care, and from the other site the national health system have serious difficulties on providing health care to citizens due for instance of lack of qualified human resources and infrastructures, although many investments are done in health sector (Notícias, 29/10/2002). The question that arises is investments are many, are they covering the extent of the country needs, how are the investments distributed?

From the total of 1,197 health facilities in Mozambique, half are health posts. Even those that are hospitals, 20% have minimal conditions to provide health care. For the entire country there are 15,000 beds, which clearly are not sufficient. Statistical data show that there are 0.8 beds for 1000 patients. At the maternity site, the situation of beds is better when one bed is for 1000 women (patients), (Notícias, 29/10/2002).

The existing limited number of health workers struggle to provide care to the patients using poor resources and capabilities. So, filling data, analysing data is not a priority, since it is not directly related to the cure. The priority is to heal the patients.

3.8 THE NATIONAL HEALTH SERVICE (SNS): REFERRAL SYSTEM

The National Health Service (SNS) comprises the public health sector, the private health sector including institutions for profit and others which are not for profit, practitioners of traditional medicine, herbalists, some practitioners of ayuverdic medicine and a community sector, which includes midwives as well as community workers that provide a link with the health posts.

The Public Health Service (PHS) is a major health care provider at the national level. It is unthinkable to talk about health system in Mozambique without referring to the public health system. After the independence of Mozambique, the PHS became the main provider of health services to the population, trying to offer this at lower costs and to make it accessible to all.

3.8.1 PHS Structure, organization and management culture

The PHS is organized into four levels. The Level I is composed of health posts and health centres which provide preventive and curative primary health care services. Level II is composed of rural and general hospitals that usually provide emergency care and perform simple surgeries, as well as providing obstetric and trauma interventions. Levels I and II are the most peripheral, implementing the Primary Health Care (PHC) strategy and receiving referrals of patterns with clinical conditions which can not be treated at the level I (such as complications in childbirth, trauma and medico-surgical emergencies). Level III is composed by the province-level hospitals and Level IV by the Central and specialised national hospitals. Levels III and IV are fundamentally designed for more specialised curative care, and can receive referrals from the lower levels.

During the past ten years, the referral system has been distorted, resulting in poor performance of the most peripheral units. These levels operate below the minimum standards arising mainly as a result of war and the poor economic situation in the country over the past two decades.

Heath units are characterised by chronic shortages of supplies essential for health care provision that have serious negative repercussions on quality, particularly in rural areas. As a consequence, the present referral system is barely operational, and patients frequently use the most convenient level of SNS provision e.g. levels III and IV.

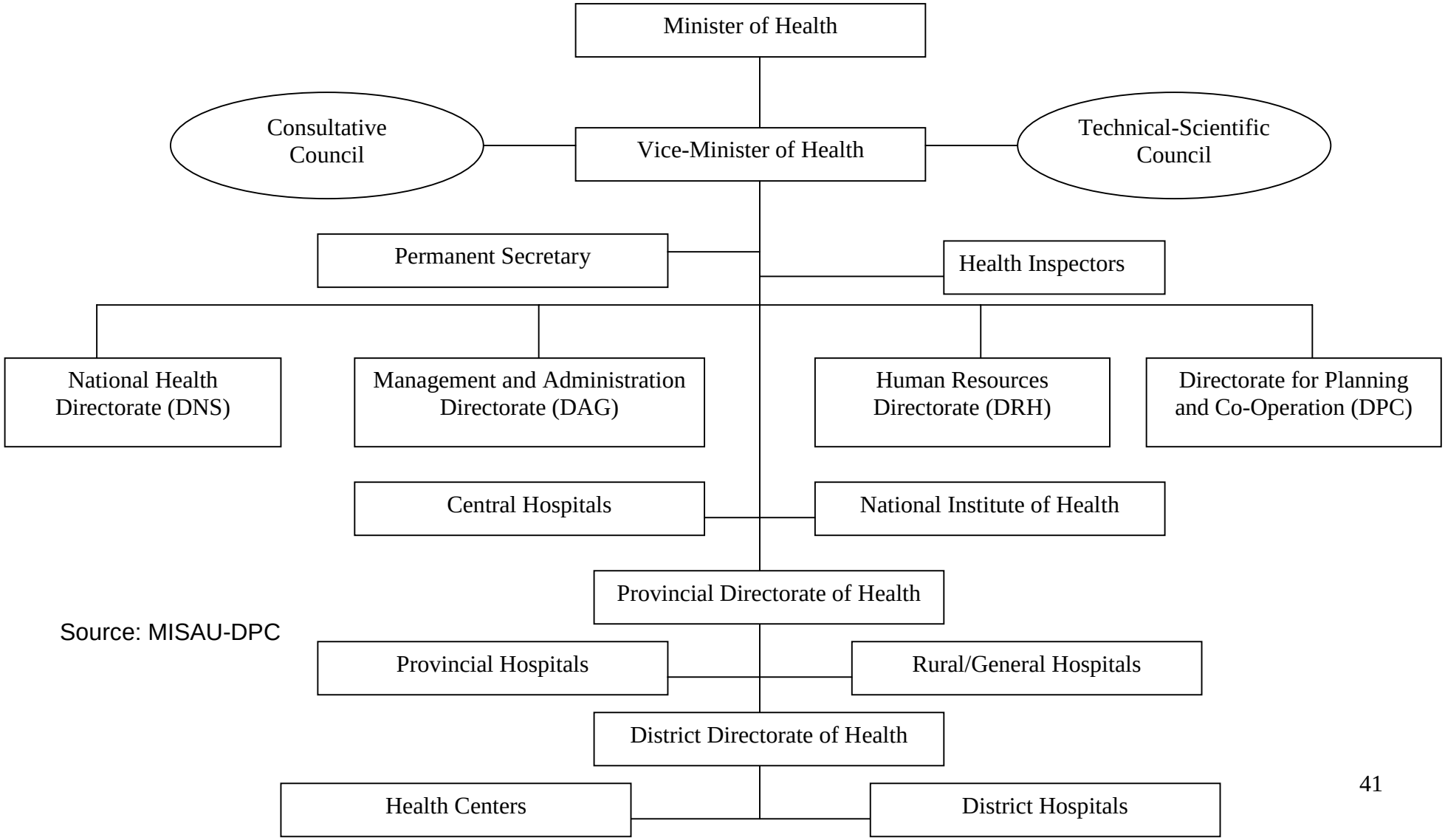
MISAU (2001c) argues that the weakness of the most peripherical levels (health centres and rural/general hospitals) can also be attributed to:

- Inequalities between health teams, particularly the poor qualification of professionals working in the most remote regions.
- Continual and chronic lowering of employees' morale, motivation and professional ethics, as a result of difficult working and living conditions and low salaries.
- Unhygienic infrastructure, that is in a poor state of repair too.
- Lack of basic equipment. Those available are poorly functioning.
- Inadequate supervision by higher levels.
- User's perceptions that health care are of poor quality.

The management of the health system is hierarchical and centralised in the Ministry of Health (MISAU). The higher levels have the authority and control over the execution of programmes and plans designed at central levels. MISAU is responsible for formulating policies, strategies and budgets. MISAU also regulates the sector and the governmental and non-governmental agents that provide health care at various levels (MISAU, 2001c). The budgets are not distributed equitably to all the health sectors, and the differing priorities create imbalances in the health sector. This inequitable distribution is due to the existence of priority sectors considered by the government, for instance, the fights against malaria and AIDS. So, as (Sims et al., 1998) argue, this organisation is not flexible, and is extremely bureaucratic. This rigidity make also the health sector very inflexible on changes e.g., the quantities of medicines have to be approved by the MISAU, the province storage are not allowed to acquire medicines their own selves without MISAU's approval. And for the health information system, it means that the information has to pass through many persons, policies and levels to be used for decision-making, taking long time to decision be made or even not to be used for decision-making.

The following figure shows the organizational structure of the public health sector.

Figure 3.2 – Organizational Structure of the Ministry of Health



Source: MISAU-DPC

In the following pages, I describe the roles of the entities outlined figure 3.2

The NHS is divided into three levels: the Ministry of Health, the provincial directorates and the district directorates.

At the Ministry of Health there is the Minister of Health, who is assisted by the Vice Minister, and advised by a Health Consultative Council and Technical Scientific Council. The Ministry of Health has four national directorates, namely: Health National Directorate (DNS), Administration and Management Directorate (DAG), Human Resources Directorate (DRH) and Planning and Co-Operation Directorate (DPC).

The National Directorate of Health is responsible for managing the health programs, community health, pharmacy, medical care and epidemiology. DAG is responsible for managing financial resources and equipment, and preparation of the budgets. The Directorate of Human Resources deals with manpower issues. The Planning and Co-operation Directorate has the responsibility to draw long term planning, statistical collection and analysis of health data and defines targets and objectives. This directorate is subdivided into various departments; one of them is the Department of Health Information (DHI). This Directorate through its DHI manages the health information system.

The central hospitals are subordinated to MISAU although they have a degree of financial autonomy. The Ministry of Health distributes resources to the provinces, and supervises and inspects their activities. The Provincial Directorate of Health is responsible for all the health activities at the province level. The health activities undertaken by the districts are supervised by the District Directorate of Health that cares for an average of 100,000 inhabitants (maximum 400,000 and minimum 10,000).

The network distribution of drugs follows the structure of the NHS, which starts from the central warehouse, goes through the province, district warehouses and then the health units' pharmacies.

3.8.2 Health personnel

There are 16,500 health workers serving in the health sector, of which 60% of them are health professionals, 4% have a higher degree and 16% medium level degree. There are also some foreign workers (MISAU, 2002).

Human and material resources are not distributed equitably to the provinces and inside the provinces these items are unevenly distributed too. For instance Niassa, Cabo Delgado, Nampula and Zambézia have low allocation of resources compared to Maputo (the capital, the city), which receives six times more resources per capita than Zambézia. Internal to the provinces too, there is also the same kind of inequitable distribution.

3.9 PATTERNS OF HEALTH CARE

The patterns of health care in Mozambique are still weak, characterized by long waits by the patients in the queue, less time with the doctors, illegal money collection, unmotivated and not competent workers, difficult communication between the health levels and inadequate capacity of management. There is also the wrong use and frequent stockouts of medicines, use of old equipments, missing of adequate training in the remote areas. The referral system is more theoretical or formal than practical (MISAU, 2002). These problems can be solved by means of an implementation of broad approach, strengthening supervision, support and continuous training, adding incentives for the workers and improving their life quality, improving the health projects and programs by involving the stakeholders in the evaluation of the health services and activities.

3.10 HEALTH SITUATION

Women, children and those who live below the poverty line form the group that is most vulnerable to illnesses. The population's state of health and epidemiological profile are largely the consequence of the present level of socio-economic development. The epidemiological framework (MISAU, 2001c) in Mozambique is largely pre-transitional, this is, dominated by communicable, infectious diseases and parasites, namely malaria, diarrhoea, respiratory infections, tuberculosis and there is a rapid increase of HIV/AIDS.

Social indicators reflect the poor state of health in Mozambique, being the last among countries in the sub-region and in sub-Saharan Africa, for instance, the country's Maternal Mortality Rate is considered among the highest in the world (MISAU, 2001c). Other data indicate a rise in non-communicable diseases of worrying proportions. Traumas of various types, particularly those caused by road accidents, have reached epidemic proportions. A study of causes conducted in Maputo city in 1994 revealed that chronic degenerative illness is increasingly significant. The health situation is maintained and exacerbated by the following factors:

- Low levels of education of the population.
- Deficient nutrition of the population.
- Unfavourable environment (poor treatment of garbage and human excrement and presence of stagnant rain water due to poor drainage).
- Limited supply of drinking water.
- Regional disparities in access and conception of health care (inequalities between the regions of the country and between the countryside and the city).

3.10.1 Patterns of morbidity and mortality

Malaria, AIDS (HIV), diarrhea diseases and malnutrition are amongst the main causes of death in Mozambique. Maternal and infant mortality, cholera, meningitis, dysenteries, natural catastrophes, violence and alcoholism are other patters of mortality in Mozambique.

A study done by INE in 1997, (INE, 1998) concluded that over the last 20-25 years (1975-1997), mortality levels have remained nearly constant, a surge in mortality occurred during the period 1987 – 1992. Fertility levels remain high, and evidence of a fertility decline is questionable. The knowledge of modern contraception is still low, and this is reflected in the fact that the current use of such methods by women currently in union is only 5 percent. The total demand for family planning is still relatively low: 24 percent in urban areas 8 percent in rural areas. This suggests that the need for education, information and family planning services is extensive.

There are large differences in the levels of fertility, mortality, and contraceptive use among different sectors of the population. Urban areas, especially Maputo City, show the most favorable indicators, compared with the remainder of the country. On the other hand, people with little or no education and those who reside in rural areas are at a greater disadvantage. To counteract the inequalities found in the survey, it will be necessary to give priority to information and education, as well as the distribution of financial and human resources (INE, 1998).

3.11 HEALTH INFORMATION SYSTEM

The health system in Mozambique, as in many other developing countries, is faced with many difficulties such as lack of specialists in the field, inadequate resources and infrastructure for technical and communication services. However, various attempts are ongoing to develop these systems in order to offer better services to their customers.

Health information system in Mozambique has been a priority for the Ministry of Health to improve management and planning of the activities at various levels of the heath structure (MISAU, 2001c). Data is collected at the level of the health units, aggregated and collected at the district level and sent to provincial and national levels. In order to simplify and integrate the various programs, the information system was revised in 1989. However, data still flows mechanically from the district and province levels to national level with limited feedback and without adequate integration with various programs of action. Furthermore, data is not kept in a systematic way by the individual health facilities, due to lack of skills, people being overworked with little time supervision, and also limited training and support. Similarly, it happens to the information on medicines. All these factors contribute to a poor information culture and an inadequate DLMIS.

Despite Mozambique being among the poorest countries in the world, there are signs that ICTs are rapidly being spread to all the provincial capitals and major districts (Braa et al, 2000). The ICT infrastructure and human capacity is presently mainly concentrated in the provincial capitals and a few commercial centres, leaving most parts of the country without any ICT support. A survey conducted by a team of researchers on ICT spread revealed differences between the south and north, cities and peripherical areas (districts). The absence or shortage of communication links further emphasised these differences. In general, there is a lack of adequate electricity, telephone, transport, and facilities in the districts.

The health information system is not completely automated, and much of its technology is outdated. There are no precise, clear guidelines concerning the adoption of technology, i.e. the acquisition of application follows separate and sometimes incompatible guidelines. For example, the drugs sector at the Ministry of Health contracts its own organization to develop software and the health information sector also contracts its organization to develop software. But it is not written anywhere, which procedures each of them have to follow to acquire new software. Most of the systems lack an integrated vision; use poor quality basic materials that do not satisfy

their specific needs. Some of the projects are inadequately monitored by MISAU, who do not follow up properly and do necessary supervisions. The projects are typically dependent on international agencies and aid, which endanger continuity and sustainability.

There is limited communication infrastructure that allows different user groups to share various applications. Technical assistance and support for basic packages is typically carried out by private companies or individuals contracted directly by each department.

The same situation exists for information technologies service provision, for example, a variety of companies provide Internet, E-mail and services for MISAU, and there is, thus, no integration of the support function.

Concerning the management of health technology, the NHS has always received significant support from a variety of partners, like NGOs. The fragmented support has resulted in a great diversity of technologies, which are often inappropriate and very difficult to maintain. For example, one of the reasons why the use of Telemedicine failed is primarily due to the lack of assistance from the software providers although no study was carried out to conclude that. The absence of clear guidelines for the acquisition of durable goods (functioning for long time, maintainable and efficient) as computers, copy machines and so on has contributed to the present situation of poor preventive maintenance. So, the health information technology is characterized by:

- Limited number of professionals and lacking in quality.
- International donations without assessing the beneficiaries' real needs.
- New technologies introduced with less training.

The Management systems should reflect, as far as possible, on the key interventions of these institutions and help them achieve their objectives.

Following this broad description, the next chapter describes the pharmaceutical sector of the whole health sector in Mozambique, which is the focus of this study.

CHAPTER IV

PHARMACEUTICAL SUB-SECTOR

4.1 INTRODUCTION

In this chapter, I first present the active actors in the pharmaceutical sub-sector, the function of this sub-sector and the medicine supply programs. After that, I provide an overview of the funding for this sector and the human resources, which are key to the well functioning of the sector. The information system for the pharmaceutical sub-sector, the DLMIS is also described in this chapter. This description is initial and more details are described in the findings chapter.

4.2 THE PHARMACEUTICAL SUB-SECTOR: KEY ACTORS

The pharmaceutical sub-sector inside MISAU is the entity responsible for managing the logistics of drugs for the HNS in Mozambique and ensures that the medicines in the public and private sectors are safe, of good quality, effective, correspond to the medical needs and are reasonably priced. The different players/actors in this sector are summarized in figure 4, and described below:

The Ministry of Health is overall responsible for defining the policies to ensure that the medicines circulating in the public and private sectors are safe, of good quality, effective, correspond to the therapeutic needs of patients and are reasonably priced.

The Ministry of Plan and Finance (MPF) plays a crucial role in the management of governmental funds and foreign aids, as well as, in the allocation of capital and recurrent funding in this sector.

The Ministry of Commerce, Industry and Transport (MCIT) have the role of issuing importation permissions for Medicamentos de Moçambique (MEDIMOC).

MEDIMOC is a state enterprise, which is responsible for the legal procurement of medicines in Mozambique. It is also responsible for the storage and distribution of medicines to the public and the commercial sector (private clinics and chemist shops). Through MEDIMOC the Hospitals and provincial storages receive medicines.

The Central Bank of Mozambique (BM) provides foreign currency to pay for medicines purchased from outside the country.

The Pharmaceutical Department within the DNS is responsible for coordinating and inspecting the pharmaceutical sector, mainly, to organise and accomplish all the logistical activities related to medicines, control and organisation of the supply system, to ensure the function of quality control systems and to promote local production of medicines.

The National Laboratory for the medicine quality control (LNCQM) that deals with distribution all over the country and recommends rules to protect the citizens' health.

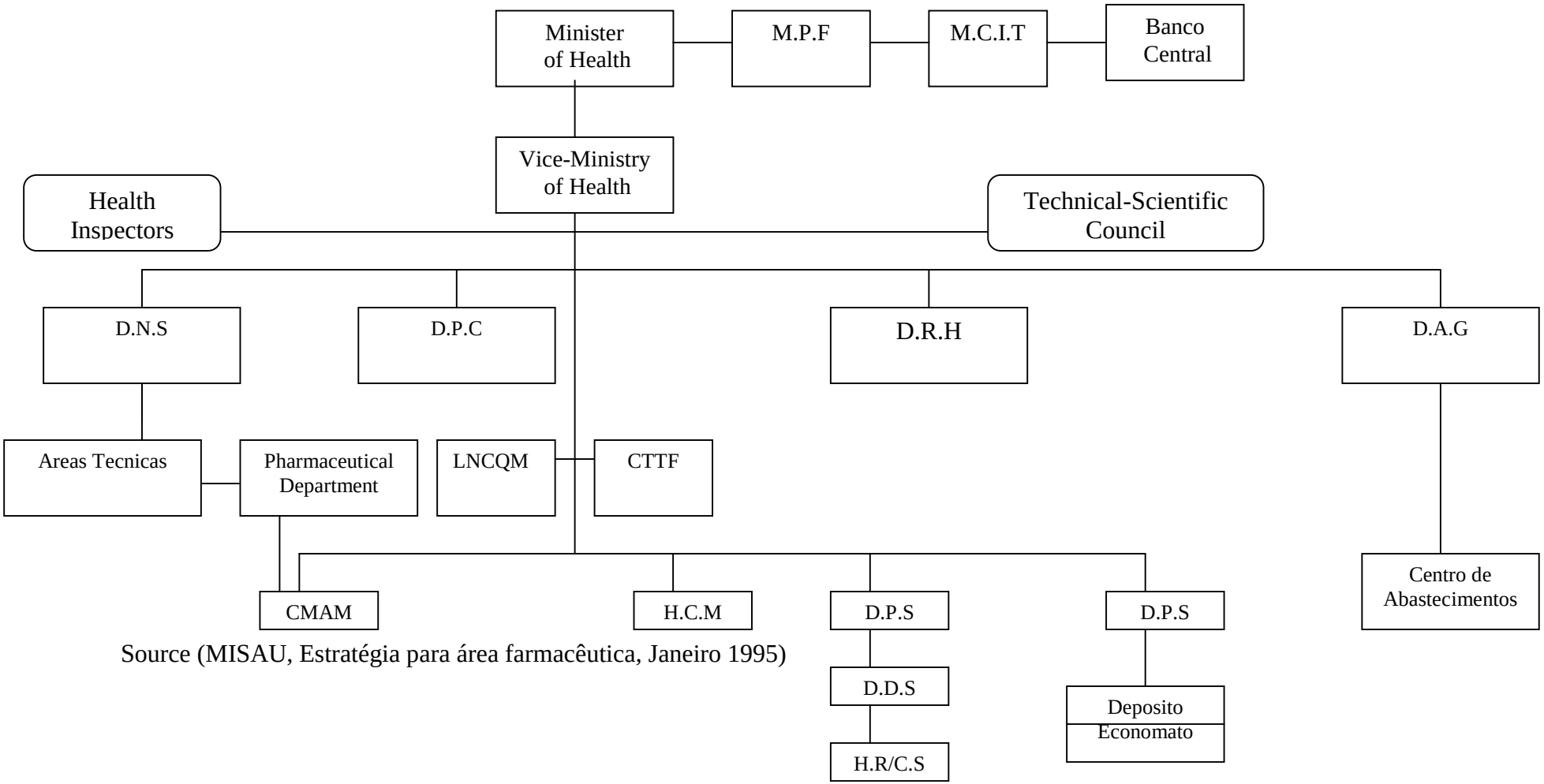
The Technical Commission and Pharmaceutical Therapy (CTTF) selects the medicines to be used, publishes the approved list in the National List of Authorized Medicines called Formulário Nacional de Medicamentos (FNM), and also set the rules to guide the appropriate use of medicines (therapeutic guides).

CMAM (Central de Medicamentos e Artigos Médicos) is responsible for the financial management of the public sector, including the money spent on medicines and medical and surgical supplies. They also manage the General State Budget – Orçamento Geral do Estado (OGE), the funds and the money generated from the sale of medicines in the health units. This money is collected and transferred to the CMAM bank account by the Provincial Directorate – Direcção Provincial de Saúde (DPS).

The provincial storage facilities identify the needs and make requisition to MEDIMOC, store and then distribute to the districts and health units that depend on the provincial storage for supplies. These storages are administrated by the DPS. The

district storages identify their needs, store and distribute the medicines to the other health units and also to the rural or general hospital of the districts.

Figure 4.1 – Organizational structure and roles (Pharmaceutical Sub-Sector)



Source (MISAU, Estratégia para área farmacêutica, Janeiro 1995)

4.3 MEDICINE SUPPLY PROGRAMS

In response to the excessive use of pharmaceuticals by both the clients and the providers, and also to try to limit the number of dangerous drugs used by the clients, essential drugs programmes have been developed in many countries as a part of their national drug policy. These programs aim at rationalizing the supply and use of essential drugs that meet the major needs of the majority of the population (Hardon et al., 2001). Mozambique has also launched the Essential Drugs Programme in 1986 within the National Drug Policy Framework, aimed at covering the most basic needs at the first level of Health Care. A National Drug Policy with respect to essential drugs was developed and therapeutic guidelines were issued to ensure good prescription practices and standard treatment of common diseases (Mwaluko et al., 1996). Mozambique produces some medicines, but not in a large scale, to "*feed*" national needs in quality and quantity.

There are two medicine supply systems in the public sector called Via Classic and the KITs System administered by the Program for Essential Medicines (PME). I describe them in the next section.

Program for Essential Medicines (PME)

This program was created with the main objective of guaranteeing the regular availability of basic medicines to the primary level health units; improve the overall use of medicines and their storage, distribution and supply. (MISAU, 1995) According to the number of outpatients per month, health units receive KIT A, B or C. Usually, KIT A is delivered to health centres, KIT B for health posts and KIT C for Agentes Polivantes Elementares (A.P.Es) (refers to people trained for a few months to work with people in the community meaning). The reception of KITs is not necessarily based on a requisition. However, the health units have to fill in some forms and send them to the district levels, where the number of necessary KITs is calculated for the health centre.

Via Classic (Regular system)

This system is considered as the primary one for supplying medicines to the health facilities because the KITs system was created only as a complement to this one. The supply through this system is based on requisitions from the health units.

The supply system is divided into three levels:

- *Central level*, which is composed by the regional storages of Maputo and Beira and CMAM, provides medicines to the central hospitals, some general hospitals and province storage facilities
- *Province level*, which is composed of provincial storages that are responsible for providing medicines to the provincial and rural hospitals and district storages
- *District level*, constituting of rural hospital storages and some health centres that provide medicines to other health centres, posts and A.P.Es.

4.4 FUNDING

After the independence of Mozambique, the provision of health care passed through many phases starting from provision of health care free of charge to now where a symbolic value is paid for some health services, and other are still free of charge. These comes from the recognition that the revenue collected can be used by the same health facility for is recurrent costs, and is impossible to the government to maintain the provision of health care free of charge arising from socials ideals, taking into account the increasing costs of health care.

More than 90% of the Cost Insurance Freight (CIF) value of the medicines imported in the country is financed by donations and grants to the health sector of international agencies like the World Bank, Swedish Cooperation (SIDA), NORAD, WHO, UNICEF, the Netherlands, are some of the organizations that finance the medicines (MISAU, 1995). The following table shows some figures of funds for drugs and the respective donors.

Table 4.1 – Availability of funds (in USD 1,0000)

Source	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Canada	3,231	3,497	3,560		2,402			
Denmark	9,830	1,400	6,100	5,688	2,245			
Swiss Cooperation	3,500	2,700				492		
Norway	7,350	410	2,409	3,328		1,023		
POOL				4,020	8,685	19,556	12,023	17,126
BAD	2,000		582					
World Bank		449	4,406	4,406	4,406	4,406	4,406	
C.E.E	1,854							
Netherlands	6,600	5,071	1,485	3,900	1,881	3,529	4,100	
Government	1,881	45	2,000	4,100	4,338	7,458	8,658	9,519
Others	241	22	585		1,365	1,418		
Total	**34,487**	**649**	**21,126**	**25,442**	**25,321**	**37,882**	**29,187**	**26,644**

Source: MISAU, Avaliação da Área Farmacêutica, 2001a

The cost recovery (symbolic money paid for medicines by the patients) is much less than 5% of the real value of the medicines. The amount transferred to the CMAM bank account is less than the collected. Thus, the MOH is not earning extra income by selling medicines and the revenues are inadequate to sustain the needs. The reason presented by MISAU (1995) is that many health units and even the DPS use part of the medicines income for other unexpected purposes, the payment of some expenses at the local level. So, these problems influence the LMIS in the way that it is not being able to be self-sustained and also makes it difficult for managers to control the collected money.

4.5 HUMAN RESOURCES IN THE PHARMACEUTICAL SUB-SECTOR

Similar to the NHS, the pharmaceutical sub-sector also has problems of human resources. These problems can be seen to be inherited from the NHS. There is an acknowledgement by the pharmaceutical sub-sector of the scarce availability of pharmacists to work in the complete supply chain. The Ministry of Health has introduced courses for meddle level technicians (with a degree lower than the university degree), agents and pharmacy auxiliaries since 1997. In the years prior to 1997, most of the pharmacists with a university degree used to come from outside of the country because Mozambique did not yet have university level courses. Despite the effort to train more people in the pharmacy area, the existing technicians are still not enough to cover the needs of the NHS (MISAU, 2002). At the lowest level of the supply chain (the health units' storages) there are no *drug professionals*, and servants take care of the work. Table 4.2 below shows the distribution of different drug professionals in each province in 2000.

Table 4.2 – Distribution of human resources in the pharmaceutical sub-sector per province

	NIASSA	CABO dELGADO	NAMPULA	zAMBÉZIA	TETE	MANICA	SOFALA	INHAMBANE	GAZA	MAPUTO	MAPUTOCIDADE	ORGAOS CENTRAIS	**TOTAL**
Pharmacists	0	0	0	0	1	0	1	0	1	2	1	3	9
Specialized Officers	0	1	0	1	0	0	1	0	1	0	2	4	10
Pharmacy technicians	6	7	13	11	7	5	9	8	10	6	17	9	108
Pharmacy Agents	8	15	22	24	9	13	13	9	8	14	30	0	165
Pharmacy Assistents	15	9	26	7	26	3	3	28	7	1	2	0	127
Total	29	32	61	43	43	21	27	45	27	23	52	16	419

Source: MISAU, Avaliação da Área Farmacêutica e a Reforma na Gestão dos Medicamentos do Sistema Nacional de Saúde, 2002

Table 4.3 – Distribution of human resources in the pharmaceutical sub sector per province and population

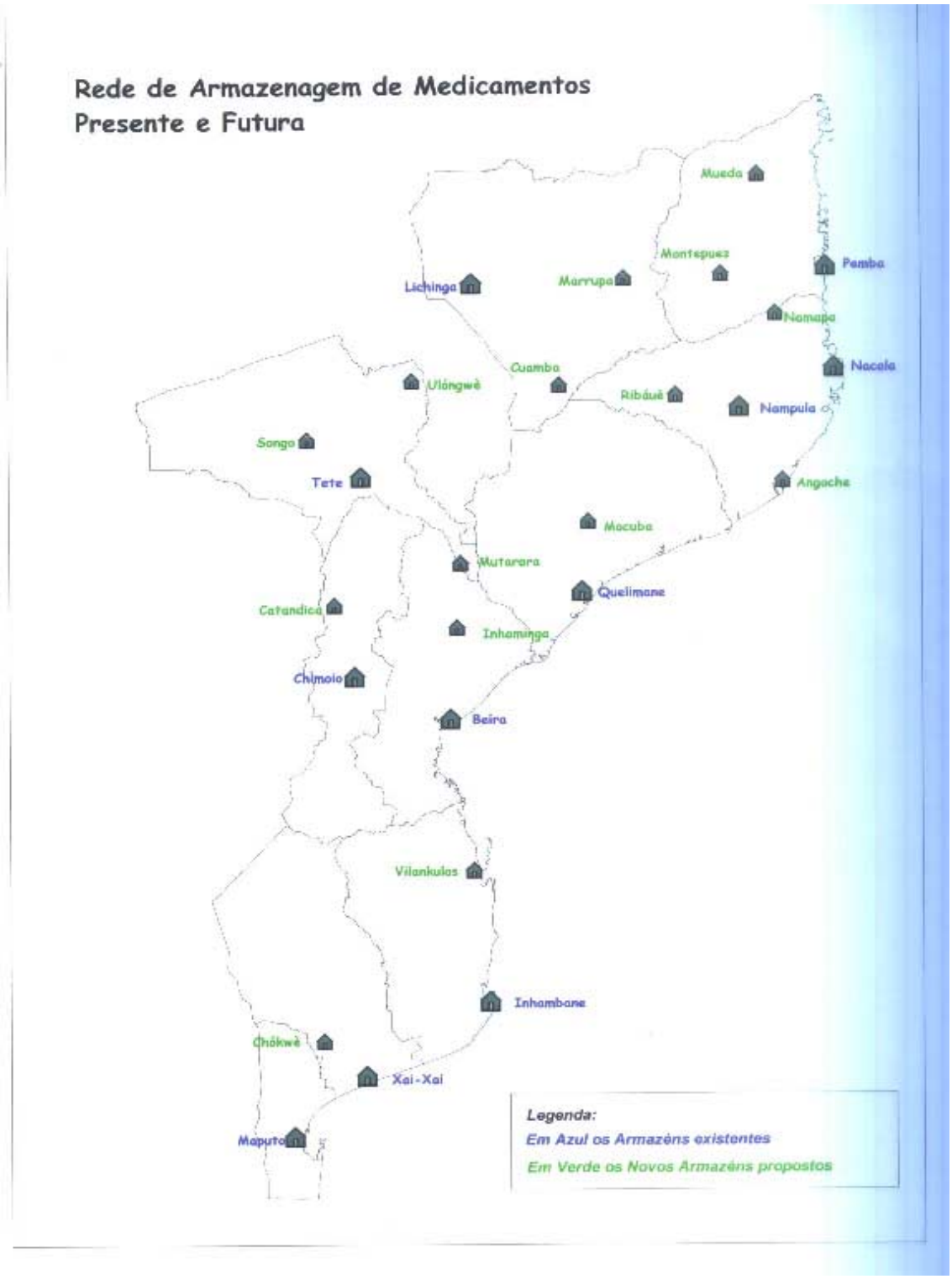
Province	Professional per Pharmacy	Population(2000)	Professional/Population (%)	Inhabitants per professional	Number of beds (1999)	Beds per professional	Values(millions of meticais) of drugs handled	Values (millions of meticais) per professional
Niassa	29	841,843	0.00003	29,029	755	26	9,585	331
Cabo Delgado	32	1,398,152	0.00002	43,692	846	26	10,701	334
Nampula	61	3,340281	0.00002	54,759	2,468	40	24,693	405
Zambézia	43	3,541,059	0.00001	82,350	1,542	36	25,332	589
Tete	43	1,384,439	0.00003	32,196	1,248	29	17,759	413
Manica	21	1,166,846	0.00002	55,564	882	42	17,069	813
Sofala	27	1,507,417	0.00002	55,830	1,786	66	45,614	1,689
Inhambane	45	1,143,061	0.00004	25,401	1,210	27	13,534	301
Gaza	27	835,143	0.00003	39,935	1,235	46	23,044	853
Maputo Province	23	1,064,708	0.00002	36,311	901	39	14,316	622
Maputo City	52	1,064,708	0.00005	20,475	2,376	46	70,425	1,354
Total/Average	**403**	**17,301,184**	**0.00002**	**42,931**	**15,249**	**38**	**272,069**	**675**

Source: MISAU, Avaliação Interna da Área Farmacêutica, 2001a

4.6 PHYSICAL DISTANCES BETWEEN WAREHOUSES

The following picture (PICTURE 4.1) shows the map of the distribution of the province warehouses already in use and the ones proposed for the future, in blue and green colours, respectively. Then, there is another table containing the estimated distances between the capitals at each province and the district headquarters.

Picture 4.1 – Province warehouses already in use and the proposed warehouses for the future



Source (MISAU, 2001a)

Table 4.4 – Estimated distances between the capitals in each province and district headquarters

Province	**Minimum (km)**	**Maximum(km)**
Maputo (City)	2	5
Maputo (Province)	24	126
Gaza	19	594
Inhambane	28	462
Sofala	31	630
Manica	22	348
Tete	20	520
Zambézia	37	485
Nampula	28	350
Cabo Delgado	39	460
Niassa	2	500

Source (MISAU, 2001a)

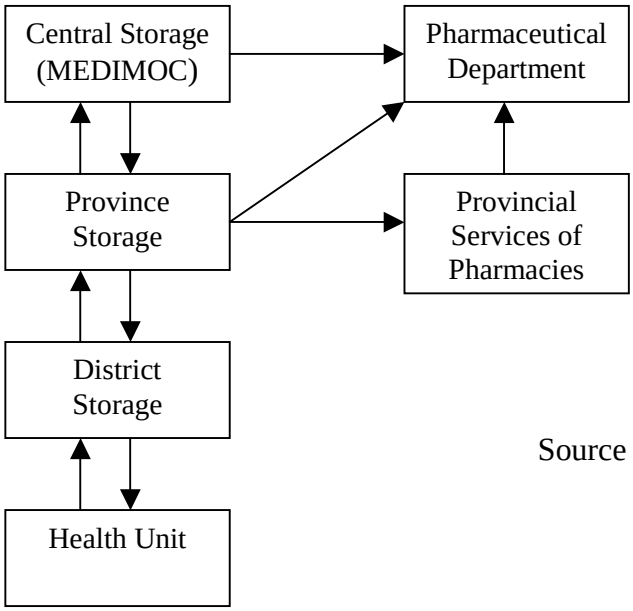
Comparing the situation of physical distances between the province warehouses that are situated in the capitals of the provinces and the district warehouses, Maputo City, presents less problems because the distance is not very long. For the other provinces the situation is not the same, very long distances have to be ran through by the personnel at the districts to get medicines, aggravated by the road conditions that most of the times are not favourable for transit because of floods for example. The problem of long distances and roads in bad conditions are some of the reasons why medicines delay reaching the expected health unit.

4.7 DRUGS LOGISTICS MANAGEMENT INFORMATION SYSTEM

After having described the structure of the pharmaceutical sector, in this section I provide a short description of the DLMIS. A more detailed description is provided in the findings chapter (CHAPTER VI).

The current system of distributing medicines and managing the information in the national health system can be described at four levels shown in the following figure.

Figure 4.2 – Flows of information and medicines



Source (MISAU, 1995)

In figure 4.2, the arrows going up and to the right side show the flow of information. And the arrows going down show the flow of medicines.

The procedures for collecting, storing, processing, and reporting information followed by the province and district are quite similar. The input data of the system comes from the health units, who gather data of the needed medicines, register them on forms and send to the district level. The district level aggregates all the forms received from the health units to estimate district needs and send to the province level. The province level evaluates the provincial needs of drugs and sends the requests to the central level through the CMAM. CMAM evaluates the needs of the country, gets the financing and orders MEDIMOC to make the procurement and the purchasing of the drugs. MEDIMOC, after getting the drugs, is responsible for distributing to the storages of the different provinces and some Central Hospitals.

The information system for management of medicines is partly automated to the scale of 10%. There are some computers installed at the CMAM, at some of the central hospitals and province storages. All the districts and health units work manually.

The communication between the different levels of the logistics system is very difficult, and it causes delays in the use of collected data at the lower levels of the systems to send data to be used for decision-making and enlarging the order cycle.

The process of acquiring medicines for the PHC has 20 steps. The first steps consist in: quantification of the needs, evaluation of the resources available (funds), setting priorities of drugs to acquire and preparation of the final list of drugs to be acquired. MEDIMOC and CMAM are responsible for performing these activities. The overall process is very long, and is supposed to take 32 weeks. However, a study done in 2000 concluded that the process took almost 48 weeks. The difference between the expected and actual times taken is very high, leading to many shortages of medicines in the warehouses (MISAU, 2001a).

CMAM keeps the information of the annual estimated needs in spreadsheets, and also situation of the orders, and stocks in Maputo and Beira central warehouses. This information is updated tri-monthly (MISAU, 2002), bared on two sets of inputs:

- the data coming from the software of controlling stocks at the central warehouses and
- the system controlling the drugs importation process, both managed by MEDIMOC.

The annual estimation of the medicines needs is based on tri-monthly requests, previous distributions and additional information given by the provincial directorates. And the prioritization is based on the criterion of weather the drugs are vital, essential and not essential.

So, the orders depend directly on the estimated needs, which do not reflect the consumptions, but on the requests and the stocks in the central warehouses (MISAU, 2002). The physical stock and information on hand of the stock in the stocks management system differ, and then there are high deviations on the drugs acquired. The current system does not have the possibility to control the stockouts and make the required adjustments.

As a result, the process of determining the quantities of drugs is more theoretical than practical, with limited mechanisms to make the theoretical approach transformed effectively into practice.

The following table shows the deviation between the quantities of drugs recorded and physical stock. These results were obtained in a survey done in 5 warehouses and 21 health units in 2000 and 2001 (MISAU, 2001a).

Table 4.5 – Percentages of deviation between the quantities of medicines recorded and physical stock

%	Warehouses	Health Units
0-24	4	5
25-49	1	2
50-74		4
75-100		10
Total	**5**	**21**

Source (MISAU, 2001a)

For each grug on the shelf of each pharmacy or storage warehouse there is a form called Ficha de Controlo de Stock (Stock Control Form), to control the stock of each medicine, where are registered the movements of the medicine. The Table 4.5 shows that the health units are facing more on controlling the stocks, that is, what was registered in the form for controlling stock differ from the physical existence of the medicines.

The provincial warehouses requests medicines tri-monthly based on the available stocks and pre defined quantities to order. In fact, the quantities to order are based on historical consumptions (MISAU, 2002).

CHAPTER V

THE RESEARCH APPROACH

5.1 INTRODUCTION

In this chapter, I present how the research was conducted and the different methods of collecting data.

To obtain information for my research, it was important to explore all possible sources of information, both formal and informal, and to consider ways of collecting, managing and interpreting it to be as useful as possible.

> The research choices depend on information requirements and the resources available. In collecting descriptive information relating to health care delivery, a suggested approach is to obtain it from routine health service, records that are kept at each health facility, and study the process its analysis and flows to the administrator levels (MacFarlane and Tekeste, 1994).

Patton (1987) argues that:

> Quantitative approach measures are succinct, parsimonious, and easily aggregated for analysis; they are systematic and easily presented in a short space facilitating comparison and statistical aggregation of the data. On the other hand, qualitative approach provides depth and detail through quotations and careful description of situations, events, people,

> interactions, and observed behaviours. Although qualitative responses are longer, more detailed, and variable in content; analysis is difficult because responses are neither systematic nor standardized.

I have used both quantitative and qualitative methods because I explored the advantages of both to make a broader analysis and to draw conclusions.

The use of many different methods is risky, because a researcher can get lost with them, not knowing the method to use in each situation. Meanwhile, combining methods was an advantage because it allowed me to cover the constraints caused by one method. Thus, the methods were organized according to the need of data and required information.

5.2 RESPONDENTS

My key respondents were people in the district, although additional interviews, visits with staff were also done from the health unit level to the Ministry of Heath level. The respondents' sample was varied. Pharmacists, nurses, patients, servants, managers and doctors constituted the respondents.

Table 5.1 – Some of the key respondents at the different levels of the health system

Profession/ Position	Local	Date
Director of the pharmaceutical department	MISAU	21/03/2003
Economist	CMAM	20/10/2002
Director of CMAM	CMAM	27/03/2003
Head of the Warehouse	Province WareHouse (Matola)	13/08/2002
Pharmacist	Province WareHouse (Xai-Xai)	19/08/2002
Head of the Warehouse	DDS -Chicumbane	23/04/2002
Pharmacist of the Health Unit	DDS - Chicumbane	20/08/2003
Head of the Warehouse	DDS - Moamba	22/03/2002
Doctor	DDS - Moamba	19/03/2002
Health unit responsible	Centro de Saúde de Chipenhe	21/08/2002
SMI Nurse	Centro de Saúde de Chipenhe	21/08/2002
Health unit responsible	Centro de Saúde Vladimir Lénine	23/08/2002
SMI Nurse	Centro de Saúde Vladimir Lénine	23/08/2002

5.3 RESEARCH METHODS

Literature Review

Before and after going into the fieldwork, literature reviews (books, publications, and journals about health care, management and logistics) was carried out in order to get familiar with logistic management information systems in the areas of health, research methods and health information system to sustain the thesis writing and theoretical knowledge based on scientific basis. Also, it was useful to obtain similar studies done around the LMIS topic.

It was useful to look at the literature review before going onto the research field because it helped me get an overview of the LMIS before starting.

As Strauss and Corbin (1998) suggest that:

> Literature review is a good way in which to begin because a researcher might enter into the field having a general notion about what he or she wants to study but, it may not be very important.

Observations

Part of the research was done by means of observations of what people were doing in the pharmacies. This made it possible to see the environment in which people work, their daily interactions and it also helped me to make some inferences about the working of the DLMIS. The observations at the pharmacies were all accompanied with conversations with the workers, while they were working. Another important aspect of the observation was to note the infrastructure both physical (rooms and shelves on which medicines are placed) and communication (phones, power, etc), and also the registers, forms, records that were made.

Interviews

The interviews were the main method to obtain information and data. The interviewees were selected based on the availability of people with a view to understand the knowledge of and experience with the LMIS levels assessed. The qualitative interviews were non-structured, although interview guides were used. The questions made to the medical personnel were about their everyday tasks concerning with drugs. I also asked about the information system (forms filled, time spent, etc) and the problems that they face everyday.

The notes from the interviews were taken by pen and paper. No automatic records were used, as tapes, CDs, etc.

Considering the ethical issues, to make the interviews I carried a letter from the Faculty to introduce myself. And in this report I avoided to refer to my respondents by their names. I used their titles rather than the names.

Document analysis

Diaries, forms, records, reports, manuals and other available kind of documents or texts) were collected from the health unit level to the Ministry of Health and analyzed. The analysis of data gathered was both quantitative and qualitative. For instance, the reports and forms, with number data type had to be quantitatively analyzed, to analyze, what was sent and received and the times between request and supply. A comparative analysis was conducted across facilities to understand imbalances and what should be done about it.

Secondary sources of information

Secondary sources of information, such as television shows, and articles written but not published, provided very useful further background material. They complemented key primary sources of information.

5.4 ASSESSMENT OF MOZAMBICAN DLMIS

John Snow, Inc., (2000), with extensive experience with LMIS in Family Planning Logistics Management projects, presents a set of assessment guidelines on LMIS assessment. So, based on these guidelines I carried out an assessment of the Mozambican LMIS. The John Snow, Inc. guidelines were not fully followed, and changes were made to fit the Mozambican context. Also, due to the less availability of the DLMIS stakeholders to the discussions and interviews, I did not follow all the steps in the guidelines.

5.6 LIMITATIONS OF THE RESEARCH

I wish I could have visited more health units in remote areas to understand in greater depth the drugs logistics problems. But the time constraint and resources, such as transport did not allow me to do so. The other difficulty was that the key informants of the LMIS were very busy with their everyday work, and so I often go limited information. In the next chapter I present the empirical component of my research.

CHAPTER VI

CASE STUDY DESCRIPTION

6.1 INTRODUCTION

In this chapter, I describe case studies from two districts of Chicumbane and Moamba and also the MISAU. The description consists of the profile of the districts and the problems described by the interviewees. Chicumbane and Moamba are the first cases presented and lastly the MISAU case study, because, first I tried to show the problems at the lowest level by describing the two case studies and then find the answers to the problems at the decision-making level.

6.2 CHICUMBANE

6.2.1 Background to the case

Xai-Xai is one of the districts of Mozambique. The district is situated in Gaza province and is the provincial capital. Xai-Xai is almost 190 km from the main capital, Maputo. The distance between the different villages and Maputo is very important. The reason is that, with closer proximity of someone or "something" from the capital, more facilities are available, including transport, new technologies, and health facilities information, and so on.

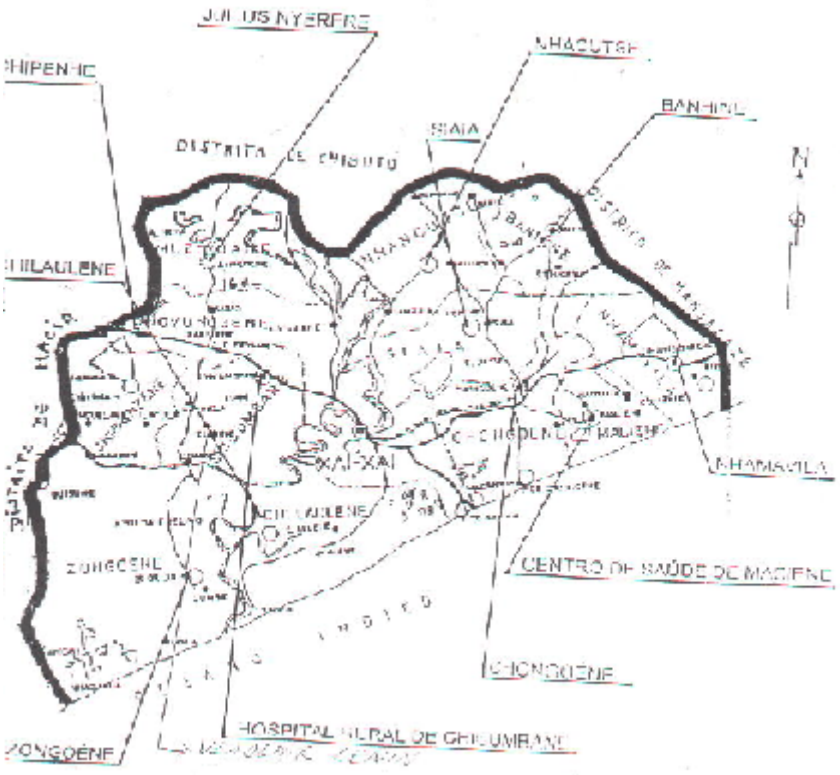
The population estimated for Xai-Xai for the year 2002, based on the 1997 census, is 208,259, spread over an area of 17,479 km. The population density is about 115 inhabitants per square kilometre.

The research was done in Chicumbane in the office of the District Directorate of Health (DDS) of Xai-Xai. In the same geographical space of the DDS, we find the rural hospital of Xai-Xai and a health centre. In some cases, it is very difficult to differentiate between them, as the resources are shared, including the building, a school for medical technicians, and other health infrastructure.

As designed in the Mozambican logistic system, the DDS serves as drug delivery point in Xai-Xai. So, it receives drugs from other delivery point, the province deposit, and distributes to the different health units. The health units under the DDS are:

- Posto de Saúde de Vladimir Lénine – 8 km from the delivery point
- Posto de Saúde de Chipenhe – 13 km from the delivery point
- Posto de Saúde de Julius Nyerere – 16 km from the delivery point
- Posto de Saúde de Chongoene – 30 km from the delivery point
- Posto de Saúde de Chilaulene – 24 km from the delivery point
- Posto de Saúde de Zongoene – 25 km from the delivery point
- Posto de Saúde de Siaia – 39 from the delivery point
- Posto de Saúde de Maciene – 40 km from the delivery point
- Posto de Saúde de Nhamavila – 43 km from the delivery point
- Posto de Saúde de Nhacutse – 44 km from the delivery point
- Posto de Saúde de Banhine – 45 km from the delivery point

Picture 6.1 – Distribution of health units in Xai-Xai (one rural hospital, one health center and ten health posts)



Source: (DDS Chicumbane, 2002)

The office of the Director, the secretary, Human Resources Department, Administration and finance department, nurses' chief office and the medical chief office compose the DDS.

The hospital has 69 beds and accommodates about 200 in-patients per month. The most common disease treated in the hospital is malaria. The hospital and the health centre offer mainly mother and child services, paediatrics and medicine. Surgery services are not available because there are no surgeons, they have limited labs, emergencies, and radiology (machine is not working). There is also a laundry, a small

place to repair some material in use in the hospital, kitchen and pharmacy. Dentistry, physiotherapy for children and adults, blood centre, leprosy and tuberculosis wards are also part of this facility. And lastly, there is a room for continuous health training for the health technicians.

Picture 6.2 – Hospital Rural de Chicumbane

The Picture 6.2 shows the front head the health facility in Chicumbane called Hospital Rural de Chicumbane.

The whole organization is divided into two essential parts. One is responsible for health care including the control of patients, diseases and pharmacy. The other section is responsible for the health administrative part, which is related to controlling the human resources, finances, logistics, planning and decisions making for both the DDS and the other health units of the districts. The DDS director is the head of the health system in the district, and is the link between the health units and Provincial Directorate of Health.

Picture 6.3 – Centro de Saúde de Chicumbane (wards of the health centre)

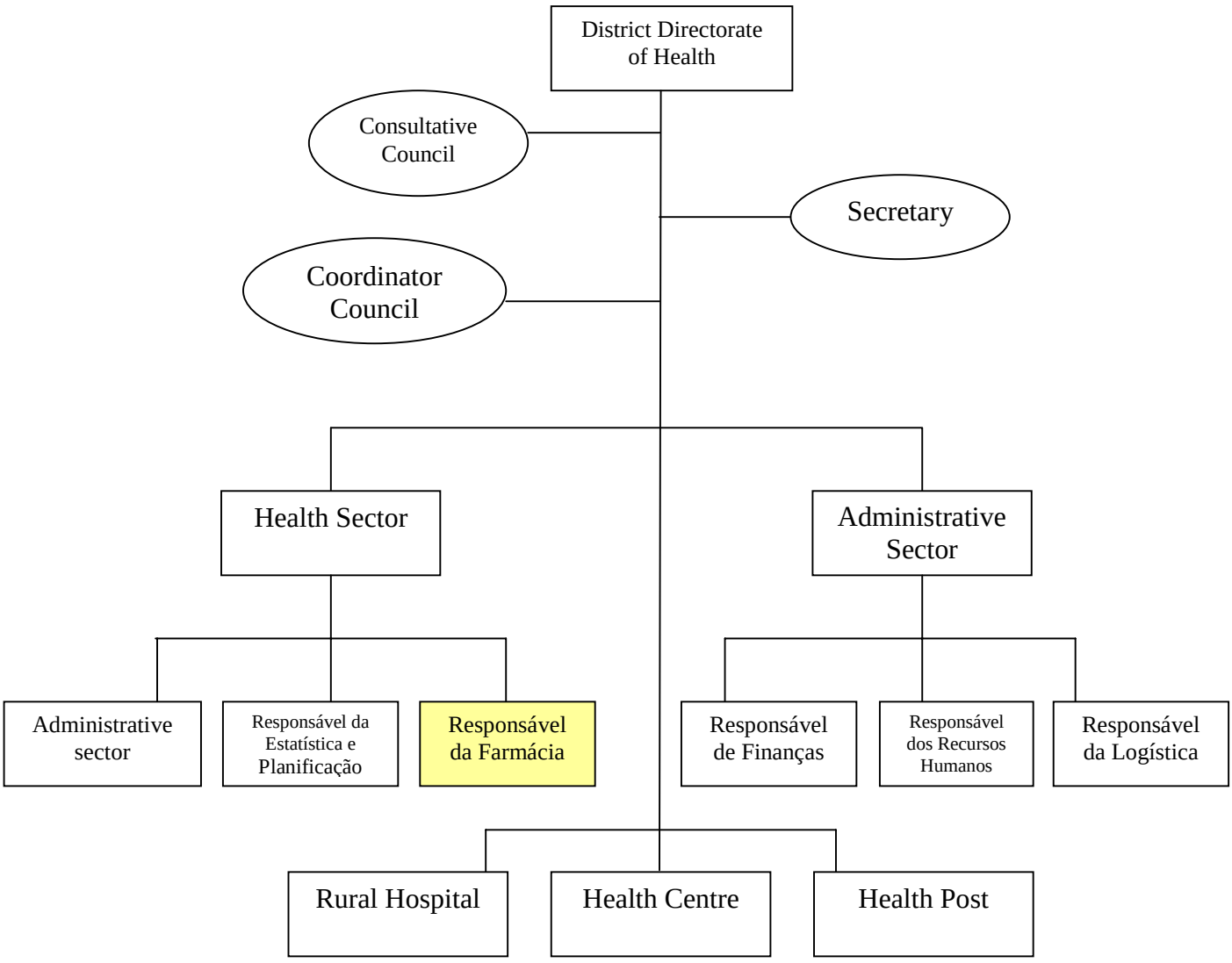
6.2.2 Issues around DLMIS

In the earlier chapters, I described the logistics and DLMIS in Mozambique, in general. This section provides a micro-level analysis of a district based on what people said in interviews about the difficulties and challenges they experience in the logistics system. Although the focus of the research was at the district level, the objective was to analyse the flow of information from the health unit to upper levels.

1. Transport

Transport is a scarce resource in Chicumbane. There are just two official cars in the DDS that cater the overall transport needs that are related to the health sector in the district. These cars have to transport the workers, cater to administrative issues, and transport the patients from the rural hospital to the province and from the health units to the district. Also they have to deal with drugs transport, and also personal issues of the workers and are used for fieldwork during immunizations campaigns and emergencies.

Figure 6.1 – Organizational Structure of the DDS of Xai-Xai



The yellow box indicates the position of the Drugs Logistics Manager

Source: (DDS Chicumbane, 2002)

Transport is a very important resource to make the drugs available in time when and where they are needed. But the two cars are grossly sufficient for all the tasks.

The problem of transportation is most magnified during travel to the health posts. The three health posts that were visited, namely, Julius Nhyrere, Chipenhe and Vladimir Lénine do not have they own transport. A nurse interviewed in Vladimir Lénine said that:

> "*The district car transports the drugs from the DDS to the bus stop and we are given money to carry the KITs from it to the health post in chapa*[1]". *Although the DDS gives this kind of lift, it is not common to get the lift because it is not always available for us; it is occupied with other tasks considered more important to the district*."

During the field work, we saw a man responsible for carrying drugs to his health post, standing under a tree and the sun for about 6 hours, with "his" KITs, waiting for the DDS car. He said during the interview:

> "*Every month I come here to take medicines to my health post, which is situated far from here. I am waiting for the DDS car to take me to the main road and then I will take a "chapa". Then, I will have to walk a bit to the post, because the "chapa" does not go up to the place I am going*."

The existing cars are overworked and without proper planning, the schedules are subject to regular delays. And its seems to be true what the man said because every month that we were in Chicumbane, fortunately at the beginning of the month, when the drugs are distributed, the man was always there under "his" tree, waiting for the DDS car to give him a lift to the main road.

[1] Chapa – car used to transport the passengers from one place to another.

The drugs are carried in the “chapa”, together with many other persons and the goods, and vulnerable to be stolen or damaged due to dust, sun and rain. This analysis is based on our visit to three health posts, which were relatively near to the district hospital. Many of the other health units are much further, and these problems would no doubt be magnified there.

In a health post in Chipenhe an interviewee said:

> “*A very difficult situation is when we want to transport a patient in the evening. Usually, when the patient comes in the evening, we have to find a car in the neighbourhood to drive us (the family of the patient and two workers of the health post) to the district hospital. Sometimes the family of the sick person does not have any money for transport, so we have to ask the neighbours to contribute money, and also, we, the health workers make contributions*”.

This lady and similarly the person in charge of Julius Nhyrere health post, said:

> “*We often depend on the kindness of the neighbours*.”

Similarly, the Provincial Deposit of Xai-Xai face problems of transport. Only one car transports the drugs to districts. This is not enough. This deposit is a delivery point of drugs in Gaza Province. It feeds 12 districts corresponding to more than a hundred health units. It is situated in the capital of Gaza.

Graduated in pharmacy, and in his sixth year working in this storage facility, the adviser of the deposit said:

> "*Each delivery point has to guarantee transport for its "clients", but because of the irregularity on receiving the medicines, frequent stocksouts occur in the health units, so, the district authorities end up coming here with their own transport to get the medicines*."

A key question arising from the analysis is: without proper transport to deliver drugs, how are people going to send the information or data of the DLMIS in time to the district, and drugs in time?

2. Human Resources

At each health post visited, people discussed their problems, some common, while others were different. The lack of personnel was a common issue discussed in the health posts. For example, the transport issue is further more complicated by the absence of few human resources. There are limited people to take care of drugs, to fill the information systems forms and to send forms to other levels. So, decisions are not made based on real facts originating situations of stockouts or overstocks, which ultimately lead to untreated diseases and a weak health system. Overstocking situations result on losses of drugs because of not being used. Another problem, due to lack of resources is that there are many overworked people, resulting in some tasks not being well done because, for instance, of tiredness.

For instance, it was found that the driver of Chicumbane was absent for some days because he was sick. There are two cars for only one driver. During these days no one went to the province deposit, although there was a need for that; the person in charge of the DDS, who was substituting the DDS director because he was sick too, had to shift his tasks and be a driver in urgent cases. The workers had to find their own ways to come and go to work, thus causing delays because the workers did not have any safe transport. They were depending on "chapas".

Chipenhe has three workers, one servant, one mother and child (SMI) nurse and one medical agent who is responsible for the post. This health post receives at an average of 50-65 outpatients daily, with a maximum and minimum of 110 and 25, respectively.

Every day, from 7.30h to 15.30h, the person in charge of the post receives her patients one by one, records them in the register book, prescribes the drugs, counts the drugs, and gives injections, if needed. After that, she fills the various forms required for administrative purposes. The SMI nurse said:

> "*There are few people working in this post. Some days ago the person in charge was on holidays and I had to run the hospital alone. The first thing I used to do when the person in charge was absent was to care about the mother and child activities (vaccinations, pregnancies and family planning). After that attending the out patients, fill in the forms and come over for a while to have a look at my sector*."

As the SMI nurse is overworked, then there are some consequences on the LMIS because she is worried about attending the patients, ordering drugs, controlling information, and so on. If correction of data is not done, then the reports going to the upper levels and decisions are made based on that.

In Vladimir Lénine, while the nurse was being interviewed, in order not to keep the people for a long time in the queue, the servant weighed the babies to facilitate the nurse's job. This is an example showing, how people are responsible to do all the tasks in the health unit, and to make it run, despite the personnel gaps. In these health posts there are no people in charge only for drugs or pharmacy, but people are all multitasking.

The consequence of this is that the DLMIS does not have enough people distributed at the health units to care just for drugs and information. As a result, the quality of the system is poor since the existing people cannot treat it with the necessary care required.

In the DDS there are five people dealing with drugs distribution and they function in the following way:

- One pharmacist technician is responsible for all the logistics of drugs in the district, and she works alone in the deposit. She deals with the information system, the orders and deliveries. She works alone. Sometimes there is a servant to help her with the pharmacy tasks, such as physically placing the drugs.
- In the pharmacy, there are three people. One nurse is at the stage of retirement, while waiting to be retired, she is giving some help in the pharmacy. Her work is to count and pack the pills in small bags for consumption. Although she has good knowledge of prescriptions and drugs, she does not attend the patients.
- The other two ladies attend the clients, collect the money, and count the drugs for the patients and fills up the form necessary for logistics planning.
- There is also a servant to help count the drugs and pack them. She also cleans the hospital and helps in the deposit of drugs by organizing the drugs.

A pharmacist assistant working in the pharmacy and the pharmacist in charge of the deposit complained saying:

"*We need more people in our sector, particularly in district deposit.*"

There is an urgent need to allocate more personnel in the pharmacy area. At all levels, the persons responsible for attending the clients also fill up and analyze the forms. But, unfortunately, according to the pharmacist at the provincial deposit:

"*It is not a priority task to the health sector to add more personnel in the pharmacy area. It is a pity because there is a competition with the private sector. And I am feeling that we are losing many workers. They are going to the private sector. There, they are doing less and receiving more, so the authorities should consider this situation, or try to compensate, motivate the workers of the public sector*."

3. Store Warehouse

The physical storage area where the drugs are put, the deposits and pharmacies vary much from one health unit to another. Generally the size of the deposit and the pharmacy depends on the level of the delivery point and the size of the health unit.

There are situations where the KITs are placed on the floor, due to lack of shelf place. In many cases, the drugs are in direct contact with the floor, which can be damaging to the drugs. The number of shelves needs to be increased and improved. For instance, Chipenhe had two 20x300cm "bars" of wood on the wall as a shelf, which was not enough to organize the drugs.

An interviewee in Vladimir Lénine said that:

"*The drugs were stolen in the deposit, twice in the same year because there is no security in the health post. "*

In the Provincial Deposit of Xai-Xai an interviewee said that:

"*The health units are not supposed to go to the district every month to take the KITs, but because they have constraints over storage capacities and security, they go to the district to take drugs just for one month. "*

In Chicumbane, access to the storage facility is not restricted to some people. Thy store other kind of goods and people have to pass through the deposit of drugs to collect these goods. This also causes a security concerns.

In all the deposits visited at the health units, drugs were kept at normal temperature with no air conditioners. In some cases, there are some fans. So, the norm about drugs having to be placed at a certain temperature is not followed, creating risks of damages, and patients getting poor quality drugs.

4. Other Resources

Electricity and telephones are resources that health posts have scarce access to. But there are other small but important things that pharmacists need.

> "*It is not healthy to do this job of counting thousands of pills and packing in small bags for consumption because of the pills powder. We do not have protector's or guarantee of risk.*"

Said a pharmacist in Chicumbane, who was supposed to count and pack pills in small bags for the patients. There were no protectors, spoons to touch the pills, bottles to put liquid drugs. The same spoon is used for different pills. Used pill bottles serve to put liquid medicines such as tincture. There are no folders to keep the records. To find data about earlier periods is very difficult, as some are lost. A data collector in Chicumbane said:

> *"We use the few and old folders to keep the latest data, that is, when the new year stars we take the records of the early periods that are in the folders, tie it up, and keep in the shelves, and we use these folders for the new year data. "*

Another problem that the service delivery has to deal with is the lack of petrol, otherwise the facility's cars cannot be used.

5. Cost Recovery

The price of the drugs is very low due to the policy of the Ministry of Health that tries to facilitate the access of health care to everybody at lowest costs. So, there are many patients that have drugs for free or with discounts. About 95% of the costs of drugs are funded by donors, and a provincial pharmacist said:

> "*It is necessary to start valuing medicines, giving them a considerable cost, starting to try to recover the real costs because when the donors stop helping us it will be very difficult to continue to supply the medicines. And also it is a way of each citizen to value his/her money*."

6.3 MOAMBA

6.3.1 Background to the case

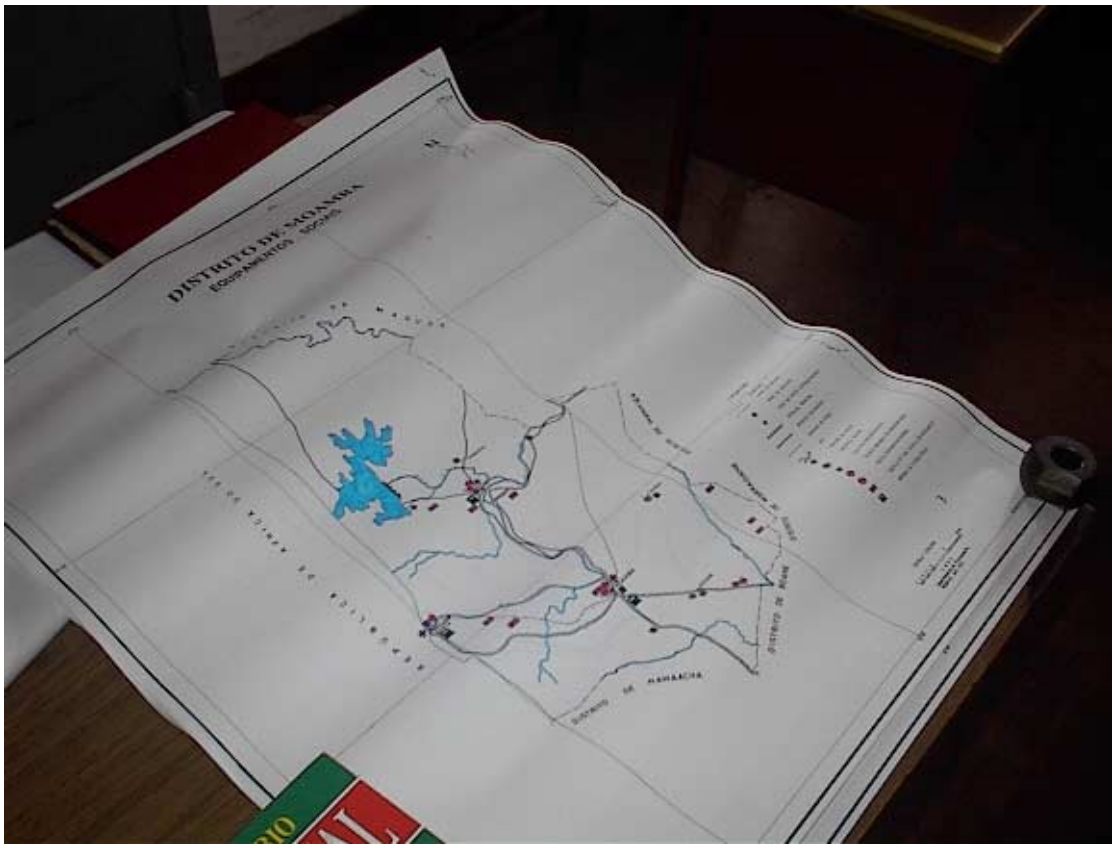
Moamba is one of the districts of Mozambique. The district is situated in the south of Maputo province. It is almost 50 km from the main capital, Maputo. The population estimated for the year 2002 based on 1997 census is 40512 spread over 4526 km.

The research was done in Moamba at the health centre, the location of the District Directorate of Health (DDS) of Moamba. It is a feature of the Mozambican health organization that where there is any DDS at the same geographical space, there should be a health unit, the biggest of the district. The DDS is a delivery point for the drugs in Moamba. The dependant's health units are:

- Centro de Saúde de Chinhanguanine – 64 km from the delivery point
- Centro de Saúde de Ressano Garcia – 42 km from the delivery point
- Centro de Saúde do Sábié – 38 km from the delivery point
- Centro de Saúde de Pessene – 13 km from the delivery point
- Centro de Saúde de Tenga – 21 km from the delivery point
- Centro de Saúde de Mahulana – 69 km from the delivery point
- Posto de Saúde de Coboco –53 km from the delivery point

To go to Posto de Saúde de Coboco and Sábié it is necessary to cross a river.

Picture 6.4 – Map of distribution of health units and other social infrastructures in Moamba



Source (Administration office of Moamba, 2003)

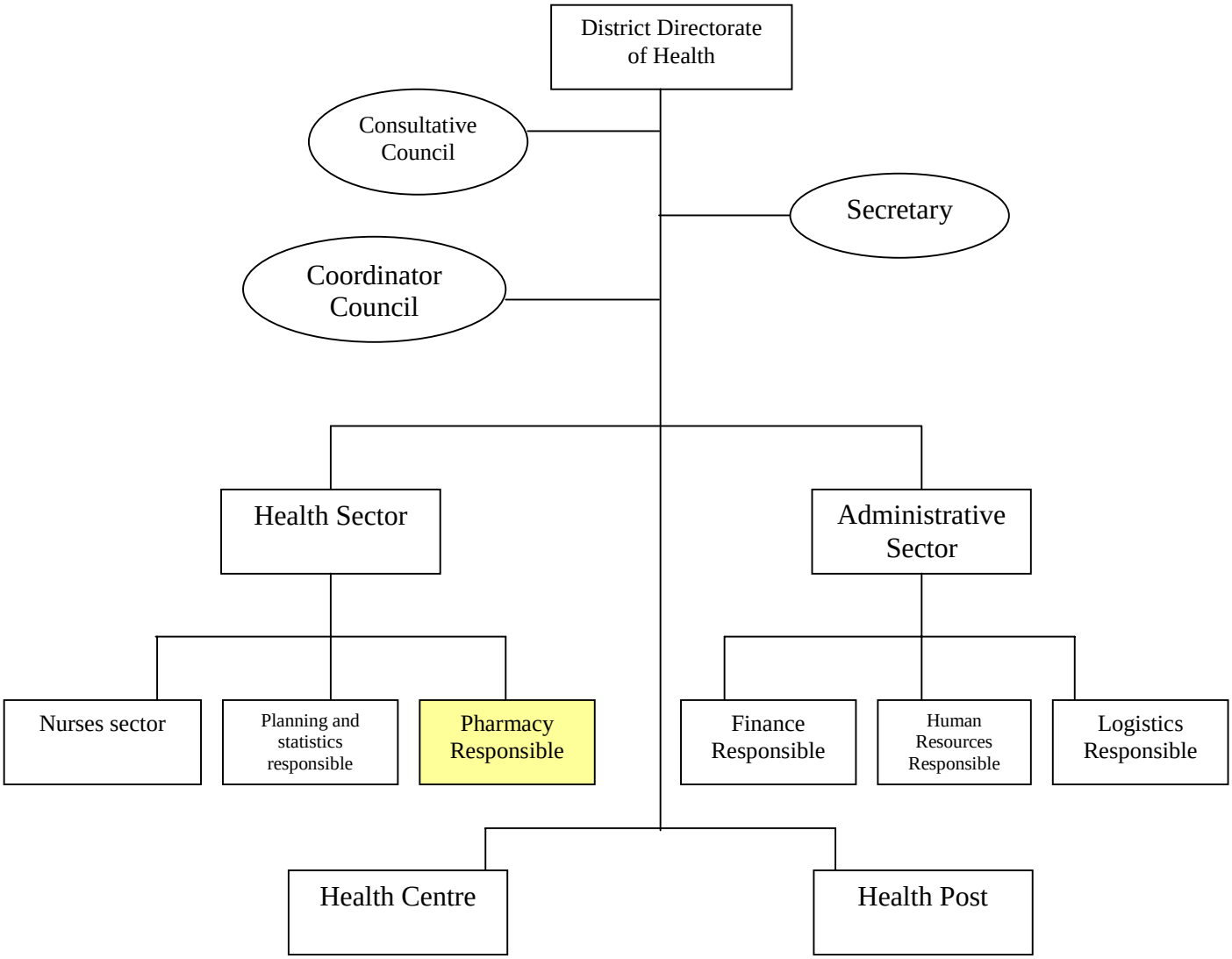
Comments about the Picture: Due to the non availability of a map with small dimensions in the DDS and in the Administration office of Moamba, and no local resources to reduce the A2 existing maps at the Administration office, I just took a picture of the available one, although it is not very neat in this document.

The office of the director, the secretary, human resources department, administration and finance department, nurses' chief office and the medical chief office compose the DDS.

The Moamba Health Centre has 87 beds, which can accommodate about 150 in-patients per month. The most common disease treated is malaria. The health centre has the following services: laboratory, dentistry, medicina geral, gynaecology and obstetric, small surgery, mother and child programs (SMI), immunization programs (PAV) and DTS/SIDA and tuberculosis and leprosies (ELAT) programs.

Picture 6.5 – Centro de Saúde de Moamba (front head and yard of the health facility in Moamba)

Figure 6.2 – Organizational Structure of the District of Moamba



Source: (DDS Moamba, 2003)

The structure of Moamba is a bit different from the structure of Chicumbane. Due to the lack of human resourses the person responsible for the human resources and logistics is the same person in Moamba. Also, the person responsible for the finance sector is the secretary. Instead of another administrative sector as it is shown in the organization structure of Chicumbane, Moamba has a Nurses sector, which makes the structures of the two districts different.

6.3.2 Issues around logistics

Similarly to Chicumbane, a case study was conducted in Moamba, on similar issues around logistics and LMIS. The common issues are not described extensively, because of the similarities of what people in Moamba and Chicumbane said. The reason for doing this second case study was to try to find issues, other than those identified in Chicumbane, to add to the broader view of the problems and challenges of the Mozambican DLMIS.

1. Transport

In Moamba, there were no considerable differences with Chicumbane in terms of the transportation system. There was one car (ambulance) to care for the overall district transport needs. Drugs are transported to other health facilities by "chapa", boat and train. Said a NEP member.

> "*Sometimes the DDS calls to Ressano Garcia saying that the drugs are coming in the train, the DDS is posting the drugs, someone must wait at the train station in Ressano Garcia to receive the drugs."*

> *"To go to Sábié two kinds of transport are used. First the drugs are carried by" chapa" to the boat and then by boat and then the drugs are taken across the river by boat, and after that another "chapa" is used to carry the drugs to the health centre of Sabié.*

The Provincial Deposit of Matola is a delivery point of the drugs in Maputo Province - Matola. It feeds about 20 districts including hospitals and indirectly 113 health units. Matola has one car to transport drugs. The person in charge of this deposit said that:

> "*Each health unit is responsible for finding a car to transport the drugs. The district deposits use their ambulances for this purpose. "*

And he agreed that the existing transport resources are scarce and there is no planning that can help to maximize the use of the cars.

2. Human Resources

In the pharmacy sector, there is just one person dealing with the drugs. He is responsible for the DDS storage and the health centre pharmacy tasks, and takes care of the other storage facilities. He has to attend the outpatient clients, in-patient orders, the orders of the health posts of the district and also care about the information system (filling forms, data processing and send reports) and make supervisions. There are three people that used to help him, an old cook of the hospital, a servant and one more health worker of the health centre. The health worker deals with the clients when the pharmacist is absent, and the other two are usually busy counting or packing the pills.

At the province storage facility, there is one pharmacist, one pharmacy technician, one administrative person, one person who deals with the computer, four servants and one helper. Although this number seems to be reasonable, one interviewee (person responsible for the store warehouse) said:

> "*The team is not complete. A complete team for this job would need another three people, including a pharmacy technician.*"

3. Store Warehouse

The Moamba district warehouse is clean and the drugs are organized according to the Formulário Nacional de Medicamentos (FNM). The storage does not have an air conditioner but has fans. However, there is some water leaking by the door when it rains. And there are some birds that enter in the storage, and then cause dirt in the pharmacy.

Picture 6.6 – District Warehouse in Moamba

The provincial deposit is big, clean, organized and a bit secure. But the floor needs to be improved. There is no air conditioner but the roof helps to regulate the inside temperature of the deposit, it reduces the temperature coming from outside when it is hot.

Picture 6.7 – People waiting outside the pharmacy to buy medicines

6.4 STOCKOUTS AND THEFT IN BOTH DISTRICTS

Stockouts and robberies are other problems found in the visited districts.

Although there are rules set by the MISAU on the distribution of drugs through the different health units, these are not being followed; other criteria are added and used on the distribution of drugs. The distribution should be based on the orders sent by each health unit that are related to the activities carried out by each health unit. However, the amounts of drugs are given based on what exists in the store warehouse and on "feelings" of the person responsible for the warehouse. When a pharmacist at Chicumbane asked why she did not give the amount of drugs requested by a certain health unit, she answered:

> "*I know that this health unit is very small and does not need this entire amount so I will reduce"*.

But, the health unit is supposed to count the drugs need. Raising the question: In what did the Chicumbane pharmacist base herself to reduce this amount? The same was said in Matola:

> *"I do not give all this amount of drugs to this health unit because it is small and does not consume too much of this kind of drugs."*

In Moamba, the health workers reported that they have serious problems with snakes, the land is favourable for snakes. The patients come with snake's bite, and usually the health unit does not have the proper drug to heal their pain, so these patients have to find another way, as the traditional ones, to solve the problem. The health unit requests the drug for snake's bite to the correspondent warehouse but the warehouse seldom has the drug.

Another constraint in the distribution of drugs is related to the storage capacities of each health unit. The amount of KITs that a health unit should receive per month is not distributed totally to the health units because some health units do not have proper security to keep the drugs in their storages for a long time. So, the health units have to come constantly to pick the drugs. This is a problem because of poor transport and inadequate personnel.

All visited storages had at least one expired drugs on the shelf. This is due to poor control of drugs. And it is a problem because patients are consuming expired drugs, not healing themselves but provoking new diseases.

Picture 6.8 – Expired medicine in the Pharmacy of Moamba

Comments to picture 6.8: This is an example of some expired drugs on the shelf. The picture was taken on first of April 2003 and drug was dated to expire on March 2003.

Picture 6.9 – Medicines delivered to the health unit and not needed

Comment to picture 6.9: The picture shows medicines that were given back to the District warehouse in Moamba because were not being used.

Picture 6.10 – Medicines already packed in small bags for consume

Picture 6.11 – A shelf of medicines in Moamba

Picture 6.12 – Forms already used, tied up and kept on boxes

Picture 6.13 – Inside a Pharmacy

6.5 LOGISTICS MANAGEMENT INFORMATION SYSTEM

- **Computerized information system**

At the health unit and the district level, there are no computerized systems. The information system is based on paper. At the province level the computerized and manual systems are used in parallel. The computerized system is used only for the local control of stock, as it is not connected with any other system at the upper levels or part of any network. The storage facility at the province level in Xai-Xai was also using the same computerized system, but stopped because both the computer and software were stolen. So, since then the deposit is just using the paper based system.

- **Estimating the drugs quantities**

Data on number of outpatients of the health unit and the most frequent notified diseases are the input to calculate the quantities of drugs needed for the health units. The information about the most frequently notified diseases given by the medical chief of the province is used to determine what kind of drugs to order. The district deposit aggregates the data coming from the health units to calculate the total drugs requirement at this level. The same is done at the province level. So if there is mistake of the drugs estimation, the health units will also have problems. The kind of health unit and the academic level of the person in charge of the health unit will help to determine what kind of KIT and drugs that this health unit should receive. This is, generally small health units do not have doctors are run by nurses and other specialists, then there are drugs that must be prescribed by certain specialist, that is why different KITs are distributed among the health unit. Annually, the estimated needs of drugs by the province are sent to the Centro de Medicamentos e Artigos Médicos (CMAM).

It seems that the information of outpatients is just theoretical because in practice it is not respected, since the number of Kits to be received is already stipulated. Reducing or increasing the number of outpatient does not in practice determine supplies. If there is other need for drugs, the health units have to make a requisition using the Classic Via system. And since data is sent based more on trust and feeling that actual consumptions, people in general have a lack of trust in the data. At the province level, the manager said:

> "*Theoretically the health units estimate their needs monthly based on the number of outpatients, but this data is not used in making decision of the quantities to be delivered to each district. Quantities to deliver by the province are based on historical data consumptions*".

- **Collecting, Processing and Reporting data**

Data for logistics management are collected, processed and reported in two systems, by the logistics management information system, by the pharmacist and the health information system, by Núcleo de Estatística e Planificação (NEP) - people (group of people's responsible information at each health facility). There were no information system technicians to work with the drugs data. Data is collected at the lowest level by pens and papers (forms), and sent to the other levels. At the provincial level, there, are some provinces with computers where data is introduced and aggregated and then sent to MISAU at the pharmacy department on diskettes to be processed, analysed and used for decision-making.

In the health information system there are three forms of data that have to do with drugs. These forms (SIS-C04, SIS-C05, SIS-C07 - see ANNEX) give the summary of monthly outpatients, stock situation of drugs from KITs. These forms are filled monthly. The information controlled is about KIT A, KIT B and distribution of KITs. The information of Via classic drugs is not controlled in this forms.

In the LMIS the requisition forms, used to get the drugs show that there are problems in orders. The quantities asked and the quantities given do not match. A health unit can ask for instance for 2000 aspirins and they given 1000, nothing or 3000. And also the numbers of items satisfied vary, sometimes less, more or 50%, but never a hundred percent. The pharmacists argue that in many cases they try to distribute equally the drugs received. If they receive, for example, 10.000 Cloroquines for 6 health posts they will distribute 1500 for each of the four health unit of the same level. The remaining health units will receive 1000 and 2000 are kept for emergencies. So, the health unit that requested 2000 will have 1500 or 1000.

The most common disease in the health units is malaria. At all levels there is the complaint that the number of drugs contained in the KITs is always less, and does not meet the needs. The health units have to open many KITs to get the right number of the needed drugs. So, there are other drugs that are accumulated because, they are less used. And that is one of the reasons why they make more than one requisition in a month to get the most used drugs in the KITs..

- **Filling in Forms**

In this topic I present some problems found in the filling of forms. The drugs forms pass through many “eyes” and levels but as no one makes any analysis of data filled in, the errors on the forms are never discovered. The pharmacists keep on doing the same error over time. I am sure that if the data on the forms were used, the errors that the forms currently present would have been discovered and corrected.

Monthly report of the stock of medicines in the health centre

One of the constraints of this system is the existence of many forms to fill that do not match with the number of human resources. The staff is very busy and there are forms that should be avoided. For instance, the items filled in SIS-C04 are the same as the ones in Monthly report of the stock of medicines in the health centre, except the field of “total value” of the drugs and “returned” that comes in one and not in the other.

Monthly report of KITs Distribution

Data about distribution of KITs collected in the form Monthly report of KITs Distribution in the set of forms of the DLMIS is the same as the collected in SIS in the form SIS-C07.

Stock Report

This form is used to control the stock from the health unit pharmacy to the province storage. Each kind of drug in the shelf has its own form. This form is used to record the movements of drugs, when, what, quantities, where, from, on stock data. It was noted in the fieldwork that the quantities in the shelf did not reflect the quantities recorded. Since the updates of the drug stocks are not done just in the moment of the drug movement, much is forgotten while filling the forms. Many of the fields of this form were not filled, for instance the field (INPUT and OUTPUT of drugs), the FNM CODE, price, maximum and minimum and expiry dates. This deficiency occurred in all the sock reports in all the sites visited.

Picture 6.14 – Misunderstandings about filling forms

On the left side there is a form with the filled data corresponding to the medicine in the right side. Where it is supposed to fill the maximum and minimum stock of the medicine was filled with something else that comes in the box of the medicine, which is not the maximum or minimum stock of the drug.

Report of deposits

There are some misunderstandings on filling the reports, for example, instead of filling the number of receipts, the ID of the receipt is filled or vice versa. In other cases, the value of the deposit is registered but not the code counterfoil, nor the date of the bank transaction. i.e. if a deposit was done, in the form the value of the deposit, the counterfoil code and the date that this transaction was executed has to be filled. But what is happening is that people fill in just the deposited value and not the other items. This did not happen only once, but repeatedly. Marracuene district presented this kind of reports to the province deposit.

Folha do Caixa

When a client pays at the pharmacy, the pharmacist takes the original receipt and he/she records it on a register book, including the details of receipts, the receipt number, money received, money subsidy and the total. The workers fill the first three columns, but not the last. They sum the total of the second two fields and calculate the grand total of the day. The calculation is very confusing. But the workers try to simplify the job by doing this. Other workers do not have time to fill the forms during the normal timetable. Some wait for spare time, if they have to do so. A pharmacist in Moamba said that when the pharmacy closes, "*I have to do extra work of filling this forms*." The doctor in charge of this health unit finds little time every day to check if the pharmacist has filled the forms. The Moamba health unit stayed a period without a person in charge. Then the forms were not filled in, no one controlled the job. The money registered did not match with the money deposited in the bank.

- **Feedback and supervision**

The logistics information system does not have a proper feedback. The same errors on filling the forms are repeatedly done by pharmacists. The supervisions carried out raise questions: Are the supervisors supervising the information issues as collecting and reporting data or anything else? Are they capable of discovering the gaps on the forms?

- **Control of drugs/ Information on hand**

In each deposit I found that at least one drug on the shelf that was expired. This important information has bypassed trough the pharmacists. All the forms used to control the medicines become meaningless, as they are not used correctly. People are controlling the medicines without the forms. The TVM news program of 31/08/02 announced that two tons of essential drugs for malaria were found expired in the deposit of MEDIMOC in Beira and then burned. It meant that thousands of dollars were wasted. The poor control is not in the health units only but also in the main stores.

6.6 CHICUMBANE AND MOAMBA: SIMILARITIES AND DIFFERENCES

Although Chicumbane and Moamba are situated in different geographical spaces, the similarities between them are more than the differences. It drives us to conclude that, to a certain extent, MISAU is trying to manage the districts equally; the problems are common to all the districts.

Doing these two case studies it was expected that the differences were huge, because one district is situated in the capital of the country and the other district (Chicumbane) in another province, Gaza, where it is supposed to have less resources than Maputo. Probably the studies were not well chosen, because many authors say that the privileged health units are the ones in Maputo.

In summary, the common problem between Chicumbane and Moamba are lack of transport, shortages of human resources, not well equipped store warehouses, less recovering costs, drugs shortages and problems on filling data on the forms.

The difference between Chicumbane and Moamba case studies is found in how each local manager guides his district, in how each one feels the problems and mainly on their flexibility. An example is that, when distributing medicines for in-patients in the health unit located in the DDS the medicines manager at Chicumbane gives exactly what is requested, or less if she does not has or feels that it has to be so. But in Moamba, the medicines manager distributes has much as he has so, requesters will not disturb him many times.

So, these problems for us means that there are no patterns of management in the district, even if the rules set are followed, they are not followed completely, because the social environment in which each manager is involved determines his/her behaviour within the logistics management.

The key points toward a development (design and implementation) of viable a DLMIS in Mozambique were pointed out in this chapter by means of the problems found in the districts and the consideration to the social environment of the DLMIS stakeholders.

6.7 THE NATIONAL LEVEL OF MISAU

After visiting the districts and the province warehouses, I visited the Ministry of Health (MISAU), the highest level of decision-making concerning drugs, to have its opinion around the problems faced by people in the districts, the discrepancies between the flow of information and flows of drugs and on the use of information for decision-making.

The logistics of medicines follow four main steps of logistics, that is, selection of medicines, procurement, distribution and use. The process of acquiring and planning of medicines to its use takes almost a year and a half due to the availability of many different stakeholders in the process and negotiations and formalities that have to be taken. A manager at MISAU said:

> *"The drugs acquisition process starts when the stock is less than the minimal stock. It is when we start planning. There is no money to acquire all the selected medicines and the respective quantities, so we have to give priorities on buying"*.

The list of needs and what to buy is done by CMAM using excel spreadsheet. When the goods are delivered to the warehouses, the data about delivering is introduced by MEDIMOC in a computerized system for managing stocks. The medicines are delivered through requests and registered in the computerized system. A manager at CMAM said:

> "*The requisitions are done by the province storages and based on mathematical formulas. The population of the province, the number of beds, the productivity (number of outpatients and inpatients per period determine the quantities of drugs to be ordered. So, if the provinces order more than what was stipulated by the formulas at the central level, the central storage will not give to the province storage the amount of medicines requested"*.

A logistics of medicines manager at MISAU said:

> *"As a matter of fact the medicines are distributed according to the quantities that the central storages have, the quantities calculated by these formulas are just theories, we do not use these quantities because we do not have the capacity to acquire all the needed amount of drugs for the country"*.

Continuing, the logistics of medicines manager at MISAU said:

> "*If drugs are enough to distribute to the province storages, data used to estimate the quantities is not the current data collected and sent by the province storages. The Ministry of Health uses the last three years data to calculate the quantities to deliver to the province storage, because, there is no trust on the data sent by the province level. Based on the historical data it's possible to know if the storage in requesting more than the demand"*.
>
> *"The province medicine requisitions delays two or three days to reach MISAU. The reply, that is, the response of the requisition (medicines) is done only if the central storage has the transport available"*.

I asked a manager at CMAM, why people at the health units say that medicines in KITSs are not enough? His reply was that:

> "*The KITs are theoretical instruments used by the Ministry of Health to distribute drugs through the health units, so the medicines coming in the KITs can be more or less than what was stipulated to be inside the KITs. Then, KITs are not the ideal instrument of "feeding" the health units, that is why exists the Via Classica"*.

The computerized information system for managing stocks is weak. It is supposed that all the province storages, provincial and central hospital work with the computerized system. But, for instance in Nampula province, some modules of the software were not functioning. The software being used in the province storages, was not bought, but was donated to the Ministry of Health. This led to problems on the maintenance and repair of the software, because, the donor, the only person with the knowledge, was busy with other activities. This problem was aggravated by the poor communication facilities in Niassa province, which made it difficult to call for repair and review.

Concerning the human resources in the LMIS, MISAU confirmed that there were no special human resources to satisfy the national demand. The drugs manager at CMAM said that:

> "*The Mozambican LMIS collects all of data in around 17 forms of the LMIS, but if these data were very carefully controlled, they could increase the recovering costs of the drugs"*. Then data is not used.

The answer to the question of weather the drugs obtained by the Ministry of Health were enough to cover the demand of the country, was:

> "*Even the health care provided does not cover the whole country, then the drugs also are not enough for the country*".

In the next chapter, I present the analysis of these findings, which are afterward discussed.

CHAPTER VII

ANALYSIS OF DESIGN AND IMPLEMENTATION OF THE DLMIS AS A SOCIAL SYSTEM

7.1 INTRODUCTION

This chapter is intended to draw the analysis of the DLMIS regarding its design and implementation, focusing on information flows, and other issues that have to be taken into account in the design and implementation of the DLMIS in Mozambique. The problem is approached with the perspective of DLMIS as a social system.

This chapter is divided into three parts. The first is the analysis of design and implementation of the DLMIS, including all levels from the health unit to the Ministry of Health. The second part is concerned with the analysis of the DLMIS as social system and the assessment of the DLMIS as the last.

7.2 INFORMATION SITUATION ANALYSIS

The analysis drawn in this section is concerned with the flow of information in the DLMIS based on my empirical analysis. Some diagrams are presented to describe the flow of information in the current DLMIS. The notation used to draw the diagrams is adopted from structured analysis and design (Dewitz, 1996).

Summarising, the information situation analysis includes: analysis of the following items: data collection, data processing, analysis and dissemination.

Data collection

The currently used tools are papers, pencils and forms, available calculators, computers installed at "all" province warehouses, central hospitals, and general hospitals in Maputo and at the Ministry of Health. Folders to keep the filled forms are examples of some of the resources that are not always available. The source for providing the resources is the Ministry of Health.

The essential data set is collected in around 17 forms. There are gaps, and some fields of the forms are not filled or they are not filled correctly. There is also duplication of information on the forms.

The pharmacists and people working with the medicines are the main people who collect data for the DLMIS.

The data reporting is ineffective, because the decision-makers do not trust the data sent, which is of poor quality (MISAU, 2001c). The data collectors try to send the reports in the specified timetable, but are often late due to the lack of transport. Often reports are just not sent. Effort is made to provide the required information, but it is not always complete.

Data processing

There are no clear quality assurance and validation processes in place, for example to check the data on medicines and compare with the physical quantity.

The daily, three monthly and the annual control of stock forms are filled and sent from each level to the upper one. There are monthly procedures to guide the sending.

Calculators are used to make mathematical operations, computers to make reports and letters. The computerized system installed is used to control the stock of drugs, a task that is also done by "hand" when the computerized system is not working, or in places where there are no computerized systems. The forms and reports used in the manual systems are not the same as the computerized one, although both help to control the stocks of drugs. All the forms and reports are the responsibility of each "manager" of the warehouse or of the pharmacy.

Analysis

Data analysis is "invisible", and largely irrelevant. There were no signs of indicators for medicines being calculated and used in the visited sites.

The feedback can be considered weak, limited primarily to visits of supervisors' teams to a site, or when something wrong is detected. The mechanism of feedback consists of correcting what is not being done well, explaining how people have to do "things". Each level of the hierarchy is expected to give feedback to the ones below, but this is limited in practice.

Analysis of data is weak, as local managers are not involved. There are no signs of epidemiological principles being applied in analysis.

Dissemination

Contrary to the other programs as Mother and Child Program (SMI) and Immunization Program (PAV), where tables are made and graphs are drawn, in the DLMIS there are no user friendly, good quality and up to date tables and graphs being used in DLMIS to help analysis of data.

Use

There is no evidence of medicines information being used in decision-making, planning and supervision.

7.3 DESIGN AND IMPLEMENTATION OF THE DLMIS

As times change, the environment in which the information systems is immersed, also changes to try to fit the new environment and requirements. In the earlier chapter I talked about the hierarchical structure of the health sector and the very centralized governmental system, which were institutionalized after the independence. The health information system, specifically the DLMIS reflects the structure of hierarchy and centralization. Now, new policies are being introduced to create a new environment to support the design of a new DLMIS. For example, this can involve a reduction in the number of forms and making the system to support local items.

Heeks et al. (1999) argue that health care information systems succeed or fail depend on the changes gap, the greater the gap between the current realities and the design conceptions (requirements and assumptions) of a new care information systems, the greater is the risk of failure. Then any incremental approach in the implementation accompanied by a serious follow up will increase the likelihood of successful systems introduction.

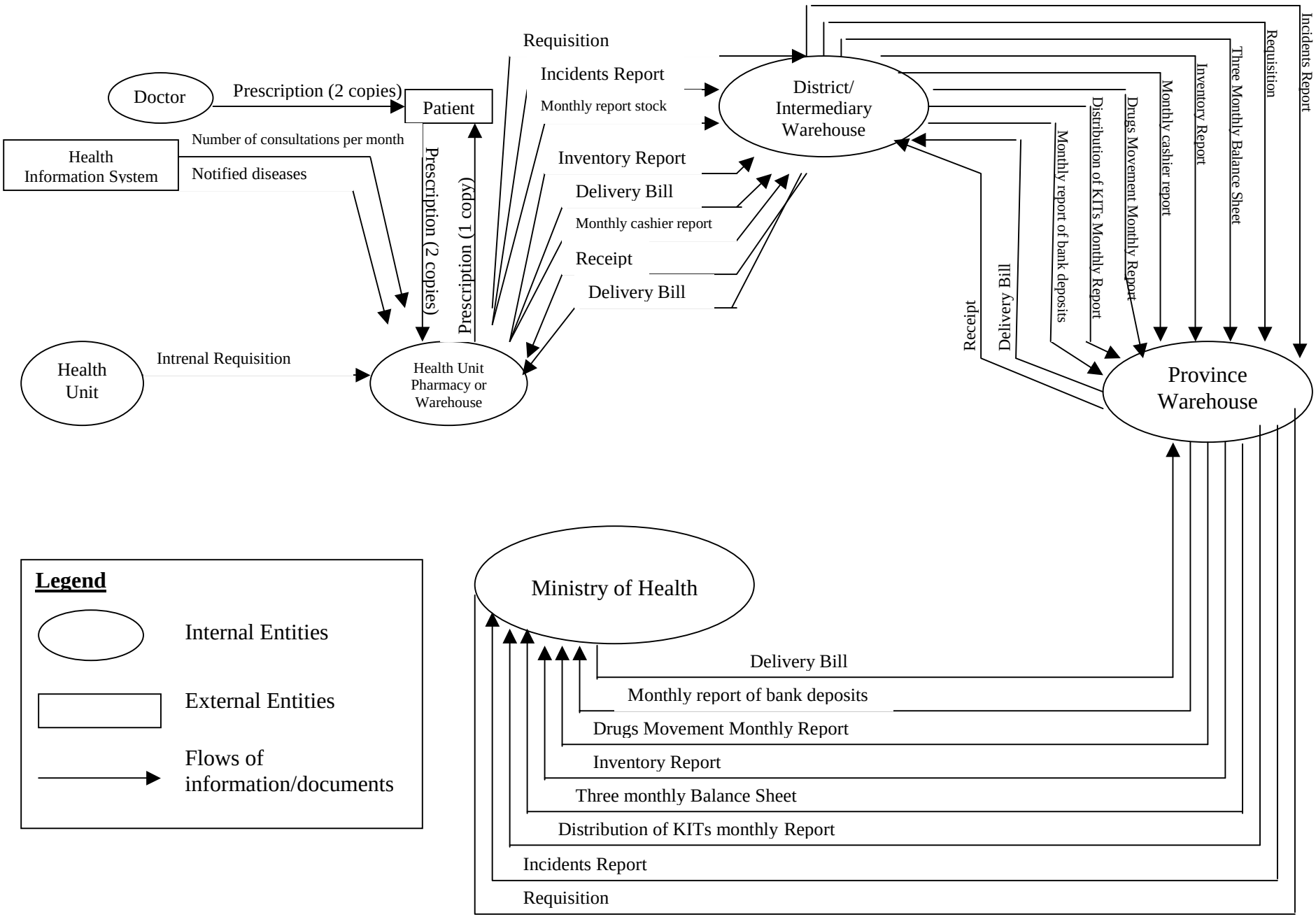
In following section I present my perception of the existing DLMIS by means of diagrams and make an initial analysis. I stress that there is a need for a deep analysis of the DLMIS. Due to the constraints of time, I am not making a full analysis of the technical details of design, but, I discuss the social aspect more deeply.

7.4 DATA FLOW DIAGRAMS OF CURRENT DLMIS

First, I present the Workflow diagram, also called the domain model. This is a graphical modeling technique used to represent the internal and external entities in the system's environment and the flows between them (Dewitz, 1996).

After the workflow diagram, I present the data flow diagram (DFD) of the current DLMIS. DFD models the sources and destinations of data (external entities), the data inputs and outputs (data flows), the actions that transform inputs into outputs (processes), and the data maintained by an information system (data store) (Dewitz, 1996)

Figure 7.1 - Workflow of current DLMIS



The dataflow diagram of the current DLMIS shows the main process by which data is collected, processed and delivered.

The processes designed by these diagrams are general for all the levels of the DLMIS. That is, all warehouse and pharmacies of different levels estimate the needs for drugs, control, and delivery drugs for other levels and for the patients.

P1 - First Process – Ordering Drugs

The input of this process is the number of consultations for a certain period of time and notified diseases that are reported in the Health information system. The doctors at the province levels do this identification of needs so that they can later require drugs based on these two items.

The FNM is the list of all the drugs that circulates in the country and its therapeutic guide for the health technicians. The drug needs for the province level are the sum of all the districts needs. For the district, drugs estimated are the sum of all the needs of the health units, and the health unit level estimates are based on the number of consultations and stock on hand.

The Ministry of health similarly estimates the needs and orders the drugs, within the existing budgets constraints. Since they cannot require all the drugs needed, they prioritize certain drugs.

The Requisition is the document used to order drugs at all levels.

P2 - Second Process – Delivering Drugs

After receiving the drugs, immediately controlling them and each health facility has the responsibility to deliver the drugs. At the lowest level, that is, at the health unit level, drugs are dispensed to outpatients in the local pharmacies. A level ahead, drugs are dispensed to the in-patients and to the health units. At the third level, that is, the province level drugs are delivered to the districts. And lastly, the regional warehouses distribute drugs to the provinces warehouses.

At each level correspondent forms are used to control the outgoing of drugs. At the health units the document to have the drugs is a receipt and, in other cases it is done by means of requisitions.

P3 - Third Process – Controlling Drugs

After estimating the needs, the requisition form is filled in and sent to the respective warehouse storage. The health units send to the districts, and the province level send to Ministry of Health (CMAM). The response of this requisition comes by means of delivery drugs and the respective forms to confirming the receipt.

After receipt, there is he process of controlling the drugs and the quantities and are registering them on the respective forms. This process consists of counting the drugs and registering it on the respective forms. The drugs taken out and in, the existent stock, are the main item registered in the control drugs process. The relevant output is the inventory stock report.

In this process, the money received from the selling of drugs in the health units is registered in the appropriate forms produced. Each prescription is registered everyday, and at the end of the day a selling report is produced. The province and the district level that have pharmacies and who sell drugs also do the same as the health unit. The

province level does not deal directly with money, and it just aggregates the reports of the deposits of the districts level and sends to the Ministry of Health.

After having this short analysis of the flow of information of drugs by means of diagrams (figure 7.1 and 7.2), I present the analysis of the DLMIS as social system.

7.5 ANALYSIS OF DLMIS AS SOCIAL SYSTEM

As argued in this thesis, the DLMIS need to be understood as a social system. I now present this analysis.

I will start from the human resources issue, which influences the success of the DLMIS. The current Mozambican DLMIS is largely dependent on people, and the lack of people is responsible for the poor collection, analysis and reporting of data. Forms are not filled correctly or are filled with gaps because the existing manpower that is not well qualified. The staff is overworked resulting in many activities not being well done, such as filling the forms of the analysis of data.

Effective logistics depends on a working transport, network that can access the remote areas. The delivery points as seen in the picture 4.1 and table 4.4 are situated far from the warehouses they depend on, making it difficult to receive the drugs in time. Transport is influenced by the larger social system and the poor economy of the country, which cannot afford an extensive pool of transport. This emphasizes the need for very good management of scarce resources.

The costs recovery of drugs is very low, as it depends in the socio-political system of the country. The ideology of free health for all is dominant and for it to be changed is a very deep noted process.

Computerized information systems are intended to help simplify the data collecting, processing and delivery of reports, making it faster error-free. This power of

technology is currently untapped because it is only available to certain stakeholders, and not to all. At the health units, where the data collection is the maximum, technologies and other resources are not available. We can assume that errors coming from the lowest level are introduced in the early part of data flow process, which influences the overall flow.

The case study shows how a centralized system works, where every single data collected is sent to the upper level, which make all decisions. There is a general lack of managerial skills to analyze, and prevent the situation to the upper levels from decision makers' point of view. The workers at the health units do not have the power to discuss their problems and an assumption is that, the upper level, knows the problems.

7.6 LINKING THE DATA FLOW AND SOCIAL SYSTEM

In the analysis and design of the DLMIS, there are significant problems in the collection, processing, analysis and reporting of data.

Seen as a social system, the DLMIS reflects problems of human recourses, lack of infrastructure and communication, poor culture of information and poor management skills. The health staff is trained as physicians and not in management and administration. Some are servants who rely on the experience and not on the formal training.

The very structured and hierarchical system makes the DLIMS to be inflexible to make changes. Decisions are made at the top level, a situation that will need to change if the DLMIS can be relevant and respond to the local needs.

If the government does not make active steps to develop health management skills and culture of information in the staff by means of training seminars for example, data will continue to be of poor quality and with it management. Data will still be sent without any critical analysis, because people do not know the importance of data to make decision.

If the policy makers do not restructure the rules in order to provide basic infrastructure (communications, transportation access to remote areas) for the health units and other resources (papers, folders, etc), to the health units, the DLMIS will continue to include poor and untimely data that is not useful for decision-making.

Viewing the DLMIS as a social system emphasizes that the design and implementation has to take into account the broader conditions of social system, such as people, infrastructure, policy and culture. Then effective systems can be developed.

This emphasizes our earlier discussion that information systems are not just technical artifacts but are part of a larger social system.

Anderson et al, (1994) argue that:

> Information systems are developed to support the management goals. These systems fail because developers frequently emphasize the technological and economic aspects of the systems and neglect the social and political considerations such as organizational environment, social interactions, political issues, and hidden costs from ineffective and institutionalized organizational routines.

In the next section, the assessment of the DMLIS is presented based on guidelines suggested by John Snow, Inc. (2000), who has studied DLMIS in other countries, mainly in the developing world. Some, and not all items of the guidelines, are chosen to make the evaluation due to the difficulties of getting data.

7.7 ASSESSMENT

The assessment of the functionality of the LMIS, is aimed at identifying the problems in its operations and propose solutions. The problems can be divided into three basic types according to John Snow, Inc. (2000), design, operation and use. Analysis of three visions helps, to respond to the questions “does the LMIS collect and report the essential data items required for logistics management? “ “Are reporting procedures followed; does the data flow in a timely fashion?” “Are managers throughout the program actually using LMIS data for decision-making?”

1. ***Outline the logistics system***

The drugs distribution system in the public sector is characterized as *vertical* because it is responsible for the primary healthcare commodities not just one commodity. The main source of supply is MEDIMOC and, the logistics system has 4 levels from the health unit to the Ministry of Health. The visited warehouses at the health units are dealing with constraints such as low capacity to store drugs, poor security, hygiene and others. The periodicity of orders and deliveries is monthly and tri-monthly. But as there are frequent stockouts, orders and deliveries are done frequently based on needs. Lead times are variable at the health units as flows depend on the availability of transport. There are theoretical mechanisms of using transport/moving products between facilities, but this is not followed because there are cars or they are mismanaged. The supervision of the transportation system and logistics of drugs is weak.

The following step consists of outline of the current DLMIS as it exists on paper. This, as John Snow, Inc. argue will help to ascertain what de *jure* DLMIS looks like and how it is supposed to work.

2. ***Outline the current DLMIS design as it exists on paper***

Summarizing, the systems described on paper shows forms that have to be filled and sent periodically, enough and prepared people engaged on filling all the fields on the forms, reporting it inside a fixed timetable, and those data being used for decision-making process.

3. ***Identify the design problems***

Looking at the data collected in the DLMIS, critical data about lead times, losses and adjustments are not collected in the system. Some data is being collected does not serve for any management purpose. For example, the category of the technician in a health unit is collected in CMAM forms and sent every month. But, this data should be kept in the human resources database. Training for the pharmacists and people dealing with drugs, would help to improve the process of collecting, reporting and analyzing. As decisions are typically not based on the reports, the reporting cycle does not coincide with decision and actual flow of drugs. The forms and data collection procedures do not reflect the service delivery and management structure in the health sector.

4. ***Assess the functionality of the logistics and the actual LMIS in the field***

John Snow, Inc. (2000), advises to rate the LMIS from 1 to 4 (where 1 = best performance) at each facility, and for the system overall on criterion of, regarding to design, operation and use. So, for the overall system, I rate 2 for the design because it needs some changes, 3 for the operation because the operation with the system is very poor that is why people act according to their feelings and also there are many errors on filling data in the DLMIS forms, and 4 for the use. The rationality is that the information produced in the DLMIS is not used so the rate is 4.

5. *Identify Logistics System Problems with LMIS: Causes and Recommended Solutions*

The *de jure* LMIS and *de facto* LMIS have significant differences, emphasizing that, the current system is not working as it was designed in paper. Problems found on stockouts, expired stocks, are derived by the design, operation and use problems of the DLMIS. The impact on the functioning of the logistics system is that deliveries of drugs are not made in time, or the right place, and it takes place in no cost-effective manner.

The framework to the guidelines of assessment, identified by John Snow, Inc. (2000) is intended to answer the following questions:

- What are the logistics' system problems?
- Which of the logistics problems are caused by the LMIS?
- Are the LMIS problems design, operation problems, or use problems?
- What are the solutions to the identified LMIS problems?

The answer to the first question is in the chapter on the findings, where the problems found are described, but we can summarize it by pointing to the lack of transport, human resources, poor culture of information, poor infrastructures and lack of enough funds to satisfy the demand of drugs. Mismanagement of the information system is the possible cause of the logistics problems. Concerning to the question on the kind of problems that the DLMIS present the answer is that the DLMIS have the design, operation and use problems. A reform of the DLMIS is one of the solutions to the encountered problems.

CHAPTER VIII

DISCUSSION

8.1 DISCUSSION

As described in the earlier chapters, Mozambican DLMIS seems to be immersed in a "sea" of problems. These problems need to be very carefully studied in order to develop appropriate solutions to address them. The origins of these problems are, cultural, political and social. It is somehow difficult to separate, or to discuss these three issues separately, because the country policy dictates the social situation of the country and the culture of the country reflects the policy. Before I discuss the DLMIS as a social system I first discuss the main problems described in the findings chapter.

With improved logistics systems, better efforts can be made to avoid losses of medicines and respond more effectively to the demands of the population. These improvements can lead to better availability of medicines and improvements in the quality of health care, by stretching the limited resources a little further.

A strong supply chain helps to reduce health program losses by minimizing waste and damages and preventing medicines from expiring on the shelves.

The challenges and also opportunities for the Mozambican DLMIS are multiple. As described in the findings there are many problems in the DLMIS, and these problems cannot be solved at once, but require an incremental approach and continuous approach.

The DLMIS had and will always have various opportunities to implement these changes in terms of time and resources. In terms of time, it means that after the historical period that Mozambique has been through, MISAU has been presented with many opportunities to change. At this time, the first and the major opportunity is within the process of health reforms that the country is currently experiencing. In terms of resources, initiatives for reforms are accompanied with budgets to implement the changes. The DLMIS needs to take these opportunities, even if they are small, and try to do some visible changes, I would like to stress that there is no need to change "everything", but start by changing the ways of working, making available crucial resources such as communication tools, provide better equipped warehouses and improving some of the management processes, for example, related to stock keeping even apparently small efforts such as better provision of folders and files will help to improve records keeping, and with it the overall functioning of the DLMIS.

From the case studies presented earlier (for example of Morroco and Philippines), various customizations, adaptations and institutionalizations were described that helped to change the DLMIS for the better. The Mozambican DLMIS should go in the same way, this is, change what is needed according to its environment, because adaptations and customizations implies the need to change according to the available resources and environment. Mozambique has some similar characteristics with the countries described in the literature review. For example, normally, the Ministry of Health runs the health information systems in developing countries, which tends to be centralized and exists as a hierarchical system. As the Mozambican DLMIS has serious problems of transport, one solution taken in one of the case studies presented by Chandani and Breton (2001) presented is to outsource transport. Why does Mozambique not do the same? This option needs to be seriously evaluated by the concerned authorities.

In the literature review, I discussed the existence of different interest groups in the development of a health information system an important implication of this is the need to include these different stakeholders in the process of reform efforts and incorporate their diverse interests into the new systems, which is the adapted or customized DLMIS, so it can have possible integrated interests for all. In Mozambique, this would include all the people working with data of drugs, managers, doctors, economists, epidemiologists, IT personnel and other technicians such inputs would help to better optimize the DLMIS.

I now discuss some of the key points identified in the findings chapter that were based on the various interviews conducted. The interviews were interested in getting the feedback and the suggestions of a researcher that could help to address some of the everyday problems they are experiencing. Some of the people said that everything is "OK", when asked about problems in the DLMIS, while others considered the problems as part of their everyday work. As the objective of my research was to identify problems in the DLMIS, I focused more on the problems identified by the interviewees. I now discuss their problems.

8.1.1 Decision-making

A key main finding of the research is that the decision making on what quantities of drugs should be acquired based on information collected. If this information was used it could empower the decision-makers, because they could act based on what is "real" facts, which could help them to negotiate more funds by, showing the real situation of the needs. Currently, the decision-makers are provided with very limited resources and power to defend themselves, due to the lack of accurate data. This lack of resources also demotivates the health workers from collecting accurate and reliable data, as they see no purposes in collecting quality data.

The non-use of the collected information brings to the health system more complications, with, the data collecting process becoming more data driven instead of action driven. So forms are just filled as a routine task, with no other purpose than satisfying needs of the bureaucracy. The absence of supervision also reduces the quality of data, as there is little control over what people are doing.

In the current system the health unit collects data in the forms, uses it for practically nothing, and then sends it to the district levels. In other programs such as immunizations and mother and child care, at least the data collectors use data locally to draw some graphs and glue them on the wall. These graphs represent comparisons of the activities done through the months, which can help them to analyze the performance of activities over time, and help to focus efforts where needed. Although sometimes the people, who draw the graphs, do not have the capability and training to adequately interpret these data. As a result, attitudes towards decision-making remain largely unchanged.

The district fills the forms and sends them to the province, with limited if not no analysis. Analysis through simple graphs could provide information about the most procured drugs or those sold less, and try to relate these to the most frequent occurring diseases.

At the level of the Ministry, also the information received in the forms is not used for relevant decision-making such as the acquisition of more drugs. One of the possible reasons for this could be the limitation of funds to buy drugs and the lack of trust in the information presented in the forms.

It is important that data written in the forms should be analyzed and used at all the levels. The health units should analyze the data they have, probably by comparing with other health units. Aspects compared could be the usage of drugs, the quantity, the seasonal variations, the time lag of ordering, and differences between the ordered and the received quantities. Such analysis can give the health units more power to

argue, for instance, by showing that the health unit with high levels of malaria and during particular months did not receive the medicines needed. The high incidence of the disease could be related to the lack of medicines.

At the district levels, they can make comparisons between the health units, how long the drugs are kept in a health unit, which health unit requests more or less drugs, why, what are the most procured drugs, which health units present more or less problems on the money collected for drugs, etc. Such analysis can help to design mechanisms to support the health units in improving their performance. Similarly, the province can conduct analysis and gain more power to negotiate with the national level (Ministry of Health), for increased budgets by showing that the existing level of funding is inadequate to meet the needs.

The Ministry of Health can improve their analysis in order to gain a more realist picture of the overall needs of the country, which can help them to negotiate with the donors, the programs implementers, and the government. A better understanding of the real needs, can help the Ministry of Health to change some polices, for instance related to procurement and selling prices of drugs.

Sandiford et al (1992) have argued that:

> There are many different interests of the stakeholders in a health information system, which need to be very carefully studied.

For improving the DLMIS there is a need to take on board all the stakeholders, from the health units to the Ministry of Health, health programs managers, drugs managers, pharmacists and discuss how to make the improvements, and the information needs at each level. These discussions provide the basis for training, and redesigning of the DLMIS.

8.1.2 Training and support

For a logistics systems to be effective, there is the need for training and support for the people who are responsible for the functioning of the supply chain. Actually the current logistic system is extremely weak on these issues, and support is not systematic. The DLMIS needs to include information about training and support, for example when was the last course held, and when will the next be arranged. People at the district level have difficulties to recall when the last training was held, possibly because it happened long time ago. Similarly, none of the district managers could answer when the next training on the DMLIS would take place.

8.1.3 Costs Recovery

Lack of control of the information produced at the lower levels is one of the reasons that make the DLMIS ineffective in the recovery of costs. If the managers could control the deposits it would probably help in getting more money from the drugs. It does not mean huge amounts, but at least some to buy more resources as transportation, pharmaceutical tools, and better pay to the workers. Waiting for donations is a very long drawn process and not effective way to deal with everyday problems. The DMLIS needs to become more self-sustaining, through more effective cost recovery mechanisms.

8.1.4 Computerization

Lambert et al., (1998) argue that:

> Generally, manual systems are very slow, inconsistent, and error prone with frequent information delays. A manual system seriously restricts a organization's ability to reduce total costs while simultaneously maintaining or improving customer service. Some common problems include the inability to detect pricing errors, lack of access to timely credit information, or difficulties in determining inventory availability. Timely and accurate information has value. Computerized systems can potentially help managers to integrate various aspects of the logistics systems and allow the reduction of costs through improved inventory and freight management. The communication network is clearly a key factor in achieving effective logistics systems.

The existing computer system for managing drugs compared to an idealized computer system is very different. The existing computerized system includes those installed in the provinces warehouses and MISAU (CMAM). An idealized computer system is often seen able to solve all problems. Based on the potential of new information and communication technologies. In an idealized system, there will be requirements for computers to be installed in the health units, and connected to a network, making easy communication both horizontally and vertically. This will allow communication between the provinces warehouse and MISAU (CMAM), and reduce the efforts of collecting, processing and reporting data at these levels, and easy maintenance.

Moving the existing system to this ideal state is very complex, requiring high level of efforts and collaboration from different people, skills, resources and departments related to the health sector, will directly influence the working of the DLMIS. The existing computerized system needs to be "repaired" in order to guarantee better performance. One of the solutions is to create local ability to maintain systems through strengthening the processes of training and education.

The history of a current computerized system as told by pharmacists at MISAU was that, a priest or a brother of a church in Niassa developed the system to help the management of drugs in this province. The system was subsequently installed in other provinces and also at MISAU. The system has been functioning since the year 2000, and the second and last version was developed in June 2002. There is no documentation of the system, except the user guidelines. There are many functional problems, and with no skilled people to maintain it and as a result the computer system can stay three months without functioning. Problems in the province warehouses are typically communicated to MISAU over phone or through travel. This adds to the cost of use of the system, some of these costs can be minimized.

There is a plan of contracting an enterprise to develop a computerized system for drugs management in MISAU. It is hoped that these new people will take into account the reality of the existing DLMIS, learn from the past and approach the task of system development in more sensitive manner.

The benefits of computerization are accompanied at the same time with costs. Installing computer systems where there are no spoons to count drugs, refrigerator for vaccines, telephones for emergencies, and just one servant to manage the health unit, does not seem to be a good idea. First, basic resources for the health units must be provided, and the role of the computer should be analyzed in relation to the provision of these basic services.

8.1.5 Data collection, reporting and analysis

The five essential types of data in the DLMIS are stocks on hand, consumption by clients, losses and adjustments, dates of orders/receipts and amounts on order. Quantities of each medicine procured should reflect the consumption and the prevalence of diseases in different areas. Improving the logistics management has become essential to make better use of existing supplies.

The research emphasizes that some data is not currently being collected, for instance, the minimum and maximum stock levels of certain drugs in the warehouse/pharmacy. The consumption of drugs is often forgotten when forms are filled, and the expiry dates of drugs are not filled in the forms. These omissions make the management of the medicines extremely difficult. If expiry dates are not registered, how is the pharmacist expected to control the drugs on the shelf and take away the expired ones? If the pharmacist does not have the idea of the maximum and minimum stock of a drug he will order too much or too little and will have many stockouts or overstocking. Then, it is very important to fill the forms correctly and analyze data.

It is thus important to firstly analyze the data needs, and to design the collecting and reporting systems based on these needs.

The LMIS can generate, for instance, inventory management reports (inventory status and losses), transportation administration reports (transportation history) and incomes statements from the sale medicines. This information can enable the decision makers to evaluate the performance of the LMIS and thus improve the weaknesses.

LMIS data has to be very carefully analyzed at each level where it is collected so the information that will be reported will be accurate and will enable the decision-makers to decide based on secure information. Reporting should not be based only on the fields of the forms, but also on the qualitative comments of issues that the data collectors find important. Analysis and reporting are very closely linked tasks because information cannot be sent anywhere without knowing and analyzing contents. Similarly, analysis is meaningless if is not used or reported to the decision-makers.

Recording, analyzing and reporting data are often difficult, especially where programs lack modern information technologies (PIP, 2001), as is typical in most developing countries. In many developing countries, LMIS reports move from the health unit level to the central level on a fixed timetable. A better approach suggested by (PIP, 2001) is to link reporting to resupply – such as when the LMIS report is also the

request for the new supplies. Such synchronization can also help to address some of the transport related problems.

8.1.6 Decentralization

Decentralization and computerization are the basis of health reform efforts in many developing countries. Decentralization of some resources can help to empower staff for instance at the district levels. A small example is that if the health units should be allowed to use the money obtained from the sale of drugs to get a “chapa” to carry the drugs from the district to their health unit. This, for example will reduce the time a health staff spends under the sun and rain while waiting for a car to give him a lift to the health unit of the district.

8.1.7 Transport

Transport is not an information problem, but there is a need in the DLMIS to keep this kind of information. One of the problems discussed in the findings was the limited availability of transport in the drugs logistics system, which leads to drugs not being provided in a timely manner to the health units. The DLMIS does not include drugs transport information; how many cars, the itinerary of the cars and schedules for drug delivery. The ambulances serve as cars to transport drugs from the province to the district and from the district to the health units, when available.

The transport problem can be solved in many ways. The first is to schedule better the trips of the existing cars including for the transportation of drugs. This is, sometimes is not that the cars are very busy to transport drugs; the problem is that there is no schedule or plans about the trips of the cars. Because these cars are ambulances, they may be used for urgent tasks. The second option is to acquire a car for distributing drugs as its primary task. It does not mean that each health unit needs to own a car, but one car can be exclusively allocated to the district for transportation of

drugs. When free, this car can also be used for ambulance tasks. Another option is to outsource the transportation for distributing drugs.

8.1.8 Human resources

A strong DLMIS should keep information on human resources, for example where they are allocated and how many. Motivating the available human resources can help to inhibit them from jumping to the more lucrative private sector.

The issue of human resources directly affects the DLMIS. Data for the DMLIS is filled by people, as said before, and information systems are made up of people. So, in this case where the system is partly manual, there is a need for qualified and sufficient human resources to run the DLMIS. The findings show that forms are filled routinely, not analyzed and sometimes with errors, because people are overworked due to the lack of human resources. Overcoming this problem is not an easy task because the country itself has problems of qualified resources for all the sectors. Meanwhile, we can improve the collection of data by better training of the available people.

CHAPTER IX

CONCLUSIONS AND RECOMMENDATIONS

9.1 INTRODUCTION

This chapter is intended to comment on the problems identified in this thesis and present some conclusions and recommendations.

Earlier studies in DLMIS discussed were more concerned with logistics for family planning. Key problems identified related to stockouts, information flows, organization structure and computerization. This study, however, is concerned with logistics for a national system that is responsible for more than one program, and not just family planning. The problems focused in this study include these identified in previous studies but also discuss problems of infrastructure, socio-political systems, educational level of the workers, prices and funding.

Generalizations to the findings can be extended to the other districts of Mozambique, which share similar characteristics of poor infrastructures and difficult to access. Although, most of the African countries have better indicators of health than Mozambique, these findings can be generalized to some African countries and other third world countries, where for instance transport to reach remote areas is difficult and a culture of information is lacking.

9.2 CONCLUSIONS

The conclusions of this thesis were drawn to answer the research questions, that are, first, to identify the problems of the current DLMIS and relating them with the flows of medicines.

The DLMIS studied is not supplying the drugs logistic system with information needed for providing the medicines in the right quantities, where and when they are needed. The main reason is that the government does not have enough resources, and funds to buy medicines to satisfy the growing demands of the country. The existing resources are not well managed to guarantee the efficiency and effectiveness of the DLMIS. One example is that large quantities of medicines are getting expired in the main storage places because of poor management. This management is closely related to the non-use of information for decision making. The collected information should be used to decide to allocate medicines in what quantities and where. The non-use of information is also related to the lack of culture in the use of information. In addition to the problem of the lack of funds to get enough medicines, there is also a lack of qualified human resources, poor infrastructure, transport and a very hierarchical DLMIS.

The second research question is to identify effects of the DLMIS problems on the health system, related to the flow of drugs.

The DLMIS problems have direct effects to the national health system, because if the health units do not have medicines for the demand, it means lack of capacity to heal patients. The aim of the main programs against malaria, diarrhoea and other diseases will not be accomplished. So, people will continue to be sick, and this will adversely influence the country's development. We said in the beginning of the thesis that healthy people means healthy country.

The third research question is to identify the existing and future potential role of information and communication technologies in the DLMIS.

Currently, ICTs are not providing the expected benefits to the DLMIS. This is, they are not providing help in collecting and processing data quickly and easily, or allowing for easy communication between the stakeholders of the DLMIS, fast delivery and production of information for the decision-makers. In the future, it is expected that with improved infrastructures and trained staff, the ICTs can provide benefits to different stakeholders. The existing ICTs at some levels of the province are confusing since some of the DLMIS tasks are done with software and some not. Some of the warehouses have software, some do not, some have but are not functioning well, and some are using both manual and automated systems.

9.3 SUGGESTIONS AND RECOMMENDATIONS

As practical contribution to knowledge, I recommend the following for the health sector/MISAU:

1. Improvement of the infrastructures

The improvement of the infrastructure, communication technologies and transport are priority tasks to improve the DLMIS. How can health units perform better without a single phone or car at this age of ICTs? How can drugs survive in a warehouse with no adequate fans, air conditioners and refrigerators? There are basic questions that need to be addressed.

2. Number of Pharmacists and training

Table 4.2 indicated that the pharmaceutical sector is not well equipped with human resources. At least, a good starting would be to have at least one pharmacist at each province, 5 technicians at the educational level below that of the pharmacists at each province, and one at each health unit of the third level. From the table, we can see that few people have higher level of pharmaceutical qualifications, raising the urgent need

for more pharmacists to be trained to fill existing gap. Also training in management and information systems should be provided to the pharmacists.

3. Reduce the number of forms

While the collecting data system is manual and the existing human resources are few and overworked, the number of forms should be reduced and focus should be on the essential items.

3. Budgets and drugs price revision

There is a need for revising the budgets for the acquisition of medicines in order to satisfy the demands, and revising of the prices of medicines. It should be possible to add to the incomes of selling drugs in the existing budgets and start to make the drugs system self-sustained. Of course, the increasing prices will have its negative impacts on the population with low income, but exceptions could be designed for certain groups of people.

4. Computerization

Acquiring a computerized DLMIS requires a careful study of the Mozambican reality and problems. Acquiring a system already developed for managing drugs information should be avoided unless it undergoes a reengineering process to fit the Mozambican context. Also computerized system should be installed where the basic infrastructure (communication, security, transport, etc) already exists.

6. Evaluation of different activities

Evaluation of activities should be introduced in the changes of the current system to allow a continuous evaluation of the drugs system.

In the current system the needs of drugs are evaluated, then drugs are gathered based on the requisitions, sold and money deposited. But there are no processes included, that evaluate the activities at all levels of the system.

The suggested balancing of the activities will help the managers at all levels of the supply chain from the health unit to the Ministry of Health to improve the performance of the DLMIS. If the design of the system turns out to be participatory, involving all the stakeholders, it should have an evaluation process, which can evaluate what was decided in the design process and the results. This has to be made into a continuous process.

This process has to produce outputs such as maps, tables and graphs to evaluate the DLMIS. These graphs, tables and maps will help the manager to make comparisons in terms of times, quantities issued and delivered in different places. Such local analysis will help to answer the question why a unit has done badly compared with another unit or time period.

7. Improve the salaries of the pharmacists

The improvement of the salaries and conditions of the pharmacists at the health units levels has to be done to help develop self-esteem in the workers, otherwise all other recommendations will be ineffective. Medicines will still be stolen and sold to the open market to fill the gap that the workers have in terms of money, and patients will continue bribing the pharmacists to get better medicines or to buy improper medicines in the open markets, most probable past their expiry dates.

8. Similar studies in developing countries

I suggest similar studies in other developing countries, so that based on the studies, different countries can share experiences. The study can also extend the existing literature and lastly the recommendation for the Third World is to avoid using the already developed computer systems of the developed countries or of any other countries in order to reduce the impacts of country gap design and implementation of IS.

9.4 CONTRIBUTION TO KNOWLEDGE

The theoretical and conceptual contribution is that the general theories as decentralization have to be very carefully thought and implemented, and how are related to the environment of the setting in which they are going to be implemented.

Experiences of other countries should be structured with a view to adapt (not replicate) to the local setting. The same strategy of using what was already done is implemented to other theories as computerization, customization and adaptations. For example, even if Morocco outsourced transport and succeeds, Mozambique does not have to do exactly the same. It is not that because Philippines reduced the number of levels in the DLMIS that Mozambique is going to do the same. So, Mozambique can carry on with its decentralization, adaptation, and customization, outsource transport but based on its social, economic and political conditions.

Lastly, the methodological contribution is that the redesigning of the DLMIS in Mozambique should follow a participatory and incremental approach, which requires a participation of many different stakeholders as possible and identification of the prior changes in the system.

The participatory approach should have as many different views from the stakeholders as possible, to understand the problems of the end user of the system and if possible by inviting people experienced in logistics, information systems, other professions and DLMIS coming from within and outside the Health System. Approaches such as Joint Application Development are best indicated for a participatory designing of an information system. Hybridism (Heeks et al., 1999), combination of IS and IT skills with an understanding of health care context and change management can be a strong approach to be included in the participatory design to the success of the system.

An incremental approach is indicated according to Heeks et al. (1999):

> Because reducing the size of change may increase the chance of the system success but also reduce the organizational benefits of the system. Conversely, increasing the size of change may reduce the chance of that system success but also increase the organizational benefits of that system.

Then the suggestions and recommendations pointed out before should not be implemented at the same time so, the size of change will not be big and the success of the implementation increases. There should be given priorities to changes for instance the improvement of the infrastructures and training.

There are common issues in this study compared with the studies of Chandani and Breton (2001), Wilson at al. (2001) and John Snow, Inc. (2000). In addition to the issues mentioned in the literature, this study points to the needs for improving infrastructure and human resources.

Relating to the assessment guidelines recommended by John Snow, Inc. (2000), there are some items of assessment that should be included as we are viewing DLMIS as social system, such as human resources and funding for drugs, for example:

- Who is filling the data forms of the DMIS? (Do these people have knowledge in information systems, management or are they pharmacists or other health workers?)
- Do the data collectors have enough resources to daily tasks such as folders, computers, etc.?

9.5 FUTHER RESEARCH

I advise further research in Mozambique regarding DLMIS to evaluate the forms, studies that reach more remote areas, drugs problems in the main hospital of the country and lastly feasibility studies to implement new software's in the DLMIS.

CHAPTER X

BIBLIOGRAPHY

Agência Suiça para o desenvolvimento e Cooperação (SWISS), 2000, ***Estudo sobre a percepção dos utentes sobre os serviços de saúde: Um estudo em quatro províncias de Moçambique (Nampula, Inhambane, Tete, Cidade de Maputo)***, Moçambique: MISAU.

Anderson, J. G., Aydin, C. E., Jay, S. J., 1994. ***Evaluating Health Care Information systems: Methods and Applications***. USA: SAGE Publications.

Boerma, J.T., 1991, ***Health Information for Primary Health Care***, African Medical and Research Foundation, 126-151

Braa, J., Macome, E., Da Costa, J.L., Mavimbe, J., Nhampossa, J., José B, Manave, A., Sitóe, A., (2001). ***A study of the actual and potential usage of information and communication technology at district and provincial level in Mozambique with focus on the health sector***. Electronic Journal of Information Systems in Developing Countries [Online], 5(2). Available from: http://www.is.cityu.edu.hk/research/ejisdc/vol5.htm [Accessed 14th April 2003]

Chandani, Y. and Breton, G., (2001). ***Contraceptive Security, Information Flow and Local Adaptations Family Planning in the Philippines and Morocco***. Electronic Journal of Information Systems in Developing Countries [Online], 5(3). Available from: http://www.is.cityu.edu.hk/research/ejisdc/vol5 [Accessed 14th April 2003]

Chemane, L. (2002). ***Mozambique ICT Policy Implementation Strategy and e-Government: Challenges and Opportunities***. In E-Africa: Regional Workshop on building e-Governance capacity in Africa. [Online]. Available from: http://unpan1.un.org/intradoc/groups/public/documents/cafad/unpan006472.pdf [Accessed 14th April 2003]

DELIVER, (2001). Strategic Decentralization: Centralizing Logistics. [Online] Available from: http://www.deliver.jsi.com/About/about.html [Accessed 11th October 2001]

Hardon, A., Boonmongkon, P., Streeflang , P., Michael L. T., Tan, M.L., Hongvivatana, T., Van Der Geest, S., Van Staa, A., Varkevisser, C., Chowdhury, M., Bhuiya, A., Springeryuang, L., Van Dongen, E., Gerrits, T., 2001. ***Applied Health Research: Anthropology of the Health and Health Care***, The Netherlands, 15-101.

Heeks, R., Mundy, D., Salazar, A., 1999. ***Information Systems for Public Health Management: Why Health Care Information Systems Succeed or Fail***. University of Manchester, UK

Instituto Nacional de Estatísticas (INE), 1998. ***Demographic and health survey (DHS) 1997: Summary report***. Maputo, Mozambique

Instituto Nacional de Estatísticas (INE), 1999. ***II Recenseamento Geral da População e Habitação 1997***. Maputo, Moçambique.

John Snow, Inc., 2000. ***Logistics Management Information System: Assessment Guidelines*** [Online]. Available from: http://www.hplm.jsi.com/ [Accessed 11th October 2001].

Lambert, D., Stock, J., Ellram, L., 1998. ***Fundamentals of Logistics Management***. Singapore.

Land, F., 1992. The information systems domain. In: R. Galliers ***Information systems Research: Issues methods and practical guidelines***. Pub Blackwell Publications. 6-13.

Macfarlane, S. and Tekeste, A., 1994. ***Information for Change in Health and Disease in Developing Countries***. London and Oxford.

Ministério de Saúde (MISAU), 1995, ***Estratégia Para Área Farmacêutica***. Maputo, Moçambique: MISAU.

Ministério de Saúde (MISAU), 2001a. Avaliação Interna da Área Farmacêutica, Maputo, Moçambique: MISAU

Ministério de Saúde (MISAU), 2001b. ***Orçamento do Estado para o ano 2002***. Maputo, Moçambique: MISAU.

Ministério de Saúde (MISAU), 2001c. Strategic Plan for the Health Sector (PESS). Maputo, Mozambique: MISAU.

Ministério de Saúde (MISAU), 2002. ***Avaliação da Área Farmacêutica e a Reforma na Gestão dos Medicamentos do Sistema Nacional de Saúde***. XXVII Conselho Nacional Coordenador de Saúde. Maputo, Moçambique: MISAU.

Mwaluko, G., Neuvians, D. and Pazvakavambwa, B., 1996. ***Health Sector Reforms in Eastern and Southern Africa: A training Manual For Health Workers,*** Biomedical Research Training and Institute, Harare, Zimbabwe.

Noormahomed, A. R., Cunha, A. C., Sitói, A. V., Herculano, B., Jeremias,L. C., 1990. ***Evaluation of the Health System in Mozambique***. Maputo, Mozambique.

Notícias, 2002. ***Apesar de Investimentos no Sector: Acesso à saúde continua deficiente.*** Maputo. Notícias, 29th October, p.1

Opit, L.J., 1987. ***How Should Information on Health Care Be Generated And Used?*** World Health Forum 1987, Vol. 8, 409-438.

Opoku-Mensah, A. (2002), UNECA, to The Communication Initiative, http://www.comminit.com/, (last accessed 21st February 2003.)

Patton, M., 1987. ***How To Use Qualitative Methods in Evaluation***. USA.

Population Information Program (PIP), 2002, ***A New Look at Logistic*** [Online]. Available from: http://www.jhuccp.org/pr/j51/j51chap1.shtml, [Accessed 7th November 2002].

Sandiford, P., Annett, H. and Cibulskis, R., 1992. ***What Can Information Systems Do For Primary Health Care? An International Perspective***. Great Britain: Pergamon Press Ltd, 1077-1085.

Sims, D., Fineman, S. and Gabriel, Y., 1998***, Organizing and Organizations: An Introduction***. London: SAGE Publications Ltd.

Sommervillle, I., 2001. ***Software Engineering***. 6th edition. USA: Pearson Education Ltd, 495-496.

Stock, J. and Lambert, D., 2001. ***Strategic Logistics Management***. 4th edition. Singapore:McGrawHill

Strauss, A. and Corbin J., 1988. ***Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory***. 2nd edition. SAGE Publications.

The World Book, Washington, D.C, Central Intelligence agency, 2001, New York: Bartely.com, 2001, http://www.bartely.com/151/ last, accessed 06/02/03.

Walsham, G., Symons, V. and Waema, T., 1988. ***Information Systems as Social Systems: Implications for Developing Countries***. London: Oxford University Press.

Wilson, J., Nzoka, G. and John Snow, Inc., 2001. ***Private Sector Information Technologies in a Public Sector Setting: Distribution Resources Planning in Kenya***. Electronic Journal of Information Systems in Developing Countries [Online]. Available from: http://www.is.cityu.edu.hk/research/ejisdc/vol5 [Accessed 14th April 2003]

World Health Organization (WHO), 2000***, Design and Implementation of Health Information Systems***, Geneva.

ANNEX

INTERVIEW QUESTIONS

Questions for the health units, district and province drugs warehouses.

General

1. What are you daily activities?
2. What are the main problems faced in your everyday life work?
3. How do you solve these problems?

Tools

1. Which tools are you (the facility) using to collect data, process and report data?
2. Are the used tools always available?

Forms

1. What are the used forms? And for what are these forms used?
2. When are the used forms supposed to be filled?
3. To whom these forms are supposed to be sent and for what purposes?
4. Locally what is done with the data collected in the forms?

Logistics System

1. How do you (the facility) calculate an order quantity?
2. Are the medicines being supplied at regular intervals?
3. Are you (the facility) receiving the right quantities of medicines?
4. Are you (the facility) receiving the ordered medicines?
5. How often you (the facility) have stockouts of medicines?
6. How often you (the facility) have supervision visits and feedback?

Questions for MISAU and CMAM.

General

1. What are you daily activities?
2. What are the main problems faced in your everyday life work?
3. How do you solve these problems?

Tools

1. Which tools are you (the facility) using to collect data, process and report data?

Quality of data and data use

1. How many forms are used in the DLMIS?
2. Are you using data coming from the low levels for decision-making (such as reordering)?
3. Is data coming from low levels trustable?
4. Is data coming from low levels in time and accurate?
5. Do you have mechanisms to validate data brought from the low levels?

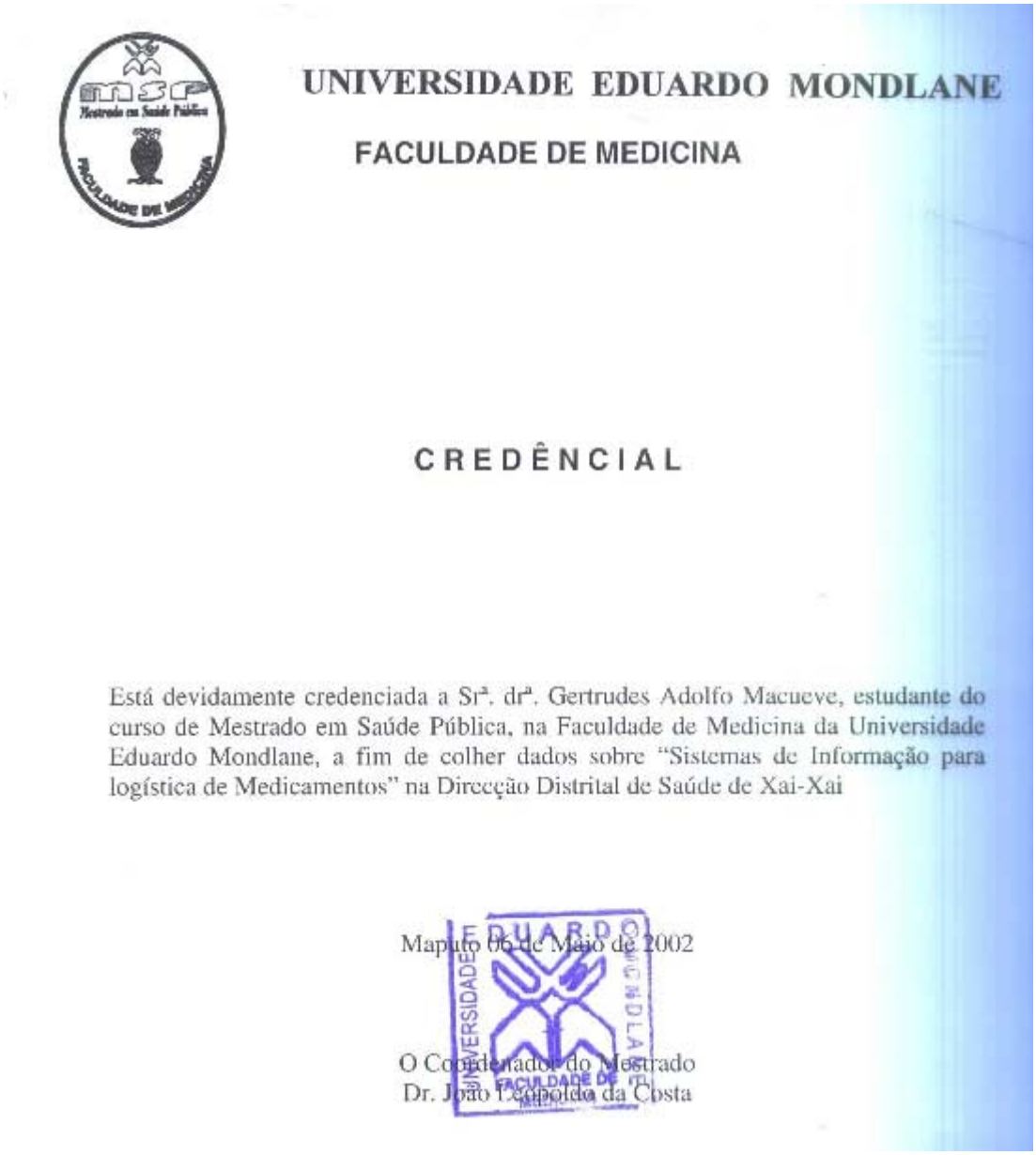
Logistics System

1. How do you (the facility) calculate an order quantity?
2. Are the medicines being supplied and ordered at regular intervals?
3. How long takes an order?
4. What are the steps to acquire medicines for the country?
5. Are the quantities of medicines ordered for the country enough? If not why?
6. Does the actual logistics system satisfy the demand of medicines?
7. In which basis are distributed the drugs trough the country (different warehouses)?
8. What are the reasons of poor feedback and supervision?

1. Is the DLMIS linked with other health information systems? How?

ETHICAL APPROVAL LETTERS

1. Ethical approval letter to Chicumbane (Credencial para Direcção Distrital de Xai-Xai)



UNIVERSIDADE EDUARDO MONDLANE

FACULDADE DE MEDICINA

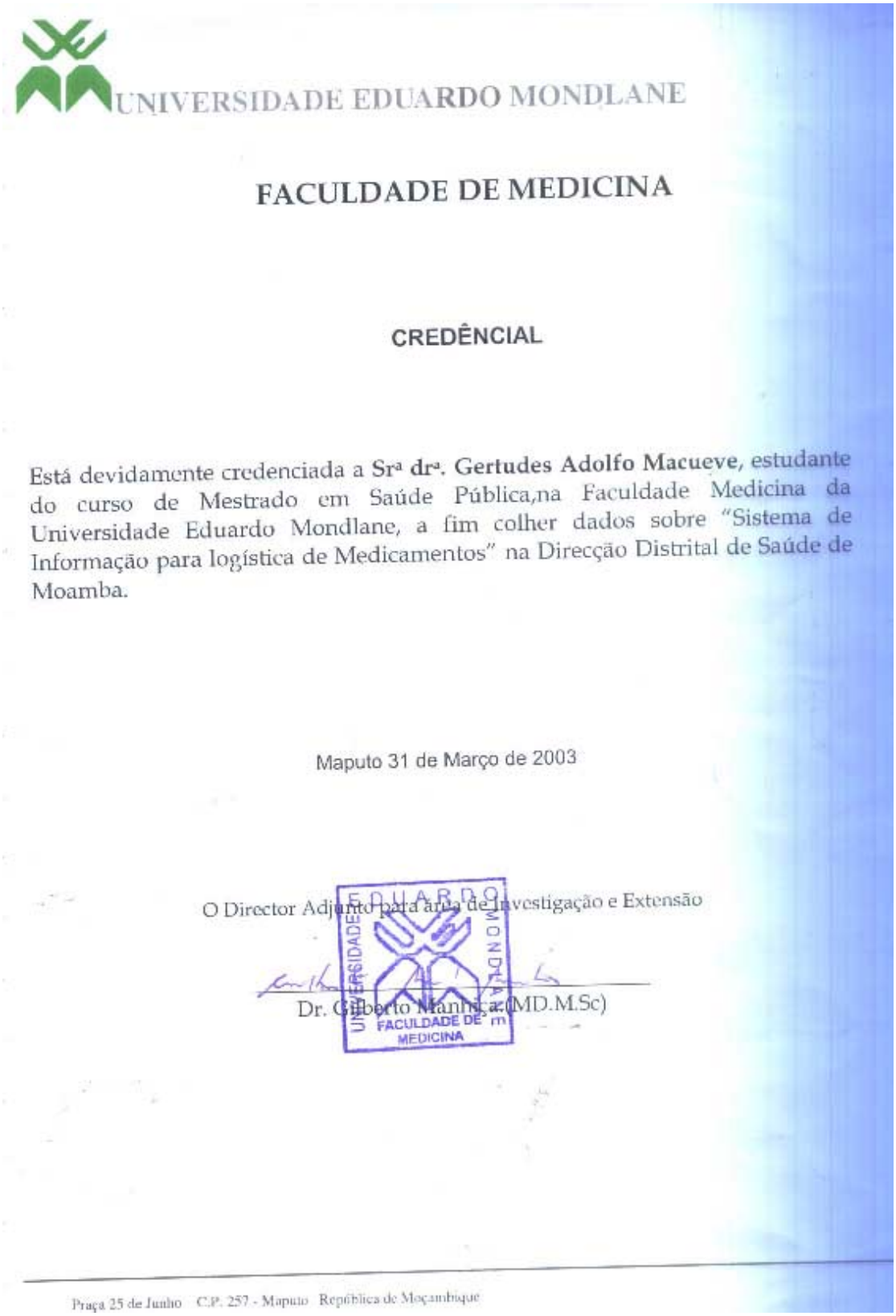
CREDÊNCIAL

Está devidamente credenciada a Srª. drª. Gertrudes Adolfo Macueve, estudante do curso de Mestrado em Saúde Pública, na Faculdade de Medicina da Universidade Eduardo Mondlane, a fim de colher dados sobre "Sistemas de Informação para logística de Medicamentos" na Direcção Distrital de Saúde de Xai-Xai

Maputo 06 de Maio de 2002

O Coordenador do Mestrado
Dr. João Lopoldo da Costa

2. Ethical approval letter to Moamba (Credencial para Direcção Distrital da Moamba)



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FACULDADE DE MEDICINA

CREDÊNCIAL

Está devidamente credenciada a **Srª drª. Gertudes Adolfo Macueve**, estudante do curso de Mestrado em Saúde Pública,na Faculdade Medicina da Universidade Eduardo Mondlane, a fim colher dados sobre "Sistema de Informação para logística de Medicamentos" na Direcção Distrital de Saúde de Moamba.

Maputo 31 de Março de 2003

O Director Adjunto para área de Investigação e Extensão

Dr. Gilberto Manhiça (MD.M.Sc)

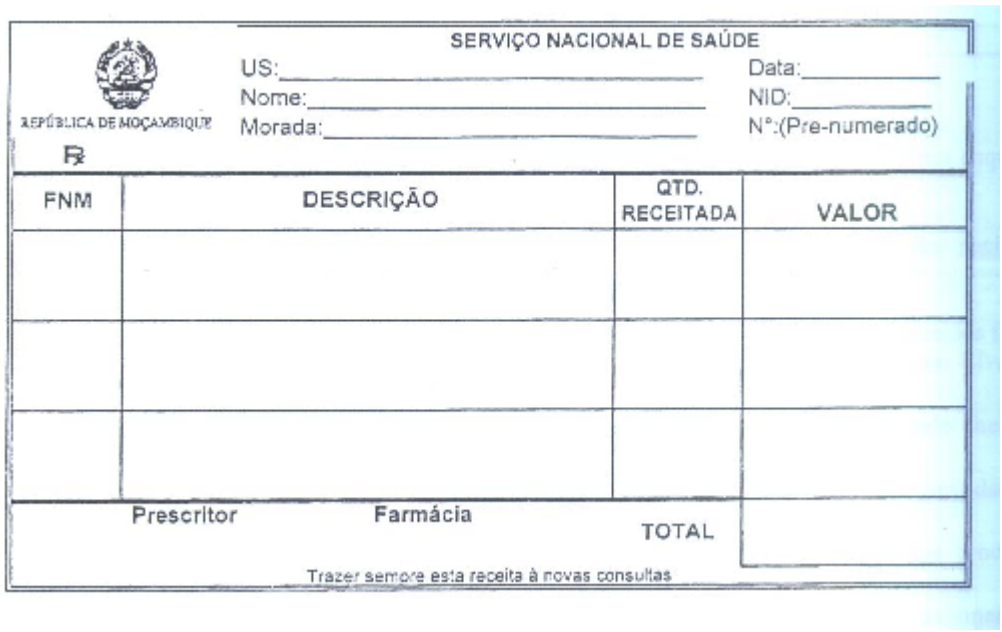
UNIVERSIDADE EDUARDO MONDLANE FACULDADE DE MEDICINA

Praça 25 de Junho C.P. 257 - Maputo República de Moçambique

FORMS USED IN THE DLMIS AND SIS

Forms used in the DLMIS

1. Prescription (Receita Médica)



REPÚBLICA DE MOÇAMBIQUE

℞

SERVIÇO NACIONAL DE SAÚDE

US:_____ Data:_____

Nome:_____ NID:_____

Morada:_____ N°:(Pre-numerado)

FNM	DESCRIÇÃO	QTD. RECEITADA	VALOR
	Prescritor Farmácia	TOTAL	

Trazer sempre esta receita à novas consultas

2. Requisition (Requisição)

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DE SAÚDE

REQUISIÇÃO

Trimestral _____

Urgente _____

Depósito Remetente		Depósito Fornecedor	
Código Remetente		Código Fornecedor	
Data da Remessa		Data da autorização	

FNM	Descrição	Stock Existente	Quantidade Pedida	Quantidade autorizada

3. Internal Requisition (Requisição Interna)

REQUISIÇÃO INTERNA

Pre-numerado

Nome da Unidade:_____

Enfermaria:_____

Data Requisição:_____

Farmácia:_____

Data da Remessa:_____

FNM	Descrição	Stock	Quantidade Pedida		Quantidade Fornecida	Valor
	Emitida por:	Aviada por:			Recebido por: TOTAL	

4. Incidents Report(Relatório de Ocorrências)

REPÚBLICA DE MOÇAMBIQUE MINISTÉRIO DA SAÚDE **RELATÓRIO DE OCORRÊNCIAS** Data:_____Unidade Sanitária:_____ Província:_____Distrito:_____Trimestre:_____

5. Monthly Report Stock (Resumo Mensal de Stock de medicamentos do Centro de Saúde)

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DE SAÚDE

RESUMO MENSAL DE STOCK DE MEDICAMENTOS DO CENTRO DE SAÚDE

PROVÍNCIA:_____Mês:_____Ano:_____

Distrito:

Unidade Sanitária:_____N. Total de Consultas:_____

Categoria do Responsável Clínico:_____

Data de Abertura doKIT:_____ Número de A.P.E's que enviaram dados durante o mês:_____

N. DE KIT/MÊS:_____ Total de consultas realizads pelos A.P.E's durante o mês:_____

FNM	Descrição	Saldo Mês Anterior	Recebido no Mês	Total do Mês	Inventário	Valor	Utilizado
	Ácido Acittílico Salicílico 500g Comprimidos						
	Adesivo 2.50cm x 5m						
	Hidróxido de Alumínio 500mg Comprimidos						
	Amoxicilina Suspensão Oral 250mg/5ml de 50ML						
	Penicilina Benzatínica 2.4MU (1.44G)Injectável						
	Benzoato de Benzilo Conc. 90% Solução de 1 Litro						
	Cetrimida 15% Clorexidina 1.5% Conc.Solução de 1 Litro						
	Cloroquina 250 mg(150mg base) Cimprimidos						
	Chlorferamina 4mg Comprimidos						
	Cotrimoxozole 400mg + 80mg Comprimidos						
	Algodão Hidrófilo 500g						
	Diazepam 5mg/ml, Injectável de 2ml						
	Adrenalina 1mg/ml, Injectável de 1 ml						
	Sal Ferroso 200mg com Ácido Fólico 0.25mg Comprimidos						
	Gaze não esterilizado de 20cm x 5m						
	Violeta Genciana Pó						
	Lactato de Ringer Injectável de 5000ml						
	Ligaduras de 75mm x 9m						
	Kanamicina 2g/8ml Injectável						
	Lidocaina $1^{3/4}$ Injectável						
	Mecandazole 100mg Comprimidos						
	Metilergometina 0.2mg/ml Injectável de 2ml						
	Metronidazole 250mg Comprimidos						
	Ácido Nalidíxico 500mg Comprimidos						
	Nistatine 100 000IU Supósitórios Vaginais						
	Sais de Rehidratação Oral Pacote para 1 Litro						
	Parecetamol 500mg Comprimidos						
	Fenoximetil penicilina 250mg Comprimidos						
	Penicilina Procaína 3G Injectável						
	Praziquantel 500mg. Comprimidos						
	Salbutamol 4mg Comprimidos						
	Fios de Sutura. Esteril. Tamanho 3/0 agulha de 24mm. 45cm						
	Tetraciclina 1% Pomada Oftálmico de 5g tubo						
	Vitamina A 200 000IU(Ratinol) Cápsulas						

6. Delivery Bill (Guia de Entrega/ Guia de Entrada)

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DE SAÚDE

GUIA DE REMESSA/GUIA DE ENTRADA

Depósito Remetente	
Código Remetente	
Data da Remessa	
N. da Aqusição	
Meio de Transporte	

	Unidade Sanitária	
	Código Destinatário	
	Data da Recepção	
Tipo de Movimento	Fornecimento Normal	
	Devolução	
	Outros	

Preenchido pelo fornecedor					Preenchido pelo receptor	
FNM	Descrição	Prazo de Validade	Quantidade Enviada	Valor	Quantidade Recebida	Diferença
			TOTAL			

Conferido por: Recebido por:

7. Balance Sheet (Balancete)

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DE SAÚDE

CENTRAL DE MEDICAMENTOS E ARTIGOS MÉDICOS

BALANCETE

Trimestre**:**_____

Data:_____Unidade

Sanitária:_____Província:_____Distrito:_____

FNM	Descrição	Stock Inicial	Entradas	Saídas	Stock Inventário	Valor
					TOTAL	

8. Mapa Resumo Mensal de Caixa

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DA SAÚDE

Mapa Resumo Mensal de Caixa

Unidade Sanitária:_____
Distrito:_____
Província:_____
Código:_____
Mês:_____

Data	Valor Cobrado	Valor Subsidiado	Total	Nº Receitas	Distribuído Internamente
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					
27					
Total					

Responsável da Farmácia: Responsável do Depósito:

9. Drugs Movement Monthly Report (Mapa Resumo Mensal de Movimentos)

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DE SAÚDE

Mapa Resumo Mensal de Movimentos

Unidade Sanitária:_____

Distrito:_____

Província:_____

Código:_____

Mês:_____

Unidade Sanitárias	Valor Cobrado (1)	Valor Subsidiado (2)	Total (1+2)	Nº Receitas	Distribuído ao Internamento	Distribuído as US
Total						
Responsável do Depósito:						

10. Distribution of KITs Monthly Report (Mapa Resumo Mensal de Distribuição de Kits)

MAPA RESUMO MENSAL DE DISTRIBUIÇÃO DE KITS

Depósito:_____

Província:_____Período:_____

			Kits Distribuídos		
UNIDADES SANITÁRIAS	CATEGORIA DO CLÍNICO	CONSULTAS EXTERNAS	KIT A	KIT B	KIT C
		Total			

	Número de Kits			
Kits	Stock do inicío do mês	Recebidos no mês	Distribuídos no mês	Stock no fim do mês
A				
B				
C				
Total				
Preenchido por:			Data:	

11. Monthly Report of the bank deposits (Mapa Resumo Mensal de Depósitos)

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DA SAÚDE

MAPA RESUMO MENSAL DE DEPÓSITOS

Unidade Sanitária:_____
Distrito:_____ Província:_____
Código:_____ Mês:_____

Unidade Sanitária	Nº de Talões	Valor Depositado
Total		
Responsável do Depósito:	Recebido por:	

12. Modelo do Mapa Resumo de Controle 1

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DE SAÚDE

Mapa Resumo de Controlo 1

Unidade Sanitária:_____

Distrito:_____ Província:_____

Código:_____ Mês:_____

1	Unidade Sanitária					
2	Valor Stock Início Trimestre					
3	Valor das Entradas no Trimestre					
4	Valor do Stock no Fim do Trimestre					
5	Total (1+2+3)					
6	Valor Cobrdao					
7	Valor Subsidiado					
8	Valor Distribuído aos Intrenamentos					
9	Valor distribuído às US					
10	Total (6+7+8+9)					
11	Divergência (5-10)					

13. Modelo do Mapa Resumo de Controle 2

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DE SAÚDE

Mapa Resumo de Controlo 2

Unidade Sanitária:_____

Distrito:_____ Província:_____

Código:_____ Mês:_____

US	Cobranças	Subsídio	Total	N. de Consultas	Rácio	Média Anual

14. Receipt (Recibo)

REPUBLICA DE MOÇAMBIQUE

MINISTÉRIO DA SAÚDE

SERVIÇO NACIONAL DE SAÚDE

RECIBO

Recibo:_____/_____

Unidade Sanitária:_____Valor:_____MT

Recebido de_____

Endereço:_____

A quantia de _____

Correspondente ao período:_____

Numerário: ☐

Talão de depósito: ☐ Nº de talão:_____

_____ de _____de_____

Recebido por: Entregue por:

15. Nota de Entrega

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DE SAÚDE

NOTA DE ENTREGA

Unidade Fornecedora:_____

Unidade Sanitária:_____

Descrição	Qtd. Enviadas	Qtd. Recebidas
Observações		
Recebido por(Data)	Transportado por (Data)	Entregue por (Data)

16. Ficha de Stock

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DE SAÚDE

FICHA DE STOCK

Unidade Sanitária:_____ Distrito:_____Província:_____

Nome do Artigo:_____ FNM

Stock Mínimo/Máximo:_____Preço

Prazos de Validade						
Data	Origem/Destino	N.Doc	Entradas	Saídas	Existências	Rubrica

Nota: IMPRESSÃO FRENTE E VERSO

17. Monthly Report of outpatients consultations and stock of drugs of KIT A for Heath Centers (SIS Form – SIS-C04)

REPÚBLICA DE MOÇAMBIQUE
MINISTÉRIO DA SAÚDE
Mod. SIS-C04

DISTRITO: _____
U.S.: _____
MÊS: _____ ANO: _____

PME - RESUMO MENSAL DE CONSULTAS EXTERNAS E DO STOCK DE MEDICAMENTOS KIT A – CENTRO DE SAÚDE

DATA DE ABERTURA DO KIT: _____ _____
Nº DE KIT/MÊS:
CATEGORIA DO RESPONSÁVEL CLÍNICO: _____

CENTRO DE SAÚDE Nº TOTAL DE CONSULTAS_____ **CENTRO DE SAÚDE** Nº TOTAL DE CONSULTAS_____	**DISTRITO:** Nº TOTAL DE CONSULTAS _____

MEDICAMENTOS	SALDO MÊS ANTERIOR	RECEBIDO DURANTE O MÊS	TOTAL DO MÊS	ACABOU EM (DATA)	UTILIZADO	DEVOLVIDO	SALDO NO FIM DO MÊS
A.A.S. comp. 500 mg							
Salbutamol comp. 4 mg							
A. Benzóico/ A.Salicílio pomada							
Clorfeniramina Comp. 4 mg							
Cloroquina Inj 150 mg base							
Cloroquina Comp. 150 mg base							
Cotrimoxozol comp. 400 mg/80 mg							
Amoxicilina susp. Oral 125 mg/5 ml							
Hidroxido de Alumínio comp. 50 mg							
Mebendazol Comp. 100 mg							
Metrifonato Comp. 100mg							

MEDICAMENTOS	SALDO MÊS ANTERIOR	RECEBIDO DURANTE O MÊS	TOTAL DO MÊS	ACABOU EM (DATA)	UTILIZADO	DEVOLVIDO	SALDO NO FIMDO MÊS
Metronidazol comp. 250 mg							
Paracetamol Comp. 500 mg							
Sal Ferroso e Ácido Fólico Comp							
Diazepam Inj. 10 mg/2 ml							
Lactat de Ringer Sol. E.V.							
Lidocaina Inj. 1 g/50 ml							
Metilergometrina Inj. 0.2 mg/ml							
Penicilina Benzatínica 2.4 MU							
Penicilina Procaína 3.0 MU							
Probenecide Comp. 500 mg							
Kanamicina Inj. 1 g							
Benzoato de Benzilo conc.							
Cetrimida e Clorexidina							
Tetraciclina Pomada Oft.							
Violeta de Genciana							
Algodão Adesivo 25 cm X 5m							
Ligaduras 75 m x 8 m							
Gaze 20 cm X 6 m							
Fios de Soltura							
Envelopes de Plástico							
Sabão 1 Barra							

CONSULTAS REALIZADAS POR A.P.E's

Número de A.P.E's que enviaram dados durante o mês	
Total de Consultas realizadas pelo A.P.E's durante o mês	

NOTA: ESTE RESUMO DEVE SER ENVIADO MENSALMENTE MESMO NO CASO EM QUE O KIT A NÃO FÔR RECEBIDO

18. Monthly Report of outpatients consultations and stock of drugs of KIT B for Heath Posts (SIS Form – SIS-C05)

REPÚBLICA DE MOÇAMBIQUE
MINISTÉRIO DA SAÚDE
Mod. SIS-C05

DISTRITO: _____
U.S.: _____
MÊS: _____ ANO: _____

PME - RESUMO MENSAL DE CONSULTAS EXTERNAS E DO STOCK DE MEDICAMENTOS KIT B – POSTO DE SAÚDE

DATA DE ABERTURA DO KIT: _____ Nº DE KIT/MÊS: _____
CATEGORIA DO RESPONSÁVEL CLÍNICO: _____
Nº TOTAL DE CONSULTAS: _____

MEDICAMENTOS	DURANTE O MÊS ACABARAM ALGUNS MEDICAMETOS DOS SEGUINTES MEDICAMENTOS?				
	SIM / DATA	STOCK NO FIM DO MÊS		SIM / DATA	STOCK NO FIM DO MES
A.A.S. comp. 500 mg			Cetrimicida e Clorexidine		
Aminofilina Comp. 100 mg			Tetraciclina Pomada Oft		
A. Benzóico/ A.Salicílio pomada			Adesivo 25 X 5m		
Cloroquina Comp. 150 mg base			Algodão Hidrófilo 500 mg		
Fenoximetil Penicilina Comp. 500 mg			Ligaduras 75 cm X 9 m		
Mebendazol Comp. 100 mg			Sabão 500g		
Paracetamol Comp. 500 mg					
Penicilina Procaína 2.0 MU					
Probenecide Comp. 500 mg					
Saiss de Rehidratação Oral/Pacotes					
Benzoato de Benzilo conc.					

CONSULTAS REALIZADAS POR A.P.E's

Número de A.P.E's que enviaram dados durante o mês	
Total de Consultas realizadas pelo A.P.E's durante o mês	

NOTA: ESTE RESUMO DEVE SER ENVIADO MENSALMENTE MESMO NO CASO EM QUE O KIT B NÃO FÔR RECEBIDO

19. Monthly Report of KITs by the Province and District Warehouses (SIS Form – SIS-C07)

REPÚBLICA DE MOÇAMBIQUE
MINISTÉRIO DA SAÚDE
Mod. SIS-C07

NOME DO DEPÓSITO _____
MÊS _____ ANO _____

RESUMO MENSAL DA DISTRIBUIÇÃO DOS KITS PARA NÍVEL PROVINCIAL E DISTRITAL

A) CONTROLE DE STOCK DOS KITS NOS DEPÓSITOS PROVINCIAL, DISTRITAL/ E DA MEDIMC

KITS	NÚMERO DE KITS			
	STOCK NO ÍNICIO DO MES	RECEBIDOS DURANTE O MÊS	DISTRIBUIDOS DURANTE O MES	STOCK NO FIM DO MES
A				
B				
C				

B) Nº DE KITS DISTRIBUÍDOS ESTE MÊS AS PROVÍNCIAS, DISTRITOS OU UNIDADES SANITÁRIAS

NOME DAS PROVÍNCIAS DISTRITOS OU UNIDADES SANITÁRIAS	DATA	KIT A	KIT B	KIT C

OBSERVAÇÕES:
(Sobre o abastecimento e a distribuição dos Kits, as eventuais rupturas de stock dos Kits ou seu estado de conservação, etc.)