Integration of Health Information Systems

Case Study from Malawi

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INTEGRATION OF HEALTH INFORMATION SYSTEMS: CASE STUDY FROM MALAWI

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Dedication

To my mum and to the memory of my dad

Marlen Stacey Galimoto

Abstract

This research falls under the domain of design and implementation of Health Information Systems (HIS) mainly in developing countries. The study was motivated by previous research conducted on HIS which have revealed that fragmentation of HIS is a common feature in most developing countries and this fragmentation contributes to the general poor performance of the health sector. The objective of this study was to assess the HIS in Malawi to identify where fragmentation exists, understanding why it exists with a purpose of making conclusions and recommendations on whether and how the identified fragmentation could be reduced.

To achieve this objective, the study has investigated the HIS at several levels of the health system with the purpose to understand the flow of health data/information in the system. More specifically, the study investigated on the main routine Health Management Information System that has been implemented in Malawi and on the reporting systems of several specific programmes namely the Expanded Programme for Immunisation (EPI); Integrated Disease Surveillance and Response (IDSR); Malaria Control; Safe Motherhood; Family Planning; Voluntary Counselling and Testing (VCT); Anti-Retroviral Therapy (ART); and Prevention of Mother to Child Transmission (PMTCT).

Once the information flow was determined, the study aimed to identify the information requirements and information use of the specific programmes and the district health management to understand how these contributed to the information flow that was revealed; and therefore how the system could be modified to meet these requirements. To achieve this, the study inquired on the responsibilities and duties of the district programme managers and the district health managers.

The empirical fieldwork was conducted over a period of 14 weeks from July – November 2006, at national, zonal, district and facility level. Two districts, Chikwawa and Chiradzulu were visited during the study and because the main focus of the research was the district level, most of the time was spent at the District Health office and District Hospital. The study used qualitative research methods such as semi-structured interviews; document analysis; participant observation of activities such as meetings and facility supervision; and software analysis. Analysis of the empirical data was informed by literature reviewed on health management, the components/aspects of HIS, the factors causing fragmentation in HIS and the proposed strategies for reducing fragmentation in order to improve the overall health system performance.

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The research revealed that fragmentation existed in the HIS even though commendable efforts had been made by the Ministry of Health to achieve an integrated HIS through the implementation of the HMIS. The fragmentation existed in that, in addition to the HMIS, parallel programme-specific reporting systems were operating. This parallel reporting was attributed to various reasons including the fact that the HMIS did not meet the information requirements of the programmes because: it did not provide data on a monthly basis; and it did not collect all the data elements required by the district programme coordinators and by national level programme managers. Additionally, parallel reporting existed because some coordinators were not aware that their programme-specific reporting systems had been abolished due to the introduction of the HMIS. Furthermore, fragmentation also resulted from the fact that certain programmes had been introduced after the HMIS had already been implemented hence; it did not collect the data specific for these programmes.

The study, additionally, revealed that fragmentation existed because the programme coordinators´ duties had been defined with a vertical reporting system in mind and that is why the HMIS did not meet the related information requirements for those duties.

Thus, the study re-emphasises on the importance of the interactive relationship between the technical and social aspects of a HIS and how these influence the outcome of the structure and performance of the overall HIS. With this perspective, I make recommendations in the end on possible ways for addressing the aspects contributing to the observed fragmentation in order to achieve a more integrated HIS.

Keywords: Fragmentation, Health Management Information System (HMIS), programme-specific reporting systems, data elements, information flow, district programme coordinators, district health management, integration, Malawi

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Firstly, I thank the Almighty God for everything.

Marlen Stacey Galimoto

Maputo, May 2007

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Abbreviations and Acronyms

AIDS	Acquired Immune Deficiency Syndrome
ART	Anti-Retroviral Therapy
CHSU	Community Health Sciences Unit
DEHO	District Environmental Health Officer
DHIS	District Health Information System (or Software)
DHMT	District Health Management Team
DHO	District Health Office (r)
DIP	District Implementation Plan
DNO	District Nursing Officer
EmOC	Emergency Obstetric Care
EPI	Expanded Programme for Immunisation
FP	Family Planning
HIS	Health Information System
HISP	Health Information System Programme
HIV	Human Immune Deficiency Virus
HMIS	Health Management Information System
HMIU	Health Management Information Unit
HSA	Health Surveillance Assistant

IDSR   Integrated Disease Surveillance and Response

IS   Information System

ITN   Insecticide Treated Nets

MCH   Maternal and Child Health

MOH   Ministry of Health

MSF   Medecins Sans Frontieres

MSH   Management Sciences for Health

NAC   National AIDS Commission

NGO   Non- Governmental Organisation

OPD   Out-Patient Department

PHC   Primary Health Care

PMTCT   Prevention of Mother To Child Transmission of HIV/AIDS

RHU   Reproductive Health Unit

RHINO   Routine Health Information Network

SM   Safe Motherhood

UNICEF   United Nations Children's Fund

VCT   Voluntary Counselling and Testing

WHO   World Health Organisation

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1. Introduction

This chapter aims to introduce the topic of this study and provide an overview of the issues presented in this thesis. More specifically, it provides brief details on the following areas: the background to the research, research objectives, research context and research approach, the expected contributions and lastly, the structure of this thesis document.

1.1 Background

Having a healthy population is one of the targets for attaining socio-economic development in any country. The health care system is one of the major determinants of the health status of the population and therefore the importance of quality health care services cannot be overemphasised.

However, the health status and quality of the health care services in many developing countries fall short with reference to international standards mainly due to dominating shortage of financial- and human resource in the public sector. It is in such situations that good management is crucial and a prerequisite for increasing efficiency and effectiveness of the health services (Sauerborn & Lippeveld 2000). It is widely believed that the Health Information System (HIS) has a major role in supporting good management which will eventually assist in the improvement in the quality of health service provided to the population as Mahler (1986) states "*The WHO has long identified health information systems as critical for achieving health for all by year 2000*" (Mahler 1986 cited by Sauerborn & Lippeveld 2000:1). A Health Information System is therefore defined as "*a set of components and procedures organised with the objective of generating information which will improve health care management decisions at all levels of the health system*" (Sauerborn & Lippeveld, 2000:3).

The data required for a HIS is collected using a combination of routine methods and non-routine methods. The routine methods collect activity data about special programmes, routine services, and epidemiological events as well as semi-permanent data about the administration and the population served (Heywood & Rohde, 2001). Thus reporting

systems for these activities and functions of the health system are considered to be subsets of the overall HIS and together form the routine Health Information System. On the other hand, non-routine methods include surveys, population censuses, and qualitative and quantitative rapid assessment methods (Lippeveld 2000). This study particularly focuses on the routine Health Information Systems in developing countries.

The health information systems in developing countries have been considered obstacles that hinder the provision of quality heath services rather than supporting tools. The reasons for this view include: the data gathered and information produced is irrelevant and of poor quality; the HIS is fragmented; there is lack of timely reporting and feedback; and poor use of the information (Sauerborn & Lippeveld, 2000; Lungo, 2003; Shidende, 2005).

The issue of fragmentation in HIS of developing countries has been studied previously and one of the reasons seen as causing fragmentation is that international agencies and NGOs come into the resource-constrained public health sector with resources to complement governments' efforts in the provision of health care services and these resources are directed towards specific areas and therefore are organised as standalone, vertical programmes. These vertical programmes are associated with their own information systems resulting in vertical information systems thus fragmentation of the HIS (Chilundo, 2004; Aanestad et *al*., 2005). Along the same lines, fragmentation has also been attributed to programme managers´ need for large amount of information on their specific programmes (Shaw, 2005).

The advantage of the vertical information systems is that they can provide real information support for central programmatic decisions, and the quality of information generated is often better than that of a generally managed information system (RHINO, 2003). However, the net result of HIS fragmentation are catastrophic as fragmentation creates duplication of work and data, lack of information sharing, and hinders health care service provision (RHINO, 2003; Shidende, 2005). Therefore, more integrated health information systems are advocated for as a means to improve the general quality of health services provided.

Malawi being a developing country also relies heavily on aid from donors and would therefore be expected to face a similar problem of fragmentation in the Health information system. A study of the HIS conducted in 1999 confirms this as the Ministry of Health and Population (2003) states that parallel reporting systems were evolved, primarily along vertical programme lines. These parallel systems in turn resulted in duplicated efforts in processing, training, and operating the system and often produced different conflicting data (Ministry of Health and Population, 2003).

In order to solve this fragmentation problem, the Ministry of Health endorsed a strategic plan aimed at integrating existing information systems into a flexible, accessible, comprehensive Health Management Information System (HMIS) capable of feeding back useful information on a timely basis to those in need of it most (*ibid*). According to the Ministry of Health and Population (2003), remarkable achievements had been made in the establishment of the HMIS in the country such as the selection of indicators, development of data sets, and implementation of the District Health Information Systems (DHIS) software developed by the Health Information System Program (HISP) in South Africa.

However, new issues have arisen over the years in the health sector such as the increased efforts to combat the HIV/AIDS epidemic in Malawi, which has seen the increase in programmes being implemented and the introduction of new ones. As the African Development Fund discovered, there are parallel programs for implementing HIV/AIDS activities in the country, which lack coordination and harmonization among them (ONSD, 2005). Therefore, this research was conducted with the assumption that vertical information systems exist due to the introduction of such new vertical programmes.

1.2 Research Objectives

With this background, the main objective of the research was to assess the existing HIS in Malawi and facilitate the integration of HIS of disease-specific programs with the routine HMIS, where necessary, in order to solve the fragmentation problem. More specifically the study initially was to focus on achieving increased integration of the IS for HIV/AIDS programs with the existing HMIS to increase coordination among the

various HIV/AIDS programs but also with the main routine HMIS, which as the literature expressed this was lacking.

However, in the course of the study, initial discoveries from the assessment of the HIS pointed towards the existence of fragmentation that was believed to have been eliminated by the implementation of the HMIS. Thus in the end, the research not only focused on HIV/AIDS but also other specific programmes namely: Expanded Programme for Immunisation (EPI); Integrated Disease Surveillance and Response (IDSR); Malaria Control Programme; Safe Motherhood; Family Planning; Voluntary Counselling and Testing (VCT); Anti-Retroviral Therapy (ART); and Prevention of Mother to Child Transmission (PMTCT)

Therefore, the overall objective of this study has been to assess the routine Health Information Systems in Malawi in order to determine where fragmentation exists and why; and then make recommendations on whether, and how integration could be achieved to improve the system.

In order to achieve this objective, the specific objectives of this research are to:

1. Understand the information flow of the main routine Health Management Information System (HMIS).

2. Understand the routine Health Information Systems for the specific programmes and their relation with the main routine HMIS.

3. Identify the information requirements of the specific programmes and the general health management through an understanding of the district programme managers´ and the district health managers´ responsibilities.

4. Identify the sources of information used to meet the managers´ information requirements in order to understand their actual use of information for their responsibilities.

5. Make conclusions on the aspects contributing to fragmentation in the overall routine Health Information System and formulate recommendations on how to reduce the fragmentation.

1.3 Study context and Research Methodology

The study was conducted in Malawi, which is located in Sub-Saharan Africa and is one of the poorest countries in the world.

With the objective of the study being to assess the health information system, a qualitative research approach was adopted with an interpretive underlying philosophical paradigm because it allows understanding of the social context in which information systems operate.

In this research, a case study approach was adopted and case studies were conducted in two districts of the country namely Chikwawa and Chiradzulu. As the focus of the study was the district level, the main areas of the studies were at the District Hospitals and the District Health Offices in both districts. Additionally, several facilities were visited as well as the Ministry of Health to obtain a holistic picture of the routine information system for the health system.

The study collected empirical data over a period of 14 weeks through: semi-structured interviews of various professionals working in the health sector; analysis of official documents such as registers, reporting forms, meeting minutes, and also software; and participant observation of meetings and supervisory visits.

1.4 Expected contribution

This research falls under the IS discipline as it involves a systematic investigation of the application of Information Systems in the health sector to improve the provision of health services.

As already stated, the objective of this research is to assess the routine Health Information System in Malawi in order to determine where fragmentation exists and why, and then make recommendations on whether, and how the identified fragments could be integrated. Therefore, through the recommendations, the study provides practical contributions for achieving integration in the routine HIS and thus in turn improve its performance.

A similar study on integration of health information systems has recently been conducted in Malawi with the objective to determine the level of integration at the point of data collection (Kanyimbo, 2006). Therefore, my study builds upon the findings from Kanyimbo´s research, and re-enforces/re-emphasizes his findings as similar issues are discovered. Furthermore, since this research adopts a broader view as it investigates on various aspects of data management in the HIS including data collection, processing, analysis and use, I therefore discovers new additional issues important for improving the routine HIS in Malawi.

However it is also noted "*interpretative information systems research should be able to pull out, i.e. to translate and appropriate, selected aspects to make them more generally applicable*" (Aanestad et *al.*, 2005:45). As the study is situated in the context of HIS in developing countries, the study adds on to the discussion on this area, especially to the issue of integration as it highlights certain social and technical aspects that are crucial in designing and implementing effective and efficient integrated HIS in such contexts; thereby making a contribution to the IS discipline related to the design and implementation of health information systems on a general level and more specifically on integration of various routine health information systems.

1.5 Structure of Thesis

Following this introductory chapter, Chapter 2 presents more on the research setting as it discusses the general geographical and demographic profile Malawi and the two districts where the case studies were conducted, the health care system and the supporting health information system. Chapter 3 of this thesis discusses on literature reviewed related to the issues of management in general and in health to provide an understanding of managerial work which will guide the analysing of programme managers works as well as district health managers. Additionally, literature is reviewed on health information systems in developing countries.

More details on the research approach adopted in this study are presented in Chapter 4 together with the ethical considerations taken on board and the study limitations. Chapter 5 presents the core findings of the research. Chapter 6 analyses and discusses the findings

presented in the preceding chapter with reference and guidance from the literature reviewed in chapter 3.

A summary of the findings and the conclusions drawn from the study are presented in chapter 7 which include the recommendations stemming from this study. The theoretical and practical contributions made by this study and the possible area for further research is presented in this chapter.

2. Study Context

Co-authors of this chapter: Marlen Galimoto, Jon Sandvand and Gro Alice Hamre

This chapter presents the context in which the research was carried out. It presents the general profile of Malawi, the health system, and the health management information system in addition to details on the two districts in which case studies were conducted. The chapter gives an extensive and detailed background to the context, due to the fact that it provides the background for three different thesis works.
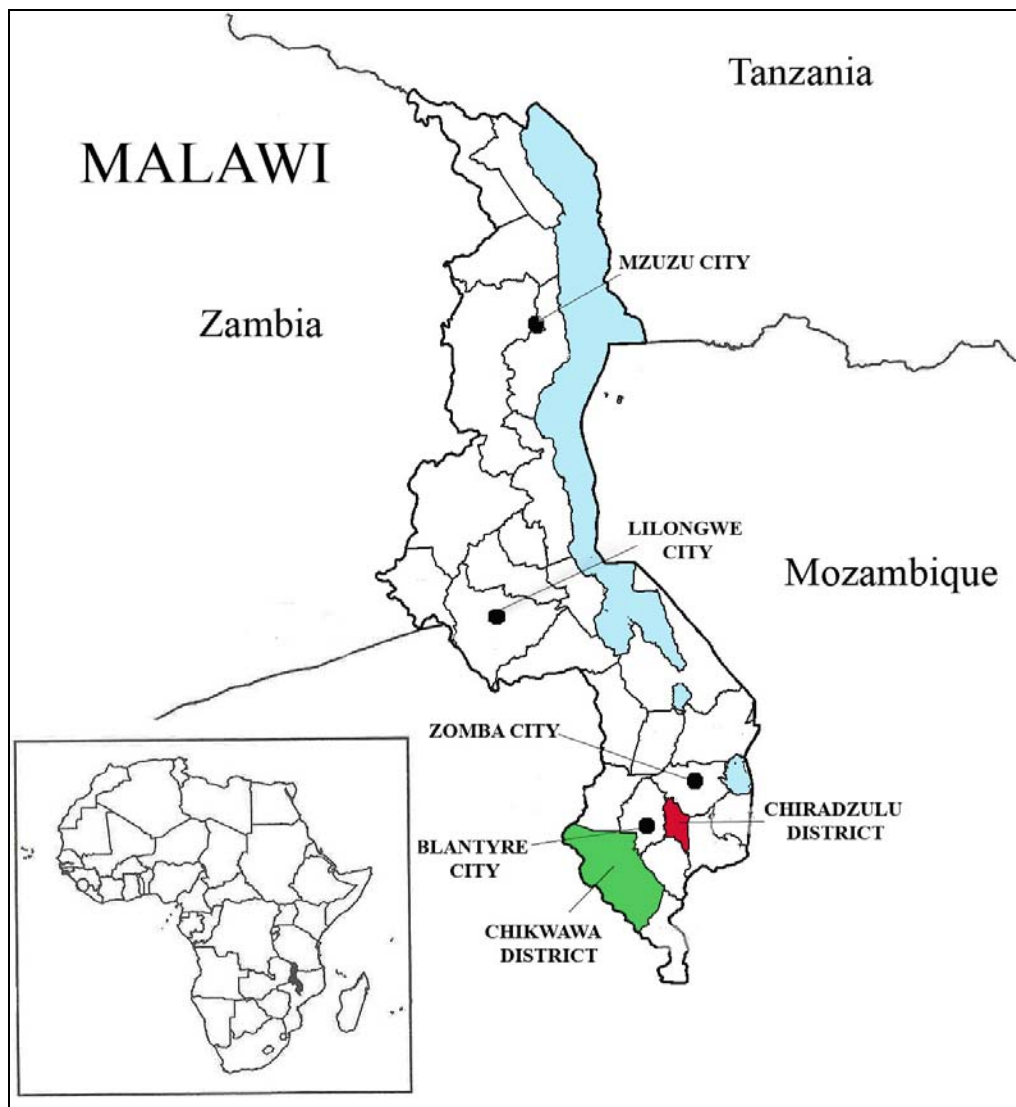
Figure 2.1:Malawi map

(Source: SAHIMS 2003 - 2005)

2.1 Malawi Country Profile

Malawi is a small landlocked country in Sub-Saharan Africa covering 118,484 square kilometres of which 20 percent is Lake Malawi. The country is 901km long and shares its borders with Tanzania, Zambia and Mozambique (Figure 2.1).

The country is administratively divided into three regions namely North, South and Central. These regions are further divided into 28 districts countrywide. The case studies were conducted in two districts, Chikwawa and Chiradzulu, located in the southern region of the country. (*See Figure 2.1 above*)

Malawi's most striking feature is the Rift Valley, which runs the entire length of the country from Lake Malawi in the Northern and Central regions, to the Shire Valley in the Southern Region. The country has a sub-tropical climate, which varies in three main seasons: a dry cool season from May to July; a dry hot season from August to November; and a warm rainy season from November to April. The low-lying areas such as Lower Shire Valley are usually vulnerable to floods during the rainy season.

Malawi is densely populated with a population estimated at 12.7 million for the year 2006 and a growth rate of 3.32 percent (National Statistical Office). Around 47 percent of the population are aged between 0-14 years, 52 percent are aged between 15-64 years, and only around 4 percent over 65 years (ONSD, 2005). The southern region of the country is the most densely populated followed by the Central and Northern region. The population is predominantly rural with only 13 percent estimated to live in the four major urban centres; Blantyre, Lilongwe, Mzuzu, and Zomba (See map in Figure 2.1).

There is no dominant ethnic group in Malawi but there is a dominant indigenous language, Chichewa, which shares the status of official language with English. However, all official records in public administration are in English only.

Malawi has different tribal, linguistic and cultural groups and varying customs, beliefs, and traditions have strong daily influence on Malawians. This helps to determine the acceptability of modern practices or ways of life such as agriculture, education, family planning and modern health care as opposed to traditional customs, e.g. use of traditional healers (Ministry of Health and Population, 2001).

2.1.1 Political history

Malawi gained independence as a nation in 1964 after 73 years of British rule. After another 30 years of one-party rule under Dr Hastings Banda, a multi-party democracy was introduced in 1994 (ONCF, 2005; Lawton et al., 2002) and in 1995; a new constitution that provided for human rights and the rules of law was adopted (Lawton et al., 2002). The new democratic dispensation brought with it a flurry of non-governmental activity, as well as free press and the pursuit of gender equality, but the speedy deregulation and liberalisation proved traumatic for the Malawian economy (Lawton et al., 2002).

The new political team that has evolved following the 2004 elections has set out a strong economic growth and anti-corruption agenda but President Dr. Mutharika and his government face great challenges in developing a democratic culture, political institutions, policy decision-making and implementation capacities, efficient for delivery of public services, and in coping with exogenous shocks (ONCF 2005).

2.1.2 Socio- Economic Profile

With more than 10 years of national multiparty democracy, Malawi remains relatively stable, but is still one of the poorest countries in the world with some 65 percent of the population living below the poverty line (ONCF, 2005; The World Bank 2005). The country ranked 83 out of 95 on the United Nations Development Program's Human Poverty Index scale in 2005 and had the fourth lowest Gross Domestic Product (GDP) in the world (World Health Organisation, 2005).

Poverty reduction efforts face many challenges that need to be overcome and achieving the health Millennium Development Goals (MDGs) remains a major challenge due to the poor macroeconomic environment, the increasing levels of poverty, and the critical shortage of human resources in the health sector (ONSD 2005).

Agriculture is the mainstay of the economy and accounts for more than 90 percent of its export earnings; it contributes 45 percent of gross domestic product (GDP), and supports 90 percent of the population (The World Bank, 2006). It is estimated that less than 15

percent of the labour force is employed in the formal sector of the economy and that more than three quarters of the labour force are small-scale subsistence farmers (ONCF, 2005). High population density in rural areas generates pressure on the best lands and ongoing rural out migration adds to already crowded urban areas bringing additional strain on urban facilities and services (ONCF 2005).

As a landlocked country, Malawi depends greatly on connections to neighbouring countries for the overland movement of exports and imports and since independence, the road system has expanded to around 15,000 km, of which around 3,000 km are tarred (ONCF 2005). The low number of tarred roads hampers the free movement of goods in and around Malawi as many dirt roads become impassable in the rainy season.

Malawi's electricity supply is unreliable and power cuts and fluctuating power levels are a major problem for manufacturers and act as a disincentive to new investment (ONCF 2005).

The water and sanitation sector is characterised by an uneven distribution of resources, poor coordination and fragmented institutional arrangements. It is estimated that 51 percent of the rural population and 69 percent of the urban population have access to clean water (*ibid*.).

High illiteracy rates and poverty have led to environmental degradation of all resources. A large portion of Malawi's biomass is burned each year, and this has resulted in large areas of land becoming deforested and degraded, which has led to soil erosion, which in turn has reduced the quality of water resources (ONCF, 2005).

Malawi is characterised by low political empowerment of women, despite women's large contribution to the economy (ONCF, 2005). Early motherhood reduce women's educational and employment opportunities, further worsening their social and economic vulnerability and exposing them to HIV/AIDS. The adult literacy rate among women stood at 54 percent in 2005, compared to 77 percent for men (National Statistical Office, 2006).

2.1.3 Health Status

The average life expectancy in Malawi has declined from 40.2 years (1998) to 37.5 years (2002), the maternal mortality rate has risen from 620 to 1,120 deaths per 100, 000 live births (2000) in a few years and 50 percent of children under five years are chronically malnourished (ONSD, 2005). Communicable diseases, food insecurity and insufficient health services makes large parts of the population very vulnerable.

The African Development Fund reports on evidence indicating that the HIV prevalence has stabilised over recent years at around 15 percent (ONCF, 2005). The social and economic effect of the pandemic is huge: family structures are dissolving, and children are being orphaned. At the economic level, AIDS-related illnesses are removing large numbers of otherwise active workers from the labour pool. In response to the epidemic, the government launched a National HIV/AIDS Strategic Framework (2000–04) and established the National AIDS Commission in 2001 to coordinate the national response, provide support to implementing agencies, mobilise resources, and monitor progress.

In addition to HIV/AIDS, Malaria and Tuberculosis are the other main killer diseases in Malawi. But malnutrition, Sleeping Sickness, Bilharzias, Hepatitis and Typhoid are also long-standing major health problems (ONCF, 2005).

2.1.4 The Public Sector

There are two systems of government administration in Malawi, namely Central and Local Government. The Central Government is organized through a central coordinating office, the Office of the President and Cabinet (OPC), while Local Government is a single tiered system of 28 rural districts subdivided into Traditional Authorities, and 11 urban councils subdivided into wards.

The Office of the President is responsible for public service delivery, including District Administration and Civil Service Personnel management. The central government consists of ministries and non-ministerial departments with their headquarters located in the Capital City, Lilongwe. The ministries and governmental departments also have field services organised at regional and district levels. The District Assemblies are the local

governmental structures headed by District Commissioners who are directly responsible to the Office of the President and Cabinet, while the other field staff is responsible to their heads of ministries and departments.

In Malawi, the government has introduced structural reforms with implications for the public sector (Durevall, 2003). The wage compression that resulted from the Africanisation of the civil service has remained at the core of the incentive problems in Malawi's civil service. In the early 1990s, Malawi was one of the countries in which the civil servants were paid fairly decent salaries but since 1994, the situation changed. Progressive depreciation of the national currency resulted in significant erosion of salaries that could not be increased to compensate for the reduction in the currency value (Adamolekun & Mvula, 1999). The health ministry provides an example of the consequences of low salaries and wages, as there have been large-scale resignations from the ministry. By 1999, up to 50 percent of the employees had left, mostly doctors, nurses and other clinical staff, and most vacancies remain unfilled (Durevall 2003).

In 2002, the Government produced its first Malawi Poverty Reduction Strategy (MPRS) paper, aimed at identifying the obstacles to equitable, sustainable economic growth and strategies for overcoming them. The MPRS is based on four pillars:

1.   Promoting sustainable, pro-poor growth

2.   Developing human capital

3.   Improving the quality of life for the most vulnerable

4.   Establishing good governance

Among the specific issues the MPRS highlighted were the needs to increase agricultural production and marketing, improve financial management, stop the spread of HIV/AIDS and provide treatment for those affected, reduce environmental degradation, and obtain debt relief (The World Bank 2005).

Adamolekun and Mvula (1999) point to main weaknesses and strengths of the Malawian public administration:

… Three areas of strength of the Malawi public administration system are noteworthy: (1) the importance attached to management education and skills upgrading, (2) the efforts aimed at transforming public financial management, and (3) the conscious linking of public administration reform to democratization and economic reform. Although the democratization process in Malawi is still in the transition stage, the manner in which it is linked closely both to public administration reform and to economic reform is likely to enhance the country's chances of moving to the democratic consolidation phase. Four main weaknesses in Malawi's public administration system in 1997 stand out: (1) poor policy management, (2) weak implementation capacity, (3) the problem of corruption, and (4) the existence of three de facto capitals. (Adamolekun and Mvula 1999, p. 287-288)

2.2 The Malawian Health System

2.2.1 Goals and objectives of the health system

The challenges faced by Malawi have justified the development of a Sector Wide Approach by the Ministry of Health and its Development Partners aiming at improving the availability of quality healthcare for poor and vulnerable populations (ONSD, 2005). The Sector Wide Approach is based on the reorganization of the health sector based on the principle of decentralization of health services to District Assemblies. The strategy for the implementation of a 6-Year Programme of Work (POW) for the period 2004-2010 based on the Sector Wide Approach (SWAp) was agreed upon in November 2002 and outlines how the Ministry and their partners will implement an Essential Health Package (EHP) over a period of six years. The goal is to strengthen the health systems through equitable health financing, increased human resources, reliable pharmaceutical and supplies logistics, and effective monitoring and evaluation. The program will also enhance the capacity of the Ministry of Health for stewardship and policy development, and strengthen the systems for planning, budgeting, and delivery of quality health services in the districts. Finally, it will expand communities' participation in the delivery of essential health interventions

The Government made a policy decision that all services within the Essential Health Package should be delivered free-of-charge.

2.2.2 Structure of the health system

Health Providers

The Health Sector has a plurality of health service providers as is the case in most low-income countries and the providers can be separated into the traditional and modern sectors (ONSD, 2005). A large number of people use the two systems simultaneously or consecutively, and they compliment each other.

Traditional providers

Traditional health providers exist in most communities and they can be divided into two main categories: traditional healers who deal with diseases/spirits, and traditional birth attendants (TBAs). The TBAs have more established links with the modern health sector as they have been trained to support primary health care since 1992, and they deliver approximately 25 percent of the pregnant women. (Ministry of Health and Population, 2001).

Modern health sector

There are three main categories of health service providers in the modern sector; the public sector, non-profit private sector and for-profit private sector. Health facilities by type and ownership are presented in Figure 2.2.

The public sector

The Ministry of Health provides about 60 percent of public health services, mostly for free. Government District Health Offices (DHO) are responsible for the provision of public services at district level. The Ministry of Local Government, through District and Urban Councils, provides different types of health services, about 1 percent of total. The Ministries of Agriculture and Education also provide health services, and these are services for specific target groups such as armed forces, prisons and police.

Non-Profit private sector

The Christian Health Association of Malawi (CHAM) provides a large proportion of services at variable charges. The Association is made up of independent church-related and other private voluntary agency facilities. It operates autonomously about 160 health

units in the rural areas. Though primarily curative in orientation, most units also provide primary health care services. Most of these health institutions provide training for nurses and other health personnel. The quality of services provided at Christian Health Association of Malawi facilities is considered better than those at Ministry of Health facilities.

Controlling Agency	Unit Type									Total
	Central Hospital	District Hospital	Hospital	Health Centre	Dispensary	Maternity	Mental Hospital	Rehabilitation Centre	Rural Hospital	
Admarc					1					1
Army			2	2						4
CHAM			21	113	19	4	1	1	3	162
Department of Forestry				3	3					6
Islamic					1					1
Local Government				14	6	11				31
MoH	4	22	2	239	59	2	1		15	344
MoH/CHAM				2						2
MoH/ Local Government				39	2				1	42
Police			1	1	2					4
Private				2	5					7
Total	**4**	**22**	**24**	**414**	**103**	**17**	**2**	**1**	**19**	**606**

Figure 2.2: Health facilities by type and ownership in Malawi 2005

(Source: Ministry of Health 2006, p.3)

Some private companies provide health services to their employees and people in their catchments areas in particular estates. Some national and international non-governmental organisations (NGOs) also support scattered small-scale community based vertical health projects, but most integrate their activities with the existing health system (Ministry of Health, 2001). To a lesser extent, there also exists Community-Based Distribution Agent for family planning commodities, Drug Revolving Funds provided by community volunteers, Home Based Care volunteers and Faith Healing groups.

Private-for-profit
Some grocery shops sell drugs in rural areas and there is growth of private practitioners running clinics in the urban areas.

Levels of Health Care

Health services are provided at three levels: primary, secondary and tertiary (ONSD 2005).

1.   At the primary level, services are delivered through health centres, health posts, and outreach clinics.

2.   The secondary level provides mainly back up services to those provided at the primary level including surgical services, mostly obstetric emergencies, and general medical and paediatric in-patient care for common acute conditions. District hospitals and Christian Health Association of Malawi hospitals, although some have specialist functions, provide secondary level health care services.

3.   At present, tertiary level hospitals provide services similar to those at the secondary level, along with a small range of specialist surgical interventions.

A recent assessment of health facilities indicated that a significant number of them need rehabilitation and upgrading in order to be able to provide the full Essential Health Package (ONSD, 2005). Most of these facilities have serious shortages of essential drugs as well as essential medical diagnostic equipment and surgical supplies.

Administrative organisation

The Ministry of Health has overall responsibility for developing policies, planning strategies and programmes, and ensuring that all providers follow the national policies and standards so that quality health services are provided to the population. It has a Secretary for Health and Population who is responsible for the financial and administrative affairs of the ministry. The ministry has seven technical divisions, see Figure 2.3 for more details (Ministry of Health and Population, 2001; ONSD, 2005).

Below the central level, the MOH is divided into 27 districts and each district's District Health Officer (DHO) is accountable to the Principal Secretary. The District Health Officer, assisted by the District Health Management Team (DHTM), is responsible for the dissemination of national policies, overall coordination of health services and

programs, and provision of services at district level. Although the DHMT has the mandate to supervise all health facilities and services within the district, the full extent of authority is unclear. The District Health Office is mainly based at the Ministry of Health District Hospital, and manages and supervises both hospital and peripheral government facilities (health centres, dispensaries and mobile clinics). Therefore, the team has direct control over MOH units only. The Christian Health Association of Malawi hospitals supervise only their peripheral clinics and the central hospitals report directly to the Principal Secretary as well. (Ministry of Health and Population 2001; ONSD 2005.)

However, with the policy direction to decentralize health services to District Assemblies, the DHO will have the responsibility for the management of all health services in the district and will be accountable to the District Assemblies for decisions on financial planning and expenditures (ONSD, 2005).
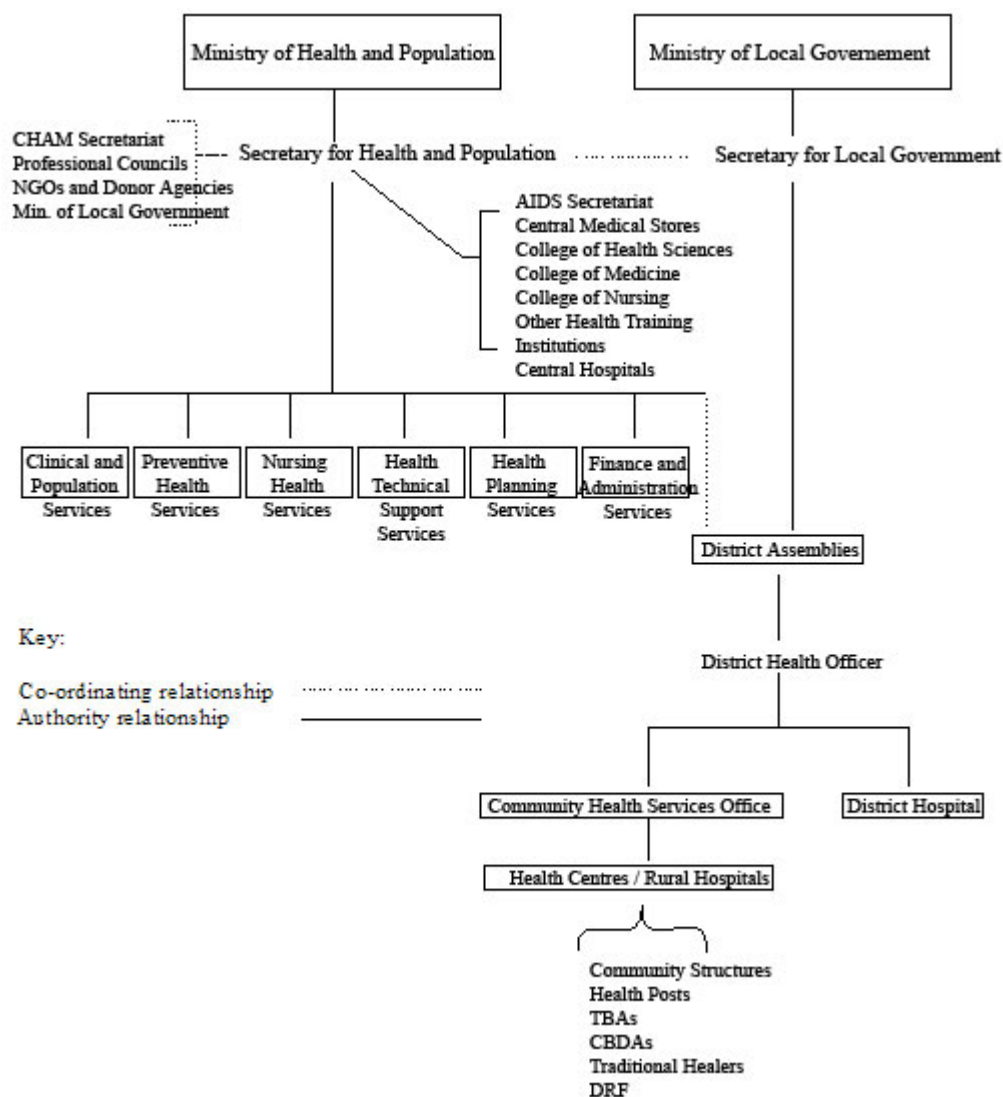
Figure 2.3: Organogram of the Ministry of Health and Population

(Source: Conticini 2004,p.35)

Until 1999, the MOH had an explicit regional level, but these Regional Health Offices were abolished due to that no tangible decisions were taken at the Regional Health Offices and therefore they did not add any value to the delivery of health services at district level.

The abolishment of the regional level created however difficulties in the supervision of the district health services from the centre. This led to the formation of 'zones', with MOH Directors allocated the task of general supervision of the districts within their assigned zone. This arrangement has worked less than satisfactorily, because the MOH Directors have serious time constraints. In view of this deficit in support to the districts,

the MOH have established Zonal Health Support Offices to facilitate the management and coordination of the health services at the operational level by reducing the management distance between the MoH headquarters and the District Health Offices. The Zonal Support Office's functions include technical advice and facilitation support of decentralization, Essential Health Package (EHP) implementation, and inter-district collaboration. (ONSD, 2005.)

2.2.3 Functions and Performance of the Health System

Health Financing

Health care financing in Malawi has five sources (Ministry of Health and Population, 2001):

1. Ministry of Finance, which uses funds collected from general tax revenue and distributes them through voted expenditure.

2. Local Government – the funds are collected from utility taxes.

3. Donors - the donor support is provided through Government's development budget, commodity aid and direct support to programs and to other providers.

4. Employers- these include firms for-profit and parastatals. They finance health care services through contributions to health insurance to organisations such as Medical Aid Society of Malawi; or direct provision of health care services for the junior employees or through direct payment of medical expenses on behalf staff members and the their beneficiaries.

5. Households who pay direct out-of pocket contribution to providers when seeking care or through contributions to Medical Aid Society of Malawi. The poor households were identified as the main purchasers of health care goods and services using out-of-pocket payment mechanisms.

The overall per capita expenditure on health is only US$ 14 and the financing is mostly private (ONSD, 2005). In 1998/99 the public expenditure on health was 2.30US$ per

capita, rising to 4.93UD$ in 2002/03 (Conticini, 2004). Government accounted for 26 percent and donors for around 30 percent (See Figure 2.4). Putting Malawi Government and donor sources together, public funds accounted for 56 percent of health expenditure, the total of which was estimated at 7 percent of GDP. Private sources accounted for the remaining 44 percent, of which 26 percent came from out-of-pocket expenditures by households. There is no social security system in place for health care and out-of pocket payments amounts to almost half the private expenditure on health (World Health Organisation, 2005).

Figure 5.8   Health Financing Sources 1998/1999
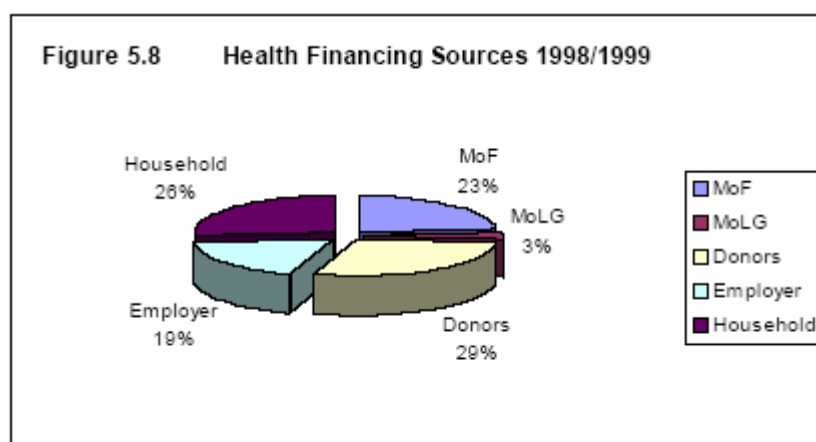
Source: MoHP 2001.

Figure 2.4: Health financing sources 1998/1999

(Source: Conticini 2004,p.53)

Although the budgetary allocation to the Ministry of Health approved by Parliament has been rising, this has not met the increasing needs of the health sector. In the past decade, economic difficulties (devaluation and inflation) have led to a decline in the real value of health expenditure, both from the recurrent budget and the government contribution to the development budget (ONSD, 2005).

Figure 6.1 Per Capita Health Expenditures (US$)
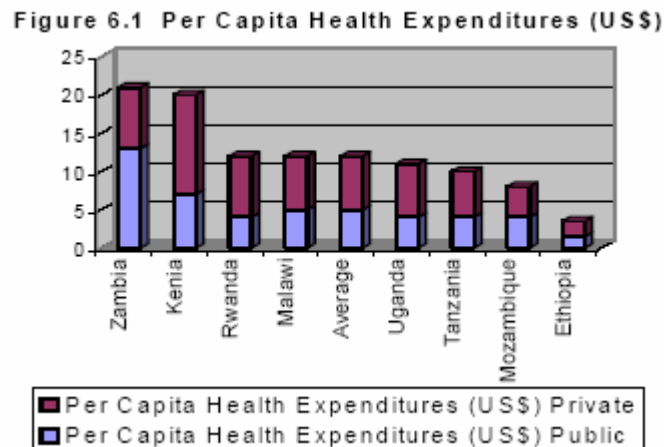
Figure 2.5: Per Capita Health Expenditure in US$ in 1998/1999

(Source: Conticini 2004,p.58)

The adoption of the Sector Wide Approach is expected to strengthen the financing of essential health care services. An average of USD 10.3 per capita per year will be required to implement the planned Programme of Work (ONSD, 2005). This amount includes the cost of Essential Health Package and non – Essential Health Package tertiary services. The majority of finance for the Programme of Work is expected to come from donors. Agreement has been made between the Ministry of Health and a core group of partners pooling all or at least a part of their resources into a basket fund (DFID, NORAD, World Bank and UNFPA) to use common implementation arrangements for planning and budgeting including procurement, financial management and technical assistance (*ibid.*).

Overall development assistance to Malawi totals about $400 million per year, excluding debt relief (The World Bank 2005). Malawi was approved for relief under the World Banks programme for Heavily Indebted Poor Countries in 2000 (The World Bank 2005; World Health Organisation, 2005).

Health service provision and resource generation

The Malawi health service delivery is focused on the provision of the Essential Health Package (EHP). The EHP consists of a cluster of cost-effective interventions delivered together in order to reduce the total cost of the interventions by reducing the cost to patients obtaining the services as well as the costs of providing services (ONSD, 2005).

The EHP addresses the major causes of morbidity and mortality among the general population and focuses particularly on medical conditions and service gaps that disproportionately affect the rural poor. Its objectives are to improve technical and allocative efficiency in the delivery of health care; to ensure universal coverage of health services; and to provide cost-effective interventions that can control the main causes of disease burden in Malawi (*ibid.*).

Human resources

One of the crucial factors affecting the quality of delivery of the Essential Health Package (EHP) is human resources. The workforce in the health sector as a whole is estimated at 15,700 persons (ONSD, 2005). This does not include an estimated 3,600 traditional birth attendants and 2,300 community-based distributor agents for contraceptives. Sixty eight percent (68 percent) of the workforce are employees of the Ministry of Health. The Christian Health Association of Malawi employs some 26 percent with the remaining 6 percent divided among local government, police, army and non-governmental organizations (NGOs)(*ibid.*).

In terms of staff, numbers of health personnel per head of population show large differences from the WHO-recommended norms. The total number of physicians in the country is 219, being one doctor per 45,662 Malawians, well below the WHO average ratio of 1 to 10,000. The College of Medicine produces about 20 doctors per year. Considering the population, this figure is extremely low and this has resulted in heavy reliance on other categories of health professionals such as clinical officers and nurses to carry out some of the work for doctors (ONSD 2005).

There is also a severe shortage of nurses, having a 64 percent of the 6,084 establishments vacant during the implementation of the fourth National Health Plan (1999-2004). The current training outputs are too low to fill the large number of vacant posts. Furthermore, most of the skilled health workers are leaving the public services mainly due to poor salaries and working conditions. Thus, there is a collapsing human resource capacity and this has negatively affected the performance of the health systems, as the health personnel are required to work beyond their limit. (Mtonya et al., 2005; ONSD, 2005)

Tab. 2.2 Established Posts and Vacancies within MoHP, 2004

Category	Established Posts / Required	Filled posts	Vacancy (%)
Nurses	6,084	2,178	64%
Clinical Officers	356	212	40%
Medical Assistants	692	327	53%
Doctors:			
Generalists	356	212	40%
Surgeons	115	17	85%
Ob-Gyn	126	11	91%
Medicine	65	3	95%
Paediatrics	60	5	92%
Anaesthetists	14	4	71%
Pathologists	22	0	100%
All Categories	7,890	2,969	62%

Sources: *Human Resources in the Health Sector (draft) April 2004 MoHP, and WHO 2004.*

Figure 2.6: Established posts and vacancies within MOH 2004

(Source: Conticini 2004,p.21).

In response, the government is implementing a Human Resource Programme, under the Programme of Work (PoW), which aims to address the critical shortage of human resources required to deliver the EHP. The programme activities include financing the recruitment of more health workers to filling the vacant posts, ensuring retention of all trained health workers, and providing in-service training. (ONSD, 2005)

Material resources

In addition to human resources, another crucial factor is the material resources such as drugs and medical supplies. WHO surveys from 2002-2004 show that almost half of all facilities are short of drugs, have inadequate means of communication and inadequate transport and there is a lack of emergency drugs in Zonal warehouses and the cholera preparedness system is weak (World Health Organisation, 2005). This has been attributed to the shrinking of the drug budget in the face of the local currency devaluation and increased pilferage of drugs. This in turn has hampered government's effort to minimize morbidity from treatable diseases such as malaria, tuberculosis thus affecting the overall performance of the health system in delivering services (Mtonya et al., 2005; ONSD 2005).

To address this problem, the Pharmaceutical and Medical supplies programme will be implemented under the Programme of Work to strengthen national procurement, distribution and stock management systems for medical and non-medical consumables. The programme will finance an adequate volume of pharmaceutical and medical supplies at service delivery points. The overall objective is to enable the health system to deliver drugs and medical supplies for the EHP. (Mtonya et al., 2005; ONSD 2005)

Inter-sectoral advocacy

Several donors have entered into delegated cooperation agreements in Malawi, e.g., on country program (Norway and Sweden; Switzerland and the Netherlands), education (UK and the Netherlands), health (Norway and Sweden; Canada and Japan) water development (Canada and Japan), and energy (Germany and the Netherlands).

The Poverty Reduction Strategy (PRSP) has contributed to improving donor coordination (The World Bank, 2005). Major donors and sectoral donor working groups in the areas of economic management, poverty reduction, water and agriculture meet regularly. Work is ongoing towards common conditionalities and joint financing arrangements (including pooled funding), joint reviews and single reporting. Donor harmonization work is mainly expected to be focused on the health sector, where the Sector Wide Approach is being conducted.

2.3 Management Sciences for Health

Management Sciences for Health is a USAID funded programme of the Ministry of Health supporting systems strengthening in different health programmes, including the Health Management Information System. The programme is supporting eight districts, namely Mzimba, Kasungu, Salima, Ntcheu, Balaka, Mangochi, Mulanje and Chikwawa, as well as the two Central Hospitals of Malawi.

In 2003, the Management Sciences for Health conducted an assessment on the implementation status of the Health Management Information System. Although implemented in all districts, the Health Management Information System was facing

some problems that were affecting the quality of the collected data in the system (MSH Malawi, 2005). The assessment revealed that in many cases untrained staff was used for data recording in daily routine data registers. The registers were also often found to contain problems of missing data, incorrect data, mathematical errors, and duplicate data among others. Timeliness of reporting was not adhered to, and there was little evidence of use of data to monitor performance (*ibid.*). Targets to support performance monitoring were also lacking, and a general lack of managerial support, supervision and feedback to HMIS work was identified.

Based on this assessment different performance assessment and supervision tools are being piloted and implemented interventions in the eight supported districts include:

- Support to the orientation of personnel to HMIS

- Support to the orientation of District health Officers and District Nurse Officers to DHIS

- Support to the orientation of Assistant Statisticians to DHIS

- Support to the dissemination of the national HMIS policy

- Support to the development of job aides to support health workers in executing HMIS work

- Piloting a monthly reporting system

- Support to the orientation of Sub District level Cluster Supervisors on HMIS which has so far been integrated into the routine supervision of the District Health system

- Support to HMIS supervision and HMIS reviews at facility, sub district cluster and district levels

- Emphasis has also been made on linking HMIS to District Implementation Plan development and monitoring

- Introduction of a HMIS Recognition Scheme (currently in three of the eight supported districts; Chikwawa, Balaka and Mulanje)

- Linking up with the Zonal Support Offices –capacity building through orientation of Officers in DHIS

The responses to these interventions are reported by Management Sciences for Health to be very positive in the districts but the pace of implementation has been at different levels. Where there has been proper management support and dedicated Health Management Information System teams, one can easily detect the results. Evaluation of the interventions are in progress and some of the reported perceived benefits of these interventions are improved timeliness and completeness of data, improved data quality that result in more confident users that are increasing the demand for data (Moyo, 2005). There is improved supervision and performance reviews using health data are bringing a culture for information use.

2.4 Malawi Health Information System

In January 2002, the Ministry of Health and Population started the implementation of a comprehensive and integrated routine Health Management Information System (HMIS) throughout the country. The introduced system was guided by the principles of; integration of all routine information systems; decentralisation in information generation and use; information for action; and being simple to establish and maintain. For the first time Malawi would have access to continuous monthly data on all agreed indicators for each health facility, district and the nation. It was also the first time that each public health facility and district health office would know the catchments area and the population size to be served.

The integrated HMIS is designed to provide programme managers and staff with reports on how well each programme is functioning and to alert the service providers and programme managers to take timely necessary corrective actions (Ministry of Health and Population, 2003). MoH officially endorsed a limited set of core health sector indicators, i.e. minimum indicators, as a standard for ensuring that all data collected has purpose

(*ibid*.). These indicators were developed through consensus building process whereby various stakeholders were involved in determining the required indicators (Chaulagai et al., 2005). Once the consensus was reached, tools for data collection, processing and reporting were revised.

2.4.1 Overall Structure of the HIS

The Ministry of Health recognises that the HMIS can never be fully integrated into a single entity in any setting. Therefore, logically grouped, a number of sub-systems have been identified as interdependent components of the national HMIS as seen in figure 2.7 below. These sub system are: (a) the financial management information system (FMIS), (b) human resource management information system (HRMIS), (c) logistic and supply management information system (LMIS), (d) physical assets management information system (PAMIS), and (e) integrated health services management information system (HSMIS).

The integrated health services management information system is at the core of this structure and derives information from all other sub-systems to serve as a comprehensive health and management information system. Malawi has fully integrated all service-related information systems and the disease surveillance system into a single entity of a health services management information system. The programme-specific logistics and supply components have been integrated into a broader logistics management information system.

HMIS design and implementation
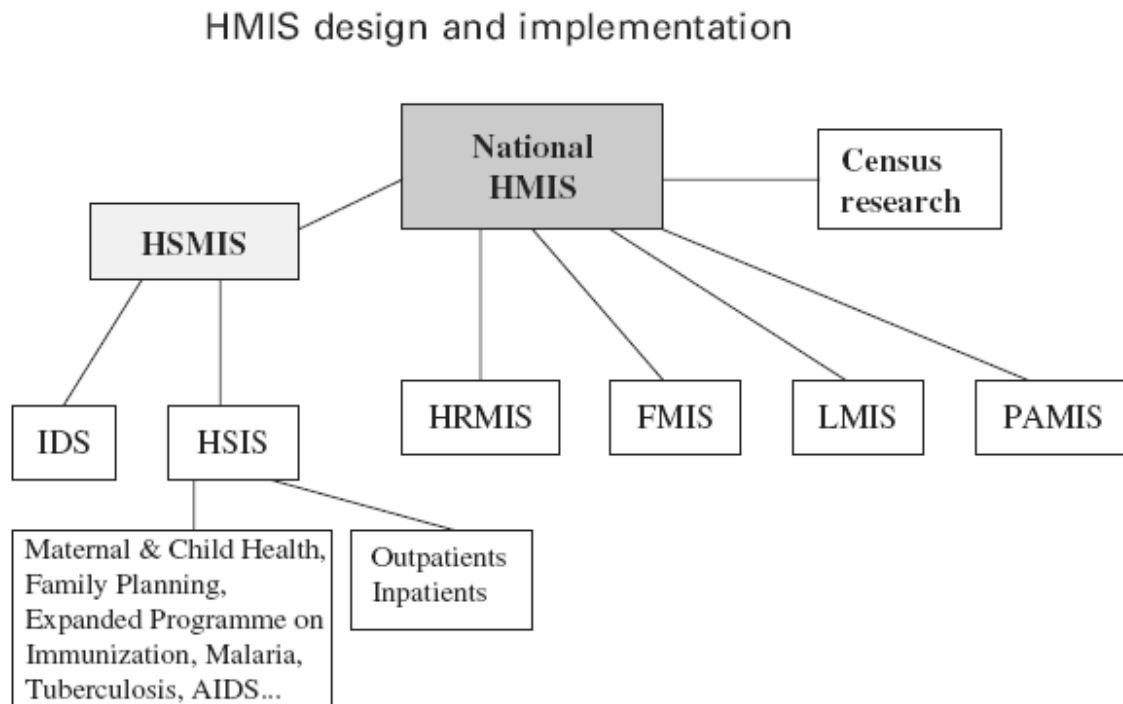
Abbreviations:
HMIS = Health management information system
HSMIS = Health services management information system
HRMIS = Human resource management information system
FMIS = Financial management information system
LMIS = Logistics management information system
PAMIS = Physical assets management information system
IDS = Integrated disease surveillance
HSIS = Health services information system

Figure 2.7:Integration Model of the national HMIS

(Source: Chaulagai et al. 2005,p.5).

2.4.2 Objectives of the Information system

The main mission of the national health management information system is to improve the health status of the people by providing reliable, relevant, up-to-date, adequate, timely and reasonably complete information for health managers at community, facility, district and national levels and through increased effectiveness and efficiency of health services (Ministry of Health and Population, 2003).

More precisely, there are three main objectives intended to be achieved through the HIS and these are:

1.   To ensure that the required health and management information is available to all users in the health sector to meet each of their predefined needs.

2.   To ensure that the required information is accessible to all concerned users.

3.   To ensure that the intended primary users of the information are informed about the information. (The individual and organisations involved in delivering and managing health services and providing support to this effect are the primary users of information).

The design of the health information system has been guided by the principles of:

- Data for decision-making

- Integration of management of health service specific routine information systems into a single system

- Data collection for local analysis and use

- Data collection, analysis and use by the same health and support personnel who are responsible for the management/delivery of health services

- Complete information available at a single repository

- Strong links between all data collection systems in order to avoid duplication and produce synergy in data analyses and dissemination

2.4.3 Institutional Set-up

The philosophy behind the HMIS was that the people who provide the service collect and compile information; and that the storage, interpretation and dissemination to different users should be done from a single point at each level.

Therefore, to achieve this, a new post for a statistician was created for each district health office and central hospital to assist with computerised data processing. The Health Management Information Unit (HMIU) was also established in the Ministry headquarters with the responsibility of coordinating information collection functions; compiling

complete health information from internal, external, primary and secondary sources; analysing, interpreting and storing information in appropriate formats; generating reports in different ready-to-use formats; and disseminating information to all relevant stakeholders (Chaulagai et al., 2005; Ministry of Health and Population, 2003).

Furthermore, a Health Information Management Technical Committee (HIMTC) was established at national level consisting of members from various departments of the MOH and other stakeholders. The responsibilities assigned to this committee include: defining minimum datasets and their definitions; conducting periodic review of health data collection procedures and tools; identifying integrated sentinel sites for all purposes; setting operational research priority and approving operational research proposals (Ministry of Health and Population, 2003)

A Committee on Health Information Policy (CHIP) was also established at national level consisting of members to be chaired by the top officials in the health sector (public and private) and with members from other external organisation such as Local Government ministry, National statistical Office. The overall responsibility assigned to this committee is of devising and approving policy on data collection, data management, and data distribution (*ibid.*)

2.4.4 Data Sources

The health system obtains required information from several direct sources as well as other systems within and outside the health sector. The most important sources are; (1) the census; (2) the registration of vital events; (3) Health facility based records; (4) community monitoring reports; (5) population surveys and research; (6) records from central ministries and institutions.

The health data is collected/compiled from both the primary and secondary sources. The primary source is from data collected by health and support personnel while delivering service and undertaking other management functions. The secondary data (i.e. from secondary sources) includes data obtained from sources such as census, surveys and research that are required for planning and management of health services (Ministry of Health and Population, 2003).

The information produced from the data is anticipated to be used to: (1) measure the health status of the people; (2) quantify the health problems; (2) quantify the medical and health care needs; (3) formulate health policies, plans and strategies; (4) set priorities to allocate resources; (5) design health interventions; (6) mentor trends and changes; (7) assess progress; (8) evaluate effectiveness and efficiency of health services (*ibid*.).

2.4.5 Information flow

The main responsibility of recognising disease outbreaks, low coverage of health services and adverse environmental conditions weigh upon local health staff. The main response and actions is expected to take place at facility level followed by district level. The transmission of information is designed to elicit help from higher levels, and not merely to find a place in an archive, as shown from the information flow depicted in Figure 2.8 (Ministry of Health and Population, 2003).

Figure 2.8: Expected Information flow for National HMIS

(Source: Ministry of Health and Population 2003,p.21).

More specifically, the information flow depicts a scenario where a facility generates quarterly reports on each predefined indicator for use by the concerned health

programmes and other stakeholders. Each facility compiles data from its entire catchments area and reports to the district level. The District Health Offices compiles data from all facilities, performs comparative analysis, and sends feedback to each health facility. The Ministry headquarters compiles data from all districts and central hospitals, performs necessary analysis and provides feedback to all reporters.

The Health Management Information Unit at headquarters sends reports to national programme managers and provides general feedback to the District Health Offices and central hospitals. The Programme managers at the national level also respond to the district and the Central hospital based on the report received. In this way, technical feedback by higher levels becomes as important as the bottom-up reporting.

Besides the bottom-up reporting and top down feedback mechanism as described above, the Health Management Information Unit (HMIU) in headquarters compiles data on core indicators from all reliable secondary sources and sends to districts and central hospitals for their use in planning and management of health services (Ministry of Health and Population, 2003).

2.4.6 Data processing and Dissemination

All health personnel involved in managing and delivery of health services are expected to collect, aggregate and analyse information using paper, pencil and a simple calculator and make immediate use in their daily work. At the end of every quarter each facility aggregate data from all the registers into a quarterly report and submit it to the district health office, i.e., to the statistician as indicated in the institutional set up.

Diagram showing information process at facilities
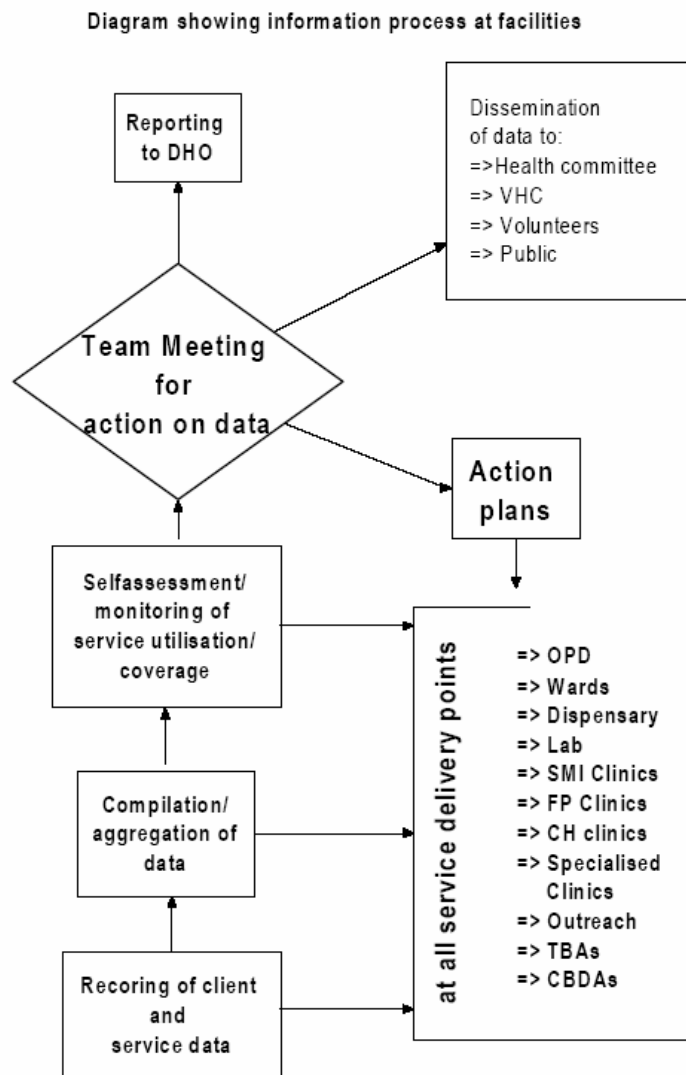
Figure 2.9: Information process at health facility level

(Source: Chaulagai et al. 2001.p.4)

The statistician compiles a report each quarter based on the quarterly reports received from the facilities in the district and a computerised system, the District Health Information Software (DHIS), has been established to assist in the processing of the data of each facility including the district hospital. The district report produced is then submitted to the MOH, i.e. the HMIU. This district report is also required to be fed back to the health facilities and other stakeholders who are partners in health service management in the district.

Each district is required to conduct an annual review meeting with its facility in-charges and other stakeholders and produces an annual performance report with the content of:

district at a glance: Maps, facts and figures; current health status in the district, i.e., analysis of routine indicators; Organisation of health services: types of services, delivery points and frequencies; Quality assurance, monitoring and supervision.

The central hospitals are also required to produce quarterly monitoring reports on tertiary care indicators. Annually, performances are analysed and comprehensive report is produced covering the area of service delivery, human resources, financial management, physical assets, drugs and supplies, etc.

At national level, each quarter the HMIU compiles data from all districts and central hospitals and produces quarterly monitoring aggregated and comparative reports for use of different national programmes and other stakeholders. A copy of this report is sent back to district health offices and central hospitals for their self-assessment, comparative analysis and actions.

These details about routine monitoring functions at different levels are depicted in Figure 2.10 below.
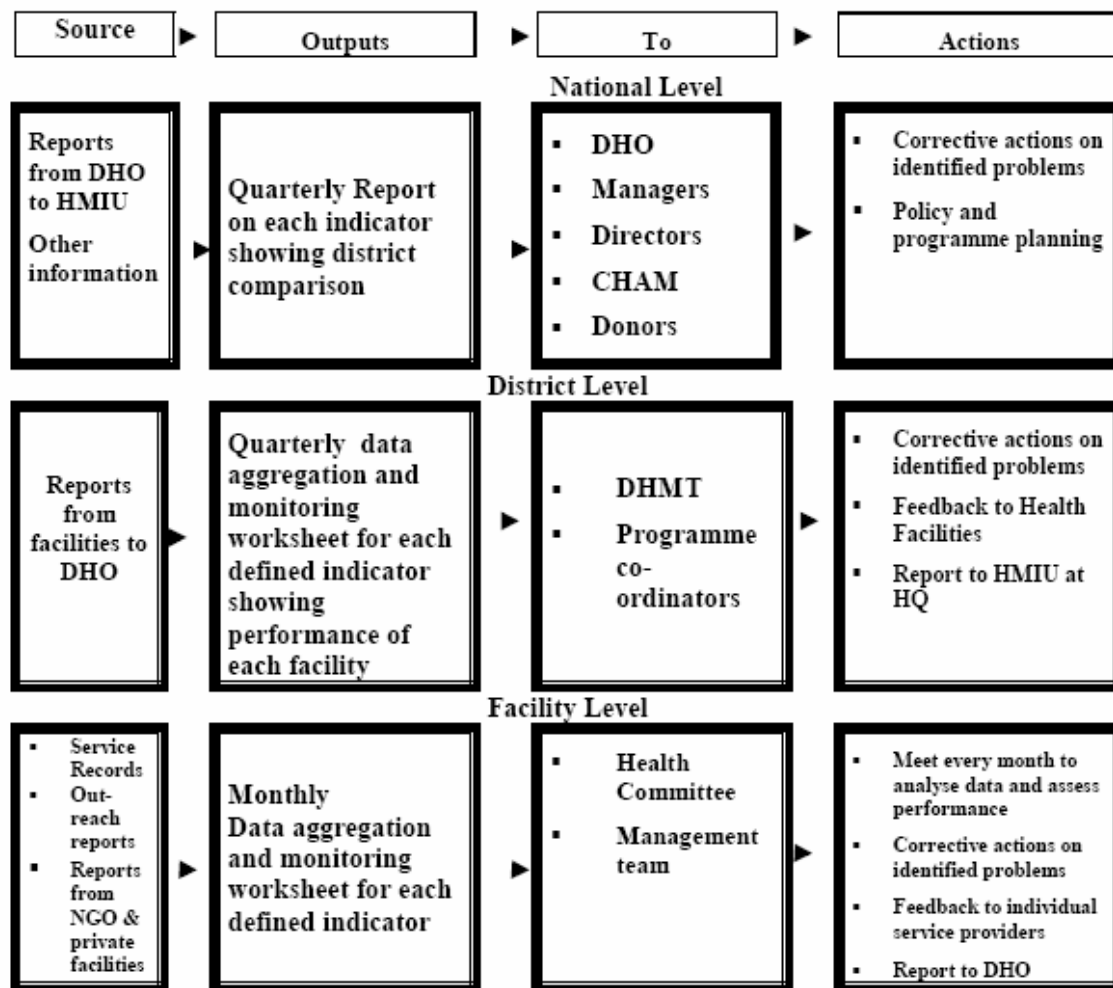
Figure 2.10: Routine actions within each level

(Source: Chaulagai et al. 2001,p.3).

2.5 District Profiles

2.5.1 Chikwawa

Chikwawa district is situated in the Lower Shire valley in the Southern region of Malawi, 48 km south west of Blantyre city (Figure 2.1). The population is estimated at 450, 609 for the year 2006 (National Statistical Office).

The district is served by one district hospital, two rural hospitals and 17 health centres. 16 facilities belong to the MoH and four belongs to The Christian Health Association of Malawi (CHAM) and all 20 facilities in the district report through the HMIS. Only 65 percent of the facilities have a functioning water system, while 60 percent has functioning electricity (Figure 2.11). The Programme of Work (PoW) target for 2010 is to reach 90 percent and 80 percent coverage respectively. 85 percent of the facilities have access to a functioning telecommunication system and already reach the target of 80 percent coverage.

Percentage of Health Facilities with Functioning Utilities (SW Zone, July 2006)						
Utility (PoW Target 2010)	BT	CK	CZ	MW	NS	TO
Water (>90%)	68% (15/22)	65% (13/20)	69% (9/13)a	88% (14/16)	100% (13/13)	29% (5/17)
Electricity (>80%)	59% (13/22)	60% (12/20)	62% (8/13)	69% (11/16)	62% (8/13)	35% (6/17)
Telecommunication (>80%)	91% (20/22)	85% (17/20)	85% (11/13)	81% (13/16)	54% (7/13)	82% (14/17)
a : due to unreliable water supply from Blantyre Water Board						

Figure 2.11: Facilities with percentage of functioning utilities compared to targets of the Programme of work

(Source: South West Zone Health Office 2006, p.10)

BT- Blantyre, CK- Chikwawa, CZ- Chiradzulu, MW- Mwanza, NS- Nsanje, TO- Thyolo)

Shortage of staff affects the delivery of health services and only 20 percent of the facilities have the established minimum staff norms of two nurses, one clinical officer and one medical officer (Figure 2.11). Chikwawa is the worst affected district in the South West Zone with severe human resource shortage, and only 59 percent of the facilities have at least one nurse. The district has 22.7 nurses per 100.000 population (Figure 2.13) and only 5.4 clinicians (Figure 2.14), both far from the targets for 2010. The severe shortage of staff is attributed to the unfavourable high temperatures and the seasonal flooding and poor housing conditions in the district.

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The coverage status of health indicators in programmes such as Maternity and Child Health for the months of July 2005 – March 2006 shows decline compared to the same period previous year. Malaria, Pneumonia, Skin and Eye infections and Diarrhoea are major disease problems in the district.

The district is being supported by Management Sciences for Health and different performance assessment and supervision tools are being piloted in the district. As part of these pilots, the district is divided into six sub-district clusters.

Health Centers with Minimum Staff Norms (South West Zone July 2006a)						
Staff Norm	BT	CK	CZ	MW	NS	TO
2 nurses	0%	24% (4/17)	80% (8/10)	46% (5/11)	60% (6/10)	40% (8/20)
at least 1 nurse	88% (14/16)	59% (10/17)	90% (9/10)	100% (11/11)	80% (8/10)	85% (17/20)
1 clinical officer	13% (2/16)	6% (1/17)	0%	18% (2/11)	0%	0%
1 medical assistant	69% (11/16)	47% (8/17)	60% (6/10)	55% (6/11)	50% (5/10)	65% (13/20)
2 nurses + 1 clinical officer + 1 medical assistant (PoW target 2010: >50%)	0%	0%	0%	0%	0%	0%
a: data adapted from "Survey on the distribution of medical personnel within the health system of Malawi" conducted by Dr. Roland Hogenschurz, TAZHSO CW, 11th May - 19th July 2006						

Figure 2.12: Health Centres with Minimum Staff Norms as compared to targets of the Programme of Works

(Source: South West Zone Health Office 2006, p.9)

CK – Chikwawa, CZ – Chiradzulu

2.5.2 Chiradzulu

Chiradzulu is a small district situated 23 km east of Blantyre in the Southern west part of Malawi taking up an area of 767 square kilometres with a population estimated at 290 780 for 2006 (National Statistical Office),

The district population is served by 1 district hospital, 1 rural hospital and 10 health centres. Nine facilities are run by the MoH, two facilities by the Christian Health Association of Malawi (CHAM), and one facility by an Islamic association. In Chiradzulu, 69 percent of the facilities have a functioning water system and 82 percent have functioning electricity (figure 2.11). As in Chikwawa, 85 percent of the facilities in Chiradzulu have a functioning telecommunication system.
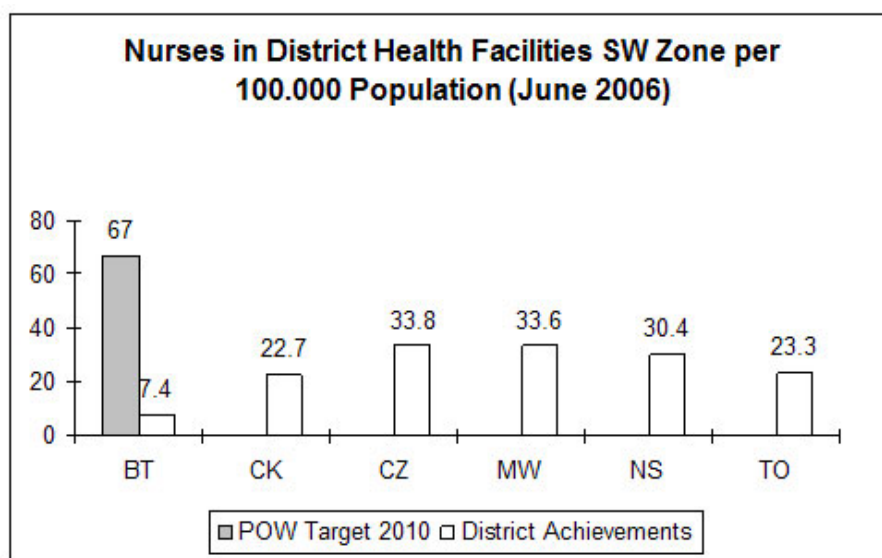
Figure 2.13: Nurse to population ratio in districts in South West Zone compared to Programme of Work target

(Source: South West Zone Health Office 2006, p.8)

(CK – Chikwawa, CZ – Chiradzulu)

Chiradzulu also experiences a shortage of staff in the governmental facilities but is considered better off than Chikwawa as it has reached about 50 percent of the required number in some staff categories such as nurses (Figure 2.12). The district have respectively 33.8 nurses (Figure 2.13) and 7.6 clinicians (Figure 2.14) per 100.000 population, but is still far from the target set in the Programme of Work of 67 nurses and 20 clinicians per 100.000 people.

There are various NGOs operating in the district in various developmental areas including health and these include MSF, OXFAM, Concern Universal, DAPP and World Vision.
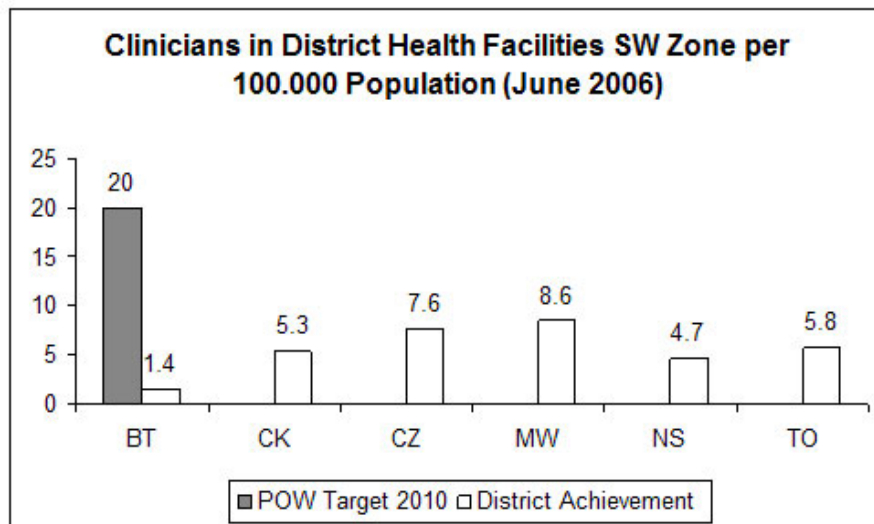
*Figure 2.14:Clinician to population ration in districts in South West Zone
compared to Programme of Work target*

(Source: South West Zone Health Office 2006, p.8)

3. Literature Review and Conceptual Framework

In this chapter, I review literature related to management in general but also specifically in the health system with the aim to understand the functions and duties managers are expected to perform. I also review literature on Health Information Systems to understand their composition and how they are meant to support management in the health system. Furthermore, I investigate approaches suggested by previous studies for (re) designing, developing and implementing Health Information Systems so that they improve the overall performance of the health system.

3.1 Management in health

The notion of management has no unified definition but tends to vary according to the context of use. However, Mintzberg (1975) explains that management is usually associated to functions such as planning, organising, coordinating and controlling, but he argues that such a description tells little about what managers actually do. He further argues that there are myths about the manager's job that do not bear up under scrutiny of the facts and these are presented below:

1. The first myth is that the manager is a reflective, systematic planner. Instead, Mintzberg argues that the managers' activities are rather strongly oriented to action, responding to real-time stimuli and they dislike reflective activities.

2. The second myth is that the managers have no regular activities to perform. In contrast, he argues that in practise managers perform regular duties such as processing information, conducting negotiations as well as ritual and ceremonial activities.

3. It is widely believed that senior managers need aggregated information, which a formal management information system best provides. However, Mintzberg argues that managers have five types of media at their command namely

documents, telephone calls, meetings and observational tours; and the managers tend to favour the verbal media.

4. The fourth myth is that management is a science and a profession but he argues that the manager's programs remain locked inside their brains.

For these reasons, Mintzberg (1975) argues that as opposed to these general myths, the reality is that management involves the fulfilment of three types of roles: Interpersonal roles, Information roles and decisional roles shown in figure 3.1 below. These three types are related whereby the formal authority given to the manager gives rise to the three interpersonal roles, which in turn give rise to three informational roles; and these two sets of roles together enable the manager to play four decisional roles.
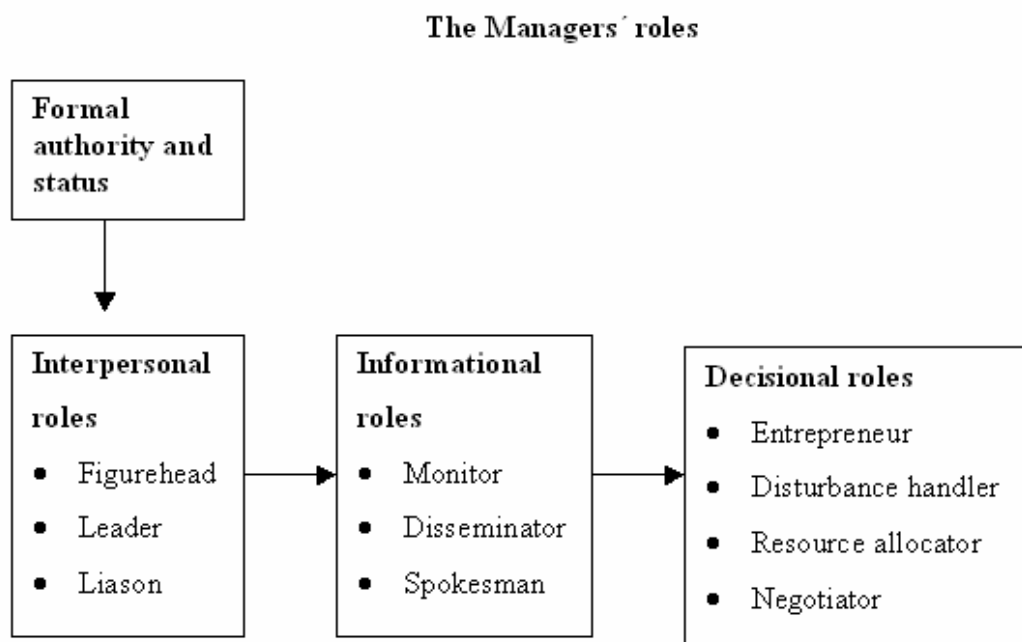
Figure 3.1: The manager's roles framework

(Source: Mintzberg 1975, p.55)

As figure 3.1 above shows, the Interpersonal roles are sub-divided into three specific roles of figurehead, leader and liaison. As a figurehead, the manager performs duties of a ceremonial nature and does not necessarily involve any important decision-making. These duties are however considered essential for the smooth running of the organisation.

The manager performs as a leader through his responsibility over the work of the staff in his unit. The duties associated with this leadership role include training and motivating his/her staff. However, other authors such as Kotter (1990) have in contrast argued that leadership is separate from management and this is discussed later in this section. The liaison role of the manager involves making contacts outside his vertical chain of command; and for this reason, Mintzberg explains that managers tend to spend a considerable amount of their time with their peers.

Mintzberg identifies three information roles of the managers as a monitor, a disseminator and a spokesman. More specifically, as a Monitor, the manager obtains information from his subordinates (by virtue of being a leader) and from external liaison contacts. The manager is then required to disseminate the information he has obtained from the external contacts to his subordinates hence performing the role of disseminator. Conversely, the manager is also required to share the information about his unit obtained from his leadership role to his liaison contacts thus also performing the role of a spokesperson for his/her unit.

The manager is required to make decisions on various aspects thus performing decisional roles. Particularly, the manager performs roles as entrepreneur, disturbance handler, resource allocator and negotiator. As an entrepreneur, the manager seeks to improve the unit to adapt it to changing conditions in the environment; and in this case, the manager is a voluntary initiator of change. On the other hand, as a disturbance handler, the manager is involuntarily responding to certain pressures that are beyond his control. The role of resource allocator represents the responsibility that managers have on deciding who gets what in the unit and authorising important decisions before they are implemented. Lastly the manager plays the role of negotiator, as he is constantly involved in negotiations of various nature, be it with staff within the unit or external organisations.

In summary, Mintzberg (1975) concludes that the ten roles form an integrated whole such that pulling out one would be disturbing the framework. He further explains that not all managers give equal attention to each role.

As mentioned earlier, Kotter (1990) presents a different view to the notion of management (probably more in line with the traditional definition and myths) as he argues that leadership and management are two distinct and complementary systems of action where management is about coping with complexity and essentially involves organizing and staffing, controlling and problem solving; while leadership is about coping with change, and is concerned with motivating and inspiring, aligning and empowering (Kotter, 1990).

For this thesis, the debate on management versus leadership is not important. Instead, I find that the co-existence of the related aspects of both of these concepts is crucial for the success of an organization in any sector including health. The Management Sciences for Health (MSH) particularly adopts this perspective as they advocate for the need for managers who lead in order to improve health service delivery as shown in figure 3.2 below (*see Appendix E for a more detailed framework*). They consider management to involve planning, implementing, organizing, monitoring and evaluating while leadership involves scanning, focusing, aligning/mobilizing and inspiring. The relationship between these functions is not clear-cut but rather these functions are implemented simultaneously and as a cyclic process as shown in figure 3.3.
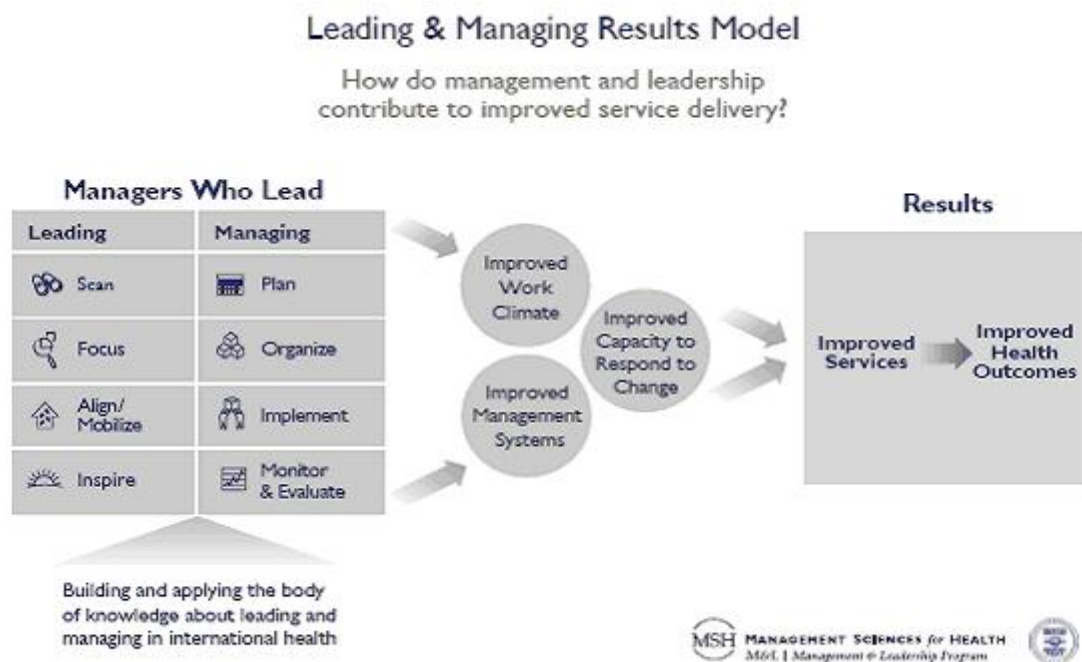
Figure 3.2:Leading and Managing Results Model Framework

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(Source: Management Sciences for Health Website)

Figure 3.3: Leading and Managing Process

(Source: Management Sciences for Health Website)

Another classification of management functions in the health sector is given by Lippeveld and Sauerborn (2000) who identify three groups: patient/client management, health unit management and health system management functions. There is a variation of functions within each group depending on the level of the health system. However, the main objective of patient/client management is to provide quality health care to patients and clients at all levels of the health care system. This type of management has also been referred to using other terminology such as clinical- or case- management or Personal health care (Muquingue et *al*., 2002; Sapirie (1997) cited by Lippeveld and Sauerborn, 2000).

For health unit management, the focus is on provision of health care to the population in its catchment area and this can further be split into two:

1. Service delivery functions, which are defined based on the health needs of the communities served by the health units. These are also referred to as Public Health functions (Sapirie (1997) cited by Lippeveld and Sauerborn, 2000).

2. Administrative functions, which includes resource (such as human, financial, supplies and information) management.

The two groups of patient/client- and health unit management are directly related to the delivery of heath services to the communities and the decisions made are considered "operational".

The main objective of Health System management is to coordinate and provide management support to the service delivery levels and some of the functions include strategic planning; policy formulation; legislation and regulation; resource mobilisation and allocation; programme implementation; monitoring and evaluation; human resource development and management; and health research management (Sapirie (1997) cited by Lippeveld and Sauerborn, 2000). This type of management is considered to occur from the district level to the national level but yet again, the extent to which each of these activities is exercised at a particular level is dependent on the administrative organisation of the health system.

Muquingue et *al*. (2002) also provides a description of health management that basically encompasses aspects of both health unit management and system management, according to Lippeveld´s grouping. They explain that health management involves "*care for the health facilities, the provision and handling of resources (logistical, financial, human, communications, transportation), coordination of preventive and promotive health programmes in the community (from tuberculosis control to extended programmes of immunization to reproductive health), reporting on the health of communities, and of the performance of the health teams. Health management oversees clinical management which is dependent on resources and conditions made available by the former.*" (Muquingue et *al*. 2002. p.3)

As already mentioned, the extent to which system management functions at a particular level are performed depends highly on the administrative organisation of the health system in terms of for instance, whether it is centralised or decentralised, and government or private-sector managed. In most developing countries, including Malawi, the health systems have adopted a PHC-based strategy, which considers the health district as the core building block of the entire health system and therefore requires a decentralised management (McCoy and Engelbrecht, 1999). It is for such a decentralised system that Bodart and Shrestha (2000:52) presents management functions expected to be carried out at district level:

1. System management functions

   - Plan development and routine activities of the health district.

   - Evaluate annual work plan.

   - Manage all district resources (financial, human, equipment etc).

   - Organise promotive activities in the district.

   - Manage the health information system.

   - Provide feedback to and supervise health facilities in the district.

   - Integrate specialised programmes in the health system of the district.

   - Identify the need for- and carry out operations research.

   - Rationalise health care to improve its efficiency, quality, and acceptability.

   - Promote intra-sectoral (private sector, NGOs) and intersectoral collaboration

2. Health unit management

   - Services delivery at the hospital

   - Hospital resource management

3. Patient/Client management

   - Providing quality secondary care for referred patients to the hospital (Bodart and Shrestha 2000:52)

Lippeveld and Sauerborn´s (2000) classification of management functions incorporates all levels of the health system and thus provides a complete picture of management as in the health sector. More specifically, it differs with the Management Sciences for Health (MSH) description on management in that it incorporates other functions such as policy

formulation, legislation and regulation, which are not mentioned in the MSH framework presented earlier. These functions, in most developing countries, are usually government responsibilities performed at provincial or national levels of the health system hence my view is that the MSH management-leadership perspective has a strong business bias and thus may not consider all levels but is more focused on middle level management, which in the health scenario, can be seen as the system (/strategic) management at the district level.

Nevertheless, because my study focuses on the district level of the health system, the leading and managing framework can be used to provide a basic understanding of what is involved in performing managing and leading functions.

For this thesis, Lippeveld and Sauerborn´s classification is also useful because of its broader view of the health system and functions as already explained, such that in looking at management functions in health, I will not be limited to system management but will also consider patient/client- and health unit management. It appears, though, that this classification seems to assume that the functions will be performed by different people at the same level, for instance, that at district level, there will be a health system manager, a hospital manager and the patient/client managers[1]. However, in an environment where there is shortage of health staff as is the case in most health systems in developing countries including Malawi, a health worker may be involved in performing functions across the groups i.e. system-, health unit- and patient-management. In such a scenario, prioritisation of activities and tasks becomes crucial.

In simple terms, prioritisation is about setting the importance of an activity/task and this can be done based on time constraints, benefits of the tasks or on pressure to complete a job. Thus, prioritisation of tasks is closely related to the concept of decision-making, which is discussed later in this chapter.

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[1] These are not real job titles, they are only meant to show the correspondence to the type/group of functions they perform.

3.2 Health Information Systems (HIS)

This section aims to create an understanding of the aspects of Health Information Systems of developing countries.

3.2.1 Components of HIS

A Health Information System is a functional entity of the health system of any country and its objective is to provide information that supports the decision making process in the health system (Lippeveld & Sauerborn 2000). Sauerborn and Lippeveld (2000:3) define Health Information Systems as "*a set of components and procedures organised with the objective of generating information which will improve health care management decisions at all levels of the health system*". Thus, the HIS should fit into the overall management structure of the health services system and a possible fit is depicted in figure 3.4 below:
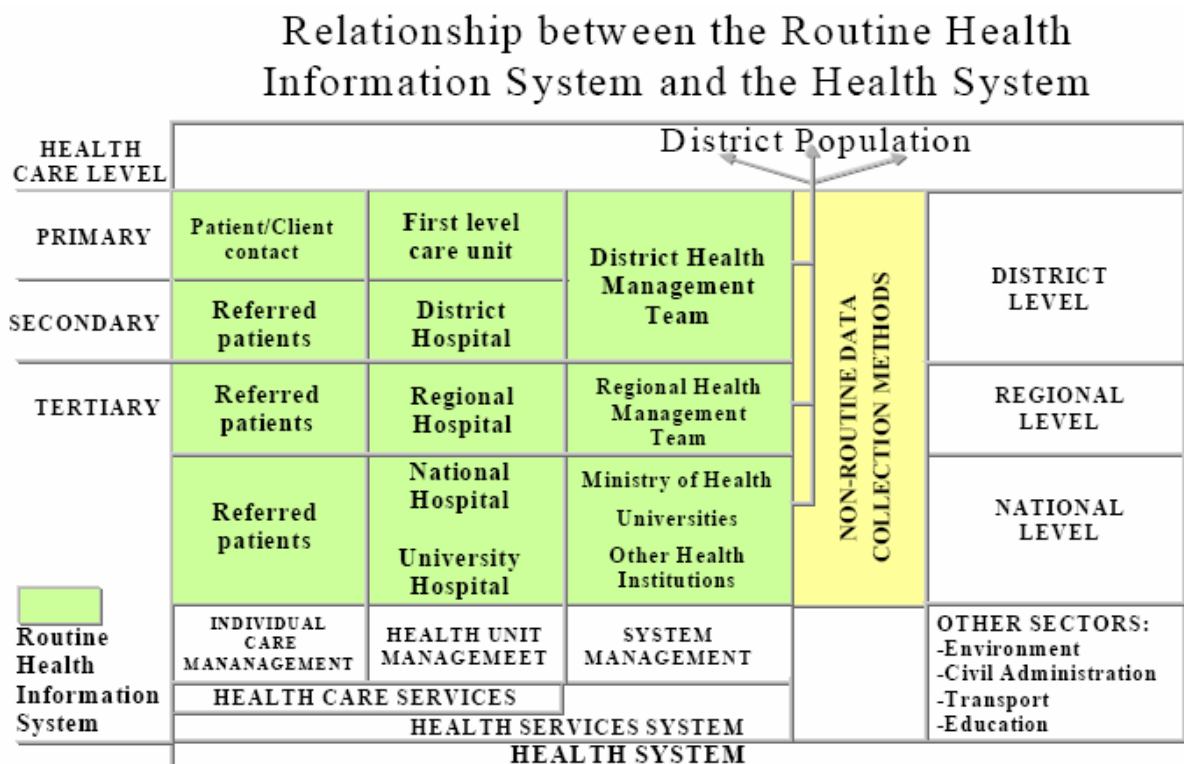
Figure 3.4:Relationship between the HIS and the health system

(Source: Lippeveld 2001, p.16)

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According to Lippeveld & Sauerborn (2000) the components of an HIS can be grouped into two entities:

1. The information process through which raw data is transformed into information. For clarification, data refers to the recorded descriptions of things, events, activities or transactions; and information is a sub-set of data that means something to the person receiving it. (Boddy et *al.*, 2005).

2. The management structure, which consists of resources and a set of organisational rules. The management structure ensures that resources such as hardware, software, financial and human resources are used efficiently following organisational rules in a way that the information process produces quality information (Lippeveld & Sauerborn 2000).

The information process can be represented as a cycle consisting of different phases of data collection, processing, analysis, presentation, interpretation and use for decision-making (Heywood & Rohde, 2001). As figure 3.5 below shows, each of the phases has a number of aspects important at that particular stage.

The Information Cycle
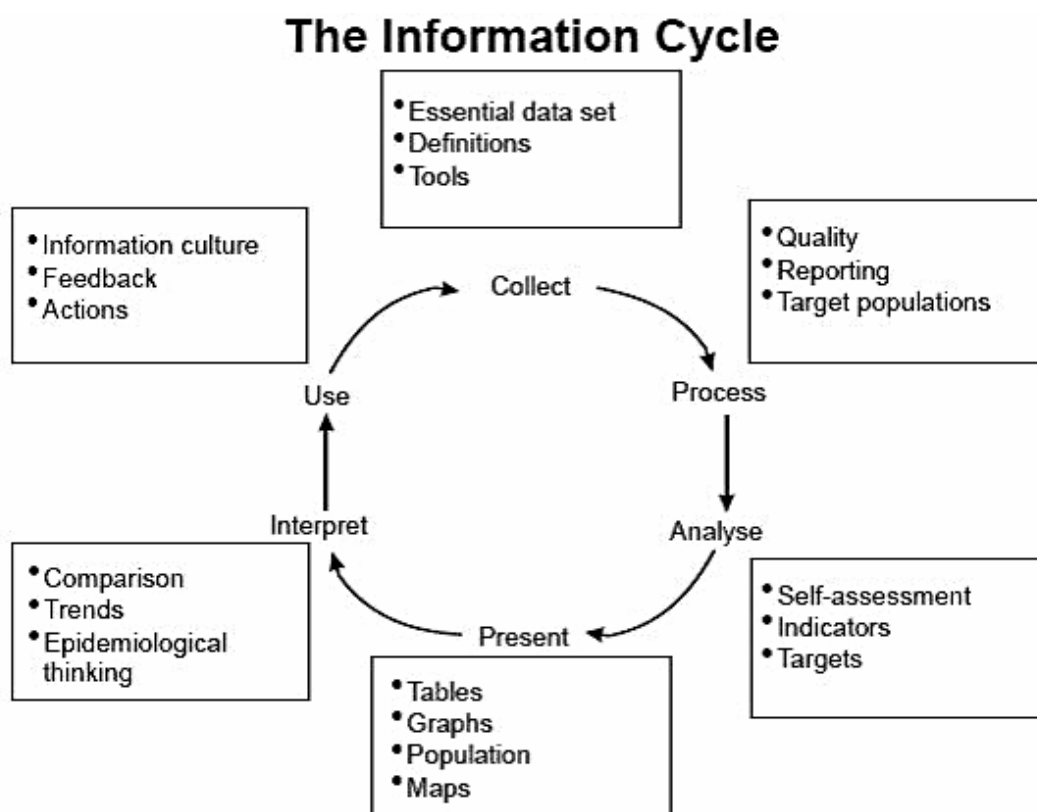
Figure 3.5: The Information Cycle

(Source: Heywood & Rohde 2001, p.21)

Data Collection

The data required for the health system is collected using a combination of routine methods and non-routine methods as Figure 3.4 showed. The routine methods collect activity data about special programmes, routine services, and epidemiological events as well as semi-permanent data about the administration and the population served while the non-routine methods include surveys, population censuses, and qualitative and quantitative rapid assessment methods (Heywood & Rohde 2001, Lippeveld 2000). For this thesis, the data collected and the information produced from the routine methods is what is of interest. Routine health information is defined as "*information that is derived at regular intervals of a year or less through mechanisms designed to meet predictable information needs*." (RHINO cited by LaFond & Fields, 2003:20).

Routine data, being activity data, is collected during delivery of service be it in the community or at the health facility. Thus, the tools for data collection include patient

record cards, tally sheets and registers and the task is a responsibility of anyone providing services to patients/clients ranging from community health workers to doctors in the hospital (Sauerborn and Lippeveld 2000). According to previous research, in many developing countries including Malawi, there is generally a negative attitude associated with collecting data as it seen as a burden whose main purpose is to provide statistics to higher levels of the health hierarchy (Chaulagai et *al.*, 2005; Damitew and Gebreyesus, 2005; Mukama, 2003; Østmo, 2007; Sauerborn and Lippeveld 2000). This attitude has been attributed to, among other reasons, severe staff shortages that lead to high workload, the irrelevance of the data collected for their tasks and the existence of duplication and unclear design of the tools (*ibid*). Therefore, in order to ensure that all routine data collected has purpose, it has been recommended that data collection should revolve around an essential dataset, which is a set of the most important data elements that should be reported routinely based on pre-identified minimum indicators for the health system (Heywood and Rohde, 2001; Shaw, 2005).

Data Processing

The data collected needs to be processed as the next stage of transforming the raw data to information. This stage involves data aggregation; data cleaning through, for instance, visual scanning (eyeballing); and data reporting (Heywood and Rohde, 2001). Data reporting/transmission can be in two forms: vertical data transmission, which focuses on transfer of data between the levels of the health system; and horizontal transmission, which looks at the transfer of data among users at the same level of the system (Bodart and Shrestha, 2000). The tools used for data processing range from being completely manual (paper-based) to electronic using computer software systems. In many developing countries such as Malawi, Mozambique and Tanzania, the case is usually that data is processed manually at the lower level of the health system and then electronically as it is transmitted to higher levels. Just like data collection, (manual) data processing is seen as yet a more cumbersome and time-consuming task and tends to be avoided by health workers (Mukama, 2003). The person responsible for data processing depends on how the management structure of the information system is organised i.e. whether there are vertical information systems for each programme, or an integrated general information system.

Data Analysis

Analysis of the processed data is expected to involve at least the calculation of indicators which measure changes over time in the health system (Heywood and Rohde 2001). The indicators are usually made up of a numerator and a denominator where the numerator is the count of the events that are being measured and the denominator is the group with which the numerators are compared. However, there are some indicators with just the number of events without a denominator and these are classified as count indicators. Other types of indicators are: Proportion Indicator where the numerator is contained in the denominator; Rate Indicators that show the frequency of the event in a specified time in a given population; and Ratio Indicators that have the numerator not included in the denominator. In developing countries such as Mozambique, calculation of indicators at the lower levels has been problematic and has been left to be done at district, provincial or national level (Lungo, 2003; Mukama, 2003). This has been attributed to the lack of denominator values at the facility level as the catchment population for a health facility is usually unknown (*ibid.*), however in the case of Malawi, facility catchment areas have been demarcated and so the facility catchment populations are known. Nevertheless, in general, i.e. in most developing countries, the data analysis responsibility is automatically associated with the person who processes the data.

According to Bodart and Shrestha (2000), there are various ways of classifying indicators depending on how they are used. The input-outcome spectrum classification distinguishes five classes of indicators:

1. Input indicators, which measure the resources needed to carry out the activities.

2. Process indicators that monitor activities that are carried out.

3. Output indicators measure the results of activities such as coverage and knowledge.

4. Outcome indicators determine developmental long-term effects including changes in the health status.

5. Determinant indicators refer to conditions that contribute to or are precursors of disease such as environmental conditions.

It is also possible to classify indicators according to programmes or activities i.e. with the indicators within the programmes categorised according to input-outcome spectrum. Indicators can also be classified as monitoring and evaluation indicators where monitoring indicators are usually measure input and process while evaluation indicators measure output and impact. Overall, the need for different classes of indicators varies with the type of management at that level of the health system (Bodart and Shrestha, 2000)

Presentation

After data analysis has been done, it is important that the information is presented to the relevant users and how it is presented is very important as it influences the use of information. The data can be presented mainly using tables or graphs that can easily be understood. It is the responsibility of the designated data processor to make sure he/she understands the information needs of different users and should therefore present relevant information to the potential users accordingly (Sauerborn, 2000).

Interpretation

According to Heywood and Rohde (2001), interpretation of the information presented involves comparison to targets, to other geographical areas, to norms (program targets), comparison over time (i.e. identification of trends over a period of time), and epidemiological analysis of the indicators (i.e. proportions, rates, ratios, incidence and prevalence) and therefore appropriate interpretation of the information is the responsibility of the users. The authors perceive use of information to be there if decisions are made and actions are taken based on the information produced. However, the concept of information use in HIS has been discussed widely with different perspectives and I explore these perspectives in the next section.

It is important to note that it is indicated that even though the processes of analysis, presentation, interpretation and use have been separated in the cycle, they are closely related in practice and can be viewed more or less as a continuum (Heywood and Rohde, 2001).

It is also important to recognise that others have referred to the information process, particularly the sub-processes of processing, analysis and presentation as data management (Lungo, 2003; RHINO, 2006). Therefore, in this thesis I will use the term data management to refer to this set of processes.

3.2.2 Use of health information

One of the implicit assumptions underlying information systems is that good data, once available, will be transformed into useful information, which in turn will influence decisions; and that such information-based decisions will lead to a more effective and appropriate use of resources (Sauerborn, 2000). Unfortunately the availability of high quality (relevant, reliable, timely) information does not guarantee its appropriate use in the decision making process and various authors claim that there is non-use or under-use of information in the health system of most developing countries (Chaulagai et al, 2005; Sauerborn, 2000; Muquingue et *al.*, 2002). Østmo (2007) explains that this perspective that there is no use of information for decision-making is dominant in research on HIS, project reports and evaluation reports by stakeholders. However, what exactly is meant by "use of information "or better yet" appropriate use of information? One of the discussions from the RHINO (2003) workshop concluded that the term "information use" is not easily defined which makes the assessment of information use also difficult. This explains why there are various perspectives and recommendations of what information use should encompass.

In discussing the issue of use of routine information in health, emphasis has been placed on using the information to support system and health unit managerial functions such as planning and resource management. In a guide for assessing the HIS in South Africa, Gouws (s.a.) states that use of information should be demonstrable and there should be a written account of information use. It is proposed that there should be action plans developed for selected indicators in order to improve the indicator. In the same light, Campbell (2003) talks about using health information to make informed decisions and these decisions should be put into "actionable recommendations", which include clear specification of the action to be taken, by whom, by when, and with what resources. To understand how informed decisions come about, it is important to understand the

decision making process and this is discussed in the subsection that follows. But continuing looking at other possible ´demonstrable actions´ of information use, Heywood and Rohde (2001) mention feedback as one mechanism to promote and ensure that actions are taken based on the information and so provision of feedback is considered evidence of use of information. This feedback can be in written form ranging from simple tables of the data that was reported to reports containing graphs showing and comparing indicator performance by facility, district or even province. It can also be verbal feedback given during meetings or supervision.

There are also other researchers who have discussed use of information in a different view. For instance, Østmo (2007) and Jacucci et *al.* (2006) give evidence of the existence of use of routine information for patient management (e.g. in the wards) and for administration at health facilities in South Africa.

Furthermore, researchers have also mentioned the importance of using information in relation to the concept of an information culture and sometimes with no clear definition of what they mean by information culture. Heywood and Rohde (2001:84) advocate that "*information use is made easier if its use is ritualised and routines are set up as part of the information culture*" and Chaulagai et *al.* (2005:9) highlights the need for support for strengthening the HMIS in Malawi "*until a culture of information is created in the entire health sector*". However, other researchers have explained their understanding of the information culture: for instance, Zheng (2005:3) defines information culture as "*the general capability, views, norms and rules of behaviour with regard to accessing, understanding and using information in a social collectivity*". Campbell (2003) explains that a "culture of information use" begins to evolve when the elements of an integrated HIS become normative practise, where the elements include data collection, self-assessment and peer review, HIS informed decision making, feedback and reporting.

Decision Making

According to Campbell (2003), a health information system measures its ultimate success by informed decisions that lead to action and positive change in the health system or health status rather than by the quality of data produced. These informed decisions are described as "*those where there is evidence of HIS information being used to support the*

decision making process" (Campbell, 2003:10). However, little is known about how decisions are made at the various levels in the public health sector and most of what is known is borrowed from analysis of policy-making process derived from other sectors with the underlying assumption that the process of decision making is similar to that for policy making (Sauerborn, 2000).

Several models have been used to describe decision-making. The knowledge-driven model of decision-making by Van Lohuizen (figure 3.6) and the classical model of decision-making by Lasswell (figure 3.7) represent decision making as a process consisting of linear distinct steps (Sauerborn, 2000). However, it has been argued that in the real world decisions are not made in a linear logical fashion but rather in an iterative way because the phases overlap (*ibid.*). In addition, there are social and political dimensions that influence decision makers as shown in figure 3.8.
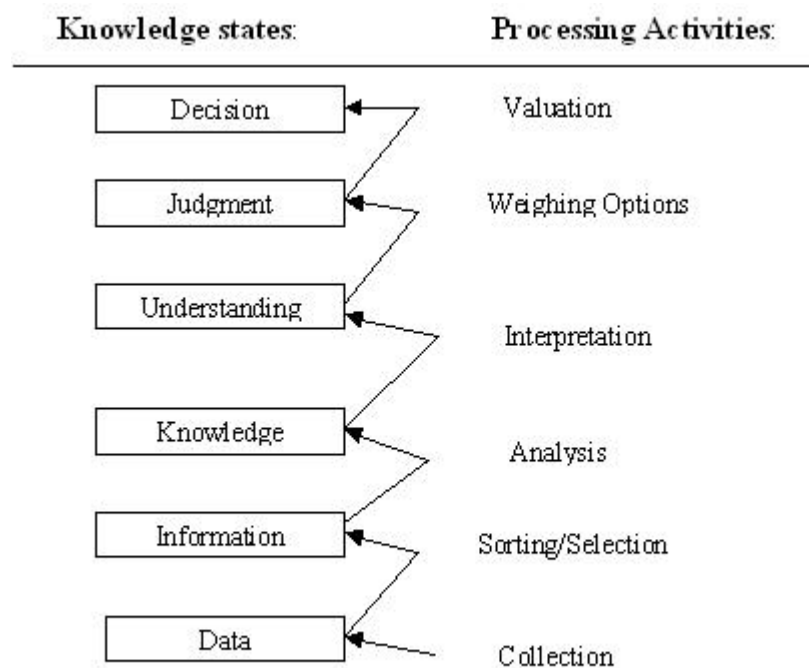
Figure 3.6: Knowledge-driven model of decision making

(Source: Sauerborn 2000, p.35)

Problem identification

↓

Agenda Setting

↓

Option Appraisal

↓

Adoption and Legitimization

↓

Implementation

↓

Monitoring

↓

Evaluation
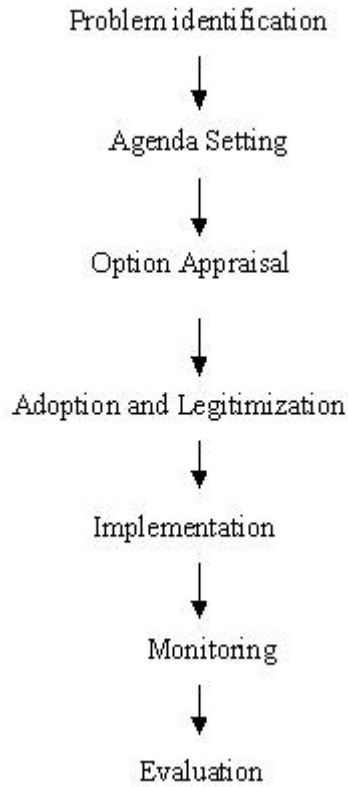
Figure 3.7: Lasswell´s Classical Model of decision-making

(Source: Sauerborn 2000, p.36)

Budget constraints

Advice from peers   Donors

Political Parties   Unions

Information → **Process of Decision Making** → **Decisions**

BLOCKS

Community

Religious Groups   Special interests   Media

Past experience
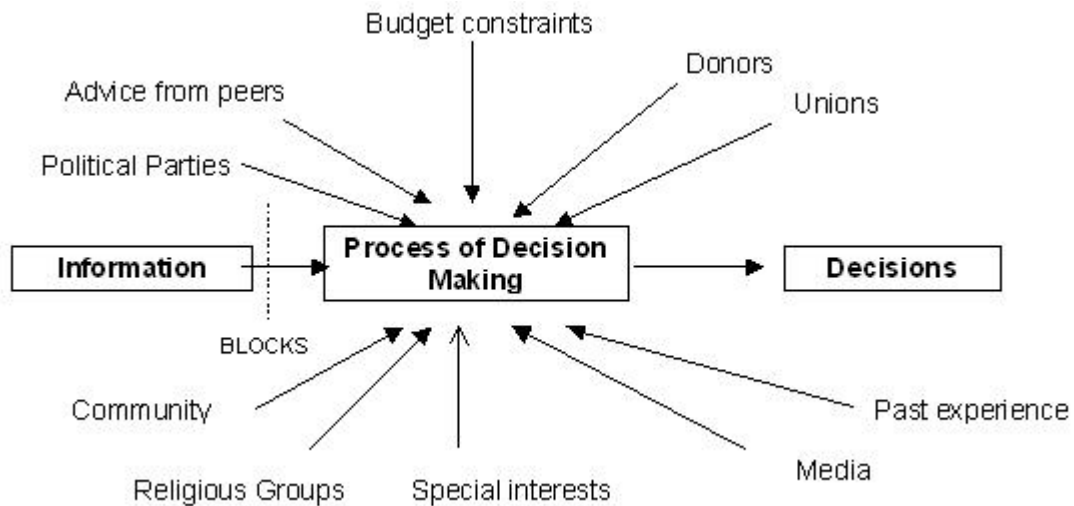
Figure 3.8: Factors influencing decision-makers

(Source: Sauerborn 2000, p.37)

From figure 3.8 above, it shows that information is just one of the many inputs of the decision making process and thus it is not surprising that decisions are made, even in the absence of reliable information because in practice, decision-making in health is mostly based on political opportunism, expediency or donor demand (AbouZahr & Boerma, 2005).

3.2.3 Factors influencing use of information

According to Sauerborn (2000), several factors influence use of information and these are:

1. Characteristics of the data in terms of relevance, reliability, level of detail (aggregation of data) and timeliness;

2. Characteristics of the required decision;

3. Organisation or structural characteristics;

4. Cultural differences between data people and decision-makers; and therefore

5. Communication between these two groups.

The characteristics of the data are a product of the design and implementation of some of the phases of the information cycle already discussed i.e. data collection and data management. For instance, the relevance and reliability is determined by the design of data collection tools and by how the data has been processed. The WHO states that information will not be valuable unless it is accurate, relevant, timely, structured and presented in an easily useable form (World Health Organisation, 2003).

The organisational characteristics in terms of whether it is privately owned or public also affect the use of information. Research indicates that private organisations tend to use information more than public ones because of the profit incentives involved (Sauerborn 2000). In the public health sector, other issues related to organisational aspects of the public health system also affect use of information. Chaulagai et *al*. (2005) discusses

how certain organisational characteristics present in the public health sector of Malawi impede use of information and these include:

1. Accountability i.e. the public servants are not usually held accountable for their performance.

2. There are major resource constraints

3. There is a lack of a shared vision such that programmes work in isolation

4. There is a punitive environment rather than a motivating one

5. There is a lack of management skills and personality

6. Low incentives

The characteristics of required decisions are related to the functions an individual performs which in turn, are determined by the organisational structure. Sauerborn (2000) also looks at the nature of the decisions in terms of whether the decision is aimed at tackling short term or long-term problems, and also in terms of risk i.e. high-risk or low-risk decisions.

In analysing the culture of the data people (i.e. producers of data) and action people (i.e. users of the information), Sauerborn (2000) looks at the characteristics of these two different groups of actors in terms of their objectives and interests and hence, their attitude towards their work and the data/information. It is indicated that the producers' main interest is usually in the absolute values and totals while the users are interested in relative values that allow comparative analysis. This difference may cause the producers to present and communicate information in an irrelevant manner for the users and thus impede use of that information.

The interest and attitude towards health information does not only differ between the producers and users but also among the users themselves. In a study of health management in Mozambique, Muquingue et *al.* (2002) investigates the information interests of a group of users, the doctor-managers, who are doctors given the managerial positions at the district level of the health system. According to the findings, these

doctor-managers can be classified into three categories in relation to their attitude and use of information, which are:

1. Information-non-user managers who have access to information but do not seem to use it.

2. Information-free managers who have no link to the information produced by their district.

3. Information-deprived managers who feel they can get more information out of their current information system to support their managerial responsibilities.

This shows that the use of information is influenced by individual characteristics of the users and these can be seen to be what LaFond and Fields (2003) classify as the behaviour determinants of health information systems in their PRISM framework.

The PRISM framework presents the Health Information System in a different perspective. The framework, depicted in figure 3.9 below, is based on the assumption that improving capacity in routine HIS, and consequently performance, requires interventions that address the environmental, behavioural and technical determinants of performances (LaFond and Fields, 2003). It particularly broadens the analysis of routine HIS to include the behaviour of the collectors and users of data and the context in which these professionals work. Therefore, in essence, the framework adopts a social-technical perspective of the HIS.

Figure 6
"PRISM" Framework for Understanding
Health Information System Performance

Inputs
information system
assessment,
strategies and
interventions

Desired Outcomes
information system performance,
good-quality information,
appropriate use of information

**Technical
Determinants**
system
design, data
collection
forms,
technology,
skills, and
knowledge of
personnel

**Systemic/Environmental
Determinants:** leadership,
structure, culture,
roles/responsibilities, resources

**Behavioral
determinants**
Attitudes,
motivation,
values

Improved
Health
System
Performance

Improved
Health
Status

Figure 3.9: The PRISM Framework

Source (LaFond and Fields 2003, p.26)

As the figure above shows, the technical determinants include issues such as design of the system, technology used and technical skills of users. The environmental determinants look at the organisation context i.e. the health system while the behaviour determinants are basically the attitudes and values of the users of the information system. The authors further explain that it is important to realise that the technical, environmental, and behavioural determinants of health information system performance rarely stand alone as the single cause of poor performance but they are often connected to one another by a continuum. For instance, "*on the environmental–behavioural continuum, achieving competency in an action such as collecting and using health information requires not just knowledge and skills but a supportive environment as well.*" (LaFond and Fields, 2003:22). This framework therefore suggests that strategies for improving HIS should focus on all three groups rather than one.

3.3 (Re) Structuring of Health Information Systems

This section aims at presenting literature that provides an understanding of issues related to the designing of effective and efficient health information systems.

As already stated, most HIS of developing countries are seen as management obstacles rather than supporting tools and one of the reasons for this is that there is fragmentation in the HIS (Sauerborn and Lippeveld, 2000). In the next section, I discuss more on the problem of fragmentation.

3.3.1 Fragmentation of HIS

Fragmentation of HIS can be attributed to the fact that there is an abundance of information systems supporting health providers and this abundance is the mirror image of the enormous variation in health care work along various dimensions (Monteiro 2003), as the characteristics of diseases and the organisation of their treatment significantly shape the reporting systems of disease-specific programmes (Chilundo and Aanestad 2004).

Furthermore, Sauerborn and Lippeveld (2000) and Aanestad et *al*. (2005) explain that the HIS are rarely a result of coordinated efforts to address information needs of health planners and managers, but instead are developed for specific programmes and the result emerging over time is a disintegrated and heterogeneous collection of systems. The various vertical information systems exist in addition to general routine health information system because it is considered insufficient and incapable of delivering the data needed for program management (RHINO, 2003). Shaw (2005) particularly attributes the existence of vertical reporting systems as a result of programme managers´ need for large amount of information specific to their programme without consideration of other programmes.

Fragmentation has also been attributed to lack of policy frameworks to guide and support implementation of an integrated Health Information Systems as shown from studies from Zanzibar, Tanzania and Mozambique (Lungo, 2003; Sheikh, 2005). As presented in chapter 2, Malawi has developed and adopted a national HIS policy framework which

supports implementation of the HIS that is based on principles of integration of all routine health information systems, decentralisation in information generation and use for action (Ministry of Health, 2003). Therefore, it would be expected that fragmentation resulting from lack of a policy framework to coordinate the HIS development efforts would not be the case in the Malawian health system context.

Shidende (2005) also identified areas that cause fragmentation within and across HIS. These areas are related to software systems used, data elements collected, local work practices, and institutional factors. More specifically, the factors contributing to fragmentation were inflexible code, poor performance of the computerised system, and different software between programmes. In terms of work practices, the study revealed problems related to information sharing between staff of different programmes and at the institutional level, the problems were related to clients attending several and different clinics (*ibid.*)

The advantage of the vertical information systems is that they can provide real information support for central programmatic decisions, and the quality of information generated is often better than that of a generally managed information system (RHINO, 2003). However, the net result of HIS fragmentation is catastrophic as fragmentation creates duplication of work and data, lack of information sharing, poor use of information and hinders health care service provision (RHINO 2003; Shidende 2005).

Sauerborn and Lippeveld (2000) emphasise on the need for integration in the overall health systems and efforts have been made by governments of developing countries such as Mozambique and Malawi to deal with the fragmentation problem in various ways such as establishing a Sector-Wide Approach to improve coordination of donor support (Chilundo and Aanestad, 2004; Malawi Ministry of Health and Population, 2003). However, it has been clearly noted that more is required than just pooling donor funds into one account, integration of reporting and monitoring systems of the separate programmes is also required (Chilundo and Aanestad, 2004). Monteiro (2003) explains that the information systems that exist are partly overlapping; complementary and interdependent therefore need to be integrated in order to remove redundant operations, sort out ambiguity and cut back on secondary, administrative overheads.

3.3.2 Integration of HIS

Integration is a difficult concept and has been defined in various ways. In general terms, RHINO (2003:53) defines Integration as "*the process of bringing together common functions within and between organizations to solve common problems, developing a commitment to shared vision and goals, and using common technologies and resources to achieve these goals*". However, integration in IS predominantly has been conceptualised as a technical challenge, involving assembling of hardware, software to accomplish a specific goal and often a software bridge is developed to bring together diverse hardware/software elements (Systems Integration 1996 cited by Zaitun et *al.* 2000; Aanestad et *al.*, 2005).

The approaches and technologies for integration vary widely and there is not one generally shared scheme of classification (Aanestad et *al.*, 2005). However, According to Hasselbring (2000), IS integration focuses on three dimensions briefly described below, with each dimension requiring standardisation of some aspects of the system.

1. **Distribution** focuses on hiding the geographical distribution of systems. This can be achieved by using middleware components, which provide solutions for the technological interconnection of distributed systems. The aim is to make common data and facilities accessible to applications through standard interfaces thereby facilitating the management of the information common to the whole organization (Grimson et *al.*, 2000).

2. **Heterogeneity** is concerned with hiding the differences in hardware platforms, operating systems, database management systems, programming languages, programming and data models as well as the differences in understanding and modelling of the same real-world concepts (Hasselbring, 2000). The typical technique used is to set standards on the programming and data models, and/or the data structure, as well as the data definitions (*ibid*). For instance, information can be exchanged through interface engines via standardised messages (Grimson et al., 2000). In HIS, this may involve developing an essential data set which consists of the most important data elements selected from all vertical

programmes that should be reported on routine basis for the purpose of generating indicators that monitor the health services provided (Shaw 2005).

3. **Autonomy** is focused on the extent to which the systems are independent. This can be achieved by using standard messaging as well as data warehousing whereby data from individual systems is integrated and homogenized in a single repository, the data warehouse (Grimson et al.2000). However, a major drawback of data warehousing is that it is not designed to support operational functions therefore the data in the individual information systems is duplicated in the warehouse. It is noted that the feasibility of reducing autonomy by technical means is highly limited and usually, autonomy can only be reduced in connection with organizational changes (Hasselbring, 2000).

Similar to Hasselbring´s statement, Chilundo and Aanestad explain that integration is not only a technical issue but also a social issue, particularly "*a complex and politically charged activity where multiple institutional influences and different, possibly competing, rationalities need to be aligned*" (Chilundo and Aanestad, 2004). Therefore, integration of information systems is multi-faced involving organisational and political issues of power and domination (Braa et *al*. 2005 cited by Shidende 2005).

Therefore, in this regard, I view integration of health information systems with a socio-technical perspective as the process of bringing together technical components of a system as well as aligning the related social aspects of the system such as the organisational structures, functions and resources.

Integration Strategies

In a health system where there is fragmented HIS, one of the characteristics is the existence of duplication in the data collection tools used starting from the facility level. The duplication in the data collection tools can be seen as a technical problem but stems from a social aspect. Therefore, in trying to address such a problem, Shaw (2005) states that the process of integrating the information systems firstly requires that different actors, such as managers of different programmes, agree on the information to be collected. It is however difficult to achieve a universal agreement that results in a

universal set of standards for all levels of the health system. Hence one approach that is recommended is that of having a hierarchy of standards whereby each level of the health system is allowed to develop its own essential dataset while still responding to the needs of the top administration (Shaw, 2005). This arrangement is depicted in the figure 3.10 below and is advocated for by other authors such as Braa & Hedberg (2002) because it allows flexibility in the standards for a particular level.
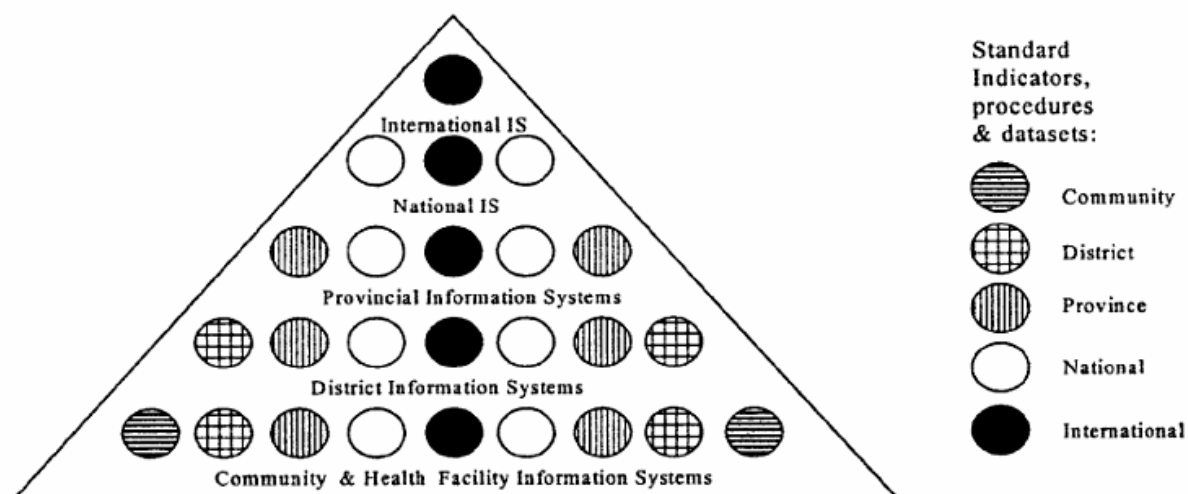
Figure 3.10:Hierarchy of Standards

(Source: Braa & Hedberg 2002, p.124)

The importance of developing standards (standardisation) cannot be over emphasised when looking at the issue of integration of information systems because the standards are at the core as they provide the basis for communication between the different actors. Braa and Hedberg (2002) provide a detailed account of how the hierarchy of standards approach was applied in South Africa for the HIS, and these standards were not only in form of the indicators and datasets but also the related procedures. They describe the standardisation process as a negotiation process through which the interests of the different actors were translated and aligned. The alignment process did not end when standards were developed but rather continued through training of other health workers to get them on board but also to build their capacity.

As mentioned earlier, the PRISM framework highlights the importance of implementing strategies that address social aspects in addition to the technical. Thus, it is important that

integration strategies address behavioural aspects of data producers and users in HIS performance. These aspects involve intangible concepts such as motivation, attitudes, and the values that people hold related to health information, job performance, and responsibilities (LaFond and Fields, 2003). The authors indicate that these behavioural factors are often the most difficult to identify and confront in a meaningful way and influencing many of them requires interventions that go beyond simple training that improves knowledge and skills in data collection and use.

Additionally, the environmental factors of the PRISM framework such as the structure of the health system and availability of human resources are also important in looking at HIS. LaFond and Fields (2003) explain that a health system structured around vertical disease control programs is most likely to be at odds with an integrated district-level health information system. The much-talked Health Sector reform in many developing countries such as Malawi, Mozambique and Tanzania aims to develop an environment that supports integration of health services and the information systems through decentralisation and sector-wide approaches. The district level is particularly a crucial level in such a decentralised system and the HIS is expected to have its greatest utility there and therefore achieving coordination and collaboration as well as an integrated health information system at this level is considered essential. Heywood and Rohde (2001) propose the structure for the organisation of HIS as shown in figure 3.11 below as ideal for an integrated HIS at district levels.
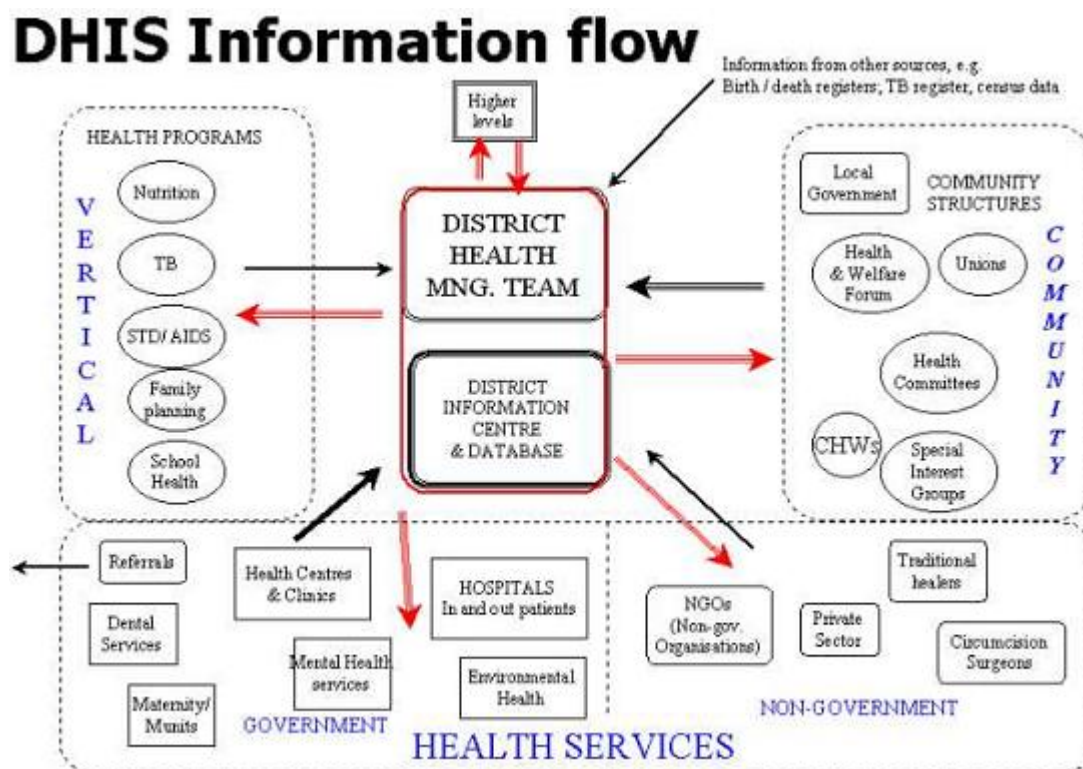
*Figure 3.11: The Structure and flow of information for a District Health
Information System (DHIS)*

(Source: Heywood and Rohde 2001, p.14)

This type of structure for the HIS has been adopted in South Africa and the basic
principles on which it is based upon include: collection of an essential data set;
decentralised use of information; and integration with and support of other information
systems. To support this structure, a software system, the District Health Information
Software (DHIS) has been developed and implemented. Due to the success of the system
in South Africa and from findings of previous research, the DHIS is advocated as the best
solution to support the health systems particularly because it is open source software, its
design does not require expensive advanced technologies, it is flexible and adaptable to
changes and new environments (Lungo, 2003; Sheikh, 2005). This has eventually led to
its adoption in other developing countries such as Botswana, India, Malawi and Zanzibar.
Additionally, plans are underway for its adoption in Mozambique, Nigeria, Tanzania and
Vietnam.

3.4 Conclusion on Literature Review- Conceptual Framework

In this section, I have investigated literature on health management, which provides a framework for understanding on general managerial aspects and more specifically, the management functions and responsibilities at the various levels of the health system. This management literature particularly provides understanding of managerial roles; functions and activities to guide in the analysis of work performed by the district programme managers and the general district health managers in the Malawian health system.

The information cycle is helpful in understanding the information process of the health information system i.e. what the stages involve as well as what is recommended as the best practise. However, even though they have been represented as different phases, in practise they are intertwined and clear demarcation of where one phase starts and stops is difficult to achieve. Nevertheless, for this thesis, the cycle provides a basis for assessing and analysing the information process in the main routine health information system and the information systems of the vertical programmes in Malawi.

One stage of the information cycle that is particularly of more interest is that of "*information* use". The literature has shown that the definition of "use of information" is highly subjective. One can view information use to be only the demonstrable output shown in action plans, while others can view the mere existence of feedback in form of graphs or verbal discussion to be information use. I therefore consider the starting point of information use to be the data analysis stage all the way to where clear actions can be identified to have occurred based on the information. I also adopt the use of "raw data" in patient/client management as evidence of use of information because as Boddy et *al.* (2005) explain, information is subjective i.e. what one views as data may be information to others. Various authors have also used the concept of information culture in relation to information use. They perceive use of information to be aimed towards the development of an information culture. It is however not clear to me whether the absence of this "information culture" implies inadequate/inappropriate use of information exists. I therefore do not use the concept to discuss use of information in this thesis.

I have also investigated literature discussing the structure of HIS in developing countries, which highlight one common flaw in the structures - fragmentation. Various reasons have been attributed to the existence of fragmentation. In an effort to improve the health information systems of developing countries, integration of information systems is one of the proposed solutions. However, the concept of integration does not have one meaning but can be translated in different dimensions. Initially, integration was mostly focused on technical aspects of information systems, but recent research has highlighted the importance of social aspects in this process. The PRISM framework particularly shows how both technical and social aspects of the HIS are important in determining its performance. Therefore, in this thesis, I adopt a socio-technical perspective on the concept of integration. More specifically, I consider integration of HIS to be the process of bringing together technical components of the system as well as aligning the related social aspects of the system such as the organisational structures, functions and resources.

The investigation on fragmentation and integration provides awareness on reasons behind fragmentation in HIS of developing countries and the proposed strategies for integration. This provides a basis for comparing the status of fragmentation/integration of information systems in Malawi's health system. Furthermore, I adopt the PRISM framework as a lens with which to gain understanding of the factors influencing the observed status of the HIS in Malawi.

4. Research Methodology

The purpose of this study was to assess the HIS in Malawi in order to determine where and why fragmentation exists and make recommendations whether, and how the identified fragments could be integrated.

In this chapter, I present how the research was conducted in order to achieve the above-stated objective. This chapter therefore presents details on the research process and approach adopted for the study.

4.1 Origin of the Research

This research is related to the Health Information Systems Programme (HISP), which started in South Africa as a collaborative research and development effort between the University of Cape Town, University of Western Cape and University of Oslo in 1994. The vision of HISP was (and still remains) *"to support the development of an excellent and sustainable health information system that enables all health care workers to use their own information to improve the coverage and quality of health services within their communities"*(HISP website). One of the significant outcomes of this project was the development of a "free and open source" District Health Information Software (DHIS) which is designed to support health workers and managers at all administrative levels of the health system.

Over the years, the HISP network has expanded globally through the adoption of the DHIS in other countries such as Botswana, India, Malawi, and Zanzibar (Tanzania). In Malawi, the main node of the HISP network is the Ministry of Health as it has been the main actor, at the forefront of the adoption and implementation of DHIS since 2000, but with technical support from South Africa and financial support through the Dutch aid, and USAID. Additionally, the College of Medicine has become part of the network, providing training on HIS to health workers and is supported by the EU- funded BEANISH (Building Europe-Africa Networks for Applying Information Society Technologies for health care) project.

This research is connected to the BEANISH project in Malawi and is a partial fulfilment of a Masters Programme in Information Systems offered by the Department of Informatics, University of Oslo. This study was financed by the Norwegian government through NORAD programme that requires research work to be conducted within the domain of Health Informatics in the student's home country.

Furthermore, as part of the Master's programme and in preparation for the research work, I attended courses offered by the Department of Informatics in Oslo on Information Systems development in Organisations; Information Infrastructure; and Open Source Software development frameworks in global networks; this was during the period of August – December 2005. I also attended courses between January –June 2006 on Health Systems; Implementation of health information systems in developing countries: International experiences; Geographical Information Systems: Analysis, Modelling and Applications; and Qualitative Research Methods conducted by the Department of Informatics of Eduardo Mondlane University, in Maputo, Mozambique.

This set of courses equipped me with knowledge on Information Systems in general and more specifically in Health Information Systems (HIS) in developed and developing countries. A field study on the HIS in a Mozambican district particularly provided a taste of the reality of the theoretical concepts discussed in the classroom and also practical experience of conducting qualitative research in IS.

4.2 Research Approach

There are various ways of classifying research approaches but one of the most common ways is that which distinguishes between quantitative and qualitative and the selection of the approach to be used depends solely on what the researcher wants to find out (Myers, 1997).

According to Myers (1997), the quantitative research methods were originally developed in the natural sciences to study natural phenomena and these involve numerical representation and statistical analysis of observations for the purpose of describing and explaining the phenomena that those observations reflect. Examples of quantitative

methods include surveys, laboratory experiments, formal methods (e.g. econometrics) and numerical methods such as mathematical modelling (*ibid*.).

Kaplan and Maxwell (1994) (cited by Myers 1997) argue that the goal of understanding a phenomenon from the point of view of the participants and its particular social and institutional context is largely lost when textual data are quantified. Therefore, qualitative research methods were developed in the social sciences to enable researchers to study social and cultural phenomena and are particularly useful in determining how and why specific outcomes occur, for example, in patterns found from analysis of quantitative data (Anderson and Aydin 1994 cited by Mukama 2003).

As Braa and Hedberg (2002) states, information systems are part of their social context of use and so the health care information systems are deeply embedded in social work practices and are barely separable from the social context of which they are part. Thus, assessment of the HIS includes understanding the social context in which they operate. Therefore, bearing in mind that the objective of this study is to assess the HIS in Malawi in order to determine where and why fragmentation exists, this research has adopted a qualitative research approach because it allows me to understand both social and technical aspects of the HIS especially as the socio-technical relation is not linear but rather difficult to demarcate and complex. This is opposed to the quantitative approach that has emphasis on numerical outputs.

4.3 Philosophical Perspective

All research (whether quantitative or qualitative) is based on some underlying philosophical paradigms, consisting of assumptions about the nature of the world and the ways knowledge about it can be acquired (Myers 1997; Oates 2006). Three different paradigms have been used in IS research and these are positivism, interpretivism and critical research.

The positivism paradigm underlies the scientific method, which assumes that the world is ordered and regular, and can be objectively investigated independent of the researcher's cognition or instruments (*ibid*). The aim of positivist studies is to find universal laws,

patterns and regularities in an attempt to increase the predictive understanding of phenomena. Positivism has been the dominant paradigm in previous research and IS research is classified as positivist if there is evidence of formal propositions, quantifiable measures of variables, hypothesis testing, and the drawing of inferences about a phenomenon from the sample to a stated population (Orlikowski and Baroudi, 1991 cited by Myers, 1997). Oates (2006) argues that this paradigm is less suited to researching the social world i.e. people, organisations and group structures they build for various reasons including limitations of the sampling methods as it may result in missing the bigger picture and repetition is not always possible.

On the other hand, the interpretive paradigm in IS research is concerned with understanding the social context of an IS through the meanings that people assign to them and the social processes by which the information system is developed and through which it influences, and is influenced by its social setting (*ibid*). Interpretive studies, therefore, attempt to identify, explore and explain how all factors in a particular social setting are related and interdependent. This paradigm is characterised by: having multiple subjective realities i.e. there is no single version of "the truth" but rather multiple interpretations; and it involves studying people in their natural social settings. The interpretive researchers aim for plausibility where they have to make arguments and convince their audience that their descriptions, explanations and interpretations are plausible and supported by evidence.

The critical research paradigm goes beyond the interpretive research by focusing on identifying power relations, conflicts and contradictions in contemporary society, and seeks to empower people to eliminate the causes of alienation and domination (*ibid*). Critical researchers recognize that although people can consciously act to change their social and economic circumstances, their ability to do so is constrained by various forms of social, cultural and political domination (Myers 1997). Therefore, critical researchers seek to identify and challenge the conditions of dominations, and the restrictions and unfairness of the status quo and taken-for-granted assumptions (Oates 2006).

In this study, the underlying philosophical paradigm adopted is interpretive because the aim of the research is to identify where fragmentation exists and explain the reasons for

this situation through an understanding of the socio-technical aspects of the existing health information systems in a holistic manner. This understanding then enables me to make recommendations for improving the situation.

4.4 Research Strategy

Myers (1997) defines a research method as a strategy of inquiry which moves from the underlying philosophical assumptions to research design and data collection. Several qualitative research methods such as action research, case study, ethnography and grounded theory are used in conducting IS research. Myers (1997) states that the choice of a specific qualitative research method is independent of the underlying philosophical position adopted e.g., a case study could be positivist, interpretive or critical. However, Oates (2006) argues that ethnographies and case studies are strongly associated with the interpretive paradigm but action research can be in any of the three paradigms.

Action research is grounded in practical action, aimed at solving an immediate problem situation while carefully informing theory. The fundamental contention of the action researcher is that complex social processes can be studied best by experiments i.e. introducing changes into these processes and observing the effects of these changes (Baskerville, 1999).

The grounded theory method, according to Martin and Turner, is "*an inductive, theory discovery methodology that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or data*" (Martin and Turner 1986 cited by Myers 1997). The method is particularly useful in developing context-based, process-oriented descriptions and explanations of the phenomenon.

On the other hand, ethnographies set out to understand how a particular group of people perceives its world, concentrating on social constructs such as language, symbols and organisation structures (Oates 2006). Furthermore, the ethnographers recognise that their own background, beliefs and actions inevitably shape the research process and affect the

situation and thus their report includes a discussion of their self and how they may have shaped what was observed and how they interpreted it.

Case studies are similar to ethnographies as they provide an account of what occurs in a social setting. Yin (2003) defines a case study as "*an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident*". Myers (1997) argues that the case study research method is particularly well suited to IS research, since the object of the discipline is the study of information systems in organizations, and interest has shifted to organizational rather than technical issues. The main difference between case studies and ethnographies is the extent to which the researcher immerses himself/herself in the life of the social group under study (Myers 1999). In a case study, the primary source of data is interviews, supplemented by documentary evidence such as annual reports, meeting minutes while in ethnography, data is also collected through participant observation and it usually requires the researcher to spend a long period of time in the "field" (*ibid*)

In this research, a case study method was adopted to assess the health information systems in Malawi, which includes its social context. The case study method was particularly considered more appropriate than ethnographies considering the time factor; the ethnographies require a reasonably long period in the field while a maximum time allocated for the study was six month.

This research adopted two types of case study approaches at various stages of the study. Partly, the case study adopted a holistic approach in order to obtain a broad overall understanding of the HIS to know how the system operates (and/or how it is supposed to operate). Therefore, this approach particularly involved collecting data at the Ministry, Zonal, district and facility levels of the health system.

However, bearing in mind that within this holistic view, the health system is further divided into multiple units in form of districts, the study therefore adopted an embedded case study design where two districts were chosen within the holistic single case. Thus a comparative case study approach was used to investigate on the HIS at the district level

and this approach was chosen because as Yin (2003) states, the results are more compelling and provide room for generalisation as compared to a single case study.

The two districts chosen were Chikwawa and Chiradzulu and their general profiles are presented in chapter 2 of this thesis. The selection of these districts was done with assistance and guidance from the Ministry of Health, and was based on the performance of the districts, physical accessibility, and financial constraints. Both districts chosen are typical rural areas and this was done to avoid the complexity in urban settings resulting from existence of central hospitals and numerous private health centres. Furthermore, the majority of the Malawian population is in the rural areas and that is where Primary Health Care efforts are central and crucial.

Chikwawa was selected because according to the Ministry, this was one of the best performing districts nationwide in relation to HMIS activities and this was particularly attributed to the fact that this was one of eight districts being supported by MSH, which has one of its main areas of focus to be strengthening of the HMIS. Additionally, the MSH was also working towards eliminating parallel programme reporting by piloting (in this district) on a monthly reporting system of HMIS from the facilities to the district and this was particularly interesting to my topic of study of integration. However, the pilot reporting system project did not have any impact on my study or research findings because it was discovered in the course of the study that this piloting was not operational on the ground as facilities were mainly only reporting on quarterly basis.

Chiradzulu was selected as the other district for the study because it was one of the districts not supported by MSH and was therefore a representation of the ordinary (or majority of the districts) in the country, which did not receive special additional support on HMIS. Furthermore, considering financial factors, the district was convenient as it is 23 km from Blantyre through a good road and is accessible by public transport and therefore would provide me with an opportunity to cut down on accommodation expenses as I could live with my family in Blantyre and yet still have easy access to the field study site.

4.5 Empirical Data Collection

The choice of research method influences the way in which the researcher collects data and as already stated, interviews constitute the primary source of data in case studies. Therefore, this study mainly obtained empirical data from interviews. However, to ensure reliability and validity of the data, document analysis and participant observation were also used to complement the interviews.

Before the empirical data collection could start, contact was first established in June 2006 with the Ministry of Health through the Heath Management Information Unit to gain ethical approval to conduct the research. It was then discovered that the protocol in the health sector required approval of the research from an established National Health Sciences Research Committee and so data collection could only commence upon the committee's approval. This committee meets every two months to review research proposals and was next scheduled to meet on 28th July 2006 and this meant a waiting period of more than a month to start data collection. However, it was indicated that it was possible to expedite the process in exceptional cases and since time was of the essence for this research, a procedure to expedite the approval was followed. Nevertheless, official approval of the research was still only granted on 28th July 2006 (*See Appendix A for letter of approval*). Once this approval was obtained, the empirical data collection began at national level with the HMIU as the main informant. The Head of the HMIU then later introduced me and my colleagues[2] to other professionals in the system working at the Zonal and district levels of the health system and this support from the HMIU opened doors to further investigation of the HIS at these levels of the system. The empirical field study lasted for a period of 14 weeks from August to November 2006. The table below shows more details on where and how the time was spent during this period. Sections 4.5.1 to 4.5.5 provides more details on how the empirical data collection exercise was carried out.

Period	Activity and Location

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[2] Two norwegian students of the same masters programme who were also conducting research projects related to HIS in Malawi.

26 June – 28 July 2006	Processing research approval at the MoH in Lilongwe
31 July – 2 August 2006	Data collection at National level MoH Lilongwe
4 – 7 August 2006	Data collection at Zonal level in Blantyre
9 August – 8 September 2006	Data collection in Chikwawa
12 September – 27 October 2006	Data Collection in Chiradzulu
30th October – 3rd November 2006	Data collection in Chikwawa

Table 4.1: Time frame of empirical data collection

4.5.1 Interviews

As table 4.1 above shows, data collection was done at various levels of the health systems and one of the techniques used to obtain this data was interviews. During the period, I interviewed various professionals working at these levels and open-ended semi-structured interviews were used, with only having an interview guide (*see interview guide in Appendix B*). This technique was used because it gives more freedom to both interviewer and interviewee to ask and give further elaborations (Silverman 2001 cited by Sheikh 2005).

As mentioned previously, the empirical data collection aimed at obtaining a holistic overview picture and understanding of the HIS, I, therefore, conducted interviews with officials working in the Health Management Information Unit (HMIU) of the Ministry of health which has the main responsibility with issues related to HIS nationally. The Management Sciences for Health (MSH) organisation being an active stakeholder on HIS issues in the country, I therefore also interviewed some of the professionals working in the organisation. More precisely, I interviewed the Monitoring and Evaluation specialist for the MSH-Malawi Programme and also the MSH Management Technical Assistant for one of the study district. I also interviewed the Assistant Statisticians who are the main

persons in charge of the HMIS at the district levels. In addition, I interviewed one official working as the Technical Advisor for the Zonal Health Support Office South West. All these interviews provided information on how the system works and/or is at least supposed to work.

A further investigation was done at facility level, particularly at district hospitals, to understand how the information system worked on the ground and this involved interviews of the health workers in the hospital units especially the wards, Integration Unit, and OPD unit who were involved in data collection of facility/patient encounter, aggregation, reporting, analysis and use. Additionally interviews were also conducted at two other facilities (one privately owned and one public) to investigate if the HIS at the facility operated in a similar manner as what was discovered at the district hospital. Therefore, this group of interviewees at the facilities and hospitals consisted of ward clerks, Health Surveillance Assistants, medical assistants, nurses and clinicians.

Among other things, the findings from these interviews indicated existence of parallel reporting systems to the main HMIS and as the interest of this research was to identify where and why fragmentation exists, the study later focused on a selected few of these programmes with parallel reporting systems. This part of the study particularly aimed at understanding the parallel reporting systems including determining the reasons behind their existence and so I interviewed the programme coordinators in charge of the programmes at district level to understand: how their reporting systems operated; the similarities and differences mainly with HMIS (but also other related programmes); and how their data was used and was useful at the district level. Therefore, this involved investigation of the coordinators' work i.e. responsibilities, duties and tasks. The coordinators interviewed were for the following programmes: the Expanded Programme for Immunisation (EPI); Integrated Disease Surveillance and Response (IDSR); Malaria Control; Safe Motherhood; Family Planning; Voluntary Counselling and Testing (VCT)[3]; Anti-Retroviral Therapy (ART); and Prevention of Mother to Child Transmission of HIV/AIDS (PMTCT). Additionally, I interviewed some members of the District Health

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[3] This programme is also known as HIV Testing and Counselling (HTC)

Management Team particularly the District Health Officer (DHO), the District Nursing Officer (DNO) and the District Environmental Health Officer (DEHO) to understand their duties, their information needs and their actual source of information, and so also determining their actual use of both HMIS and programme-specific information.

In summary, 43 different officials working in the health system were interviewed during the study. Some of the interviews were conducted with colleagues who were also doing research on the HIS and these interviews were mainly on investigation of the HIS in general. We conducted the interviews together since we required the same basic data and wanted to avoid wasting time of the interviewees by having separate interviews with them on the same issues. I also conducted interviews on my own and these were especially on the investigation of the specific programmes' systems, which was of interest to mainly my research. Table 4.2 below shows a summary of the interviews conducted during this study.

Interviews Conducted	Number of respondents							
	National	Zonal	District		Facility		MSH	Total
			CK	CZ	CK	CZ		
Alone			12	11				**23**
With Colleagues	2	1	13	6	2		2	**26**
Total Number of respondents	**2**	**1**	**22∗**	**14∗**	**2**		**2**	**43∗**

Table 4.2: Number of Interview Respondents

CK- Chikwawa

CZ --Chiradzulu

∗ The figure is not a direct sum of the columns because three respondents (in each of the districts) were interviewed twice- on my own but also with my colleagues.

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The interviews conducted with my colleagues were mainly in English but some other respondents preferred to use Chichewa, which therefore required my immediate translation. The interviews I conducted on my own were done with a mix of English and Chichewa depending on what the interviewee was comfortable with.

The interviews were conducted at the interviewees' respective workplaces such as their offices, the wards, or the consultation rooms; except for two interviews that were conducted during break time for workshops where I was a participant observer. The interviews lasted for a period ranging from 20 minutes to 2 hours.

Some of the professionals were interviewed more than once after reflection on the proceedings from the initial interviews and clarifications were needed or if further questions were generated after document analysis or observations. Some clarifications were also obtained through informal casual dialogue with the health staff.

One problem encountered especially during the initial part of the research was that when the health workers were approached for interviews related on data issues they associated it only with the HMIS and would therefore refer us to the Assistant Statistician, or at times, most of their responses would be in regards to HMIS. This particularly affected my research as I was not only interested in HMIS but I was also interested in finding out if (and about) other parallel reporting systems (that) existed. To overcome this, I had to explain in detail what I wanted to find out from them and I also had to use a lot of probing during the interviews to get the information I required.

4.5.2 Participant Observation

Observations are important in qualitative research as they allow the researcher to see what the people are doing as well as what they say they are doing (Myers, 1999).

In an effort to obtain a better understanding of what was discovered from other sources, participant observation was used whenever possible. More specifically, I attended and observed a Zonal quarterly HMIS review meeting, a quarterly DIP/HMIS review meeting, two quarterly sub-district (cluster) HMIS review meetings, a Cholera Post-mortem meeting, DHMT facility supervision and HMIS facility supervision.

Attending these meetings and supervisory visits particularly increased my understanding and informed this research mainly on issues related to data analysis and data/information use.

4.5.3 Document analysis

Documents were also reviewed and analysed as another source of data for the research. These documents included registers, reporting forms (programme- specific and HMIS); training reports; meeting presentations, minutes and reports for e.g. DIP review and/or HMIS review meetings; District Implementation Plans (DIP); general programme reports; supervision checklists and reports; HMIS guidelines and manuals; Policy documents such as National HIS policy and strategy; and other national official documents e.g. DIP development guidelines.

The review of registers provided information on data that was collected at facility level during patient/facility encounter and analysis of the reporting forms assisted in identifying fragmentation in the HIS.

Furthermore, review of the meeting- and training presentations, minutes and reports; DIPS; programme reports; and checklists also provided empirical material related to data analysis and data/information use.

The national guidelines and manuals, policy documents and other official documents also informed the research on how the system was supposed to work in general.

4.5.4 Software Analysis

The study also obtained data through brief demonstrations of software systems that were used by some of the interviewees. These demonstrations provided information on their functionalities and how the systems were used.

These systems were the District Health Information System for HMIS, EpiInfo that was used for the Integrated Disease Surveillance Programme, and Supply Chain Manager, which was used for the Logistics Management Information System.

4.5.5 Fieldwork Documentation

During the interviews and observations, data was collected mainly through note taking. Tape recording was not used, as participants were not comfortable with it; however, pictures were taken of various types of documents.

At the end of the day, the field notes were transcribed to come up with an interview transcript. During writing up of the transcripts, I also examined any documents (or pictures of documents) obtained and this enabled a comprehensive reflection on all the data obtained and identification of areas for clarification and further investigation. A memo was also written containing my views/opinions on the findings, the interviews as well as the activities observed.

4.6 Empirical Data Analysis

As Myers (1997) states that a clear distinction between data gathering and data analysis is problematic in qualitative research, this was also the case for this study. The analysis started during the empirical data collection and this was a hermeneutics approach as the primary concern was the meaning of text, for instance, textual analysis was done on the data elements of the reporting forms to identify data overlaps and data duplication.

Furthermore, Myers (1997) points out that in an organization, people can have incomplete, cloudy and contradictory views on many issues and so the hermeneutic analysis can be used in an interpretive information systems study to try and make sense of the organization as a whole including the relationship between people, the organization, and information technology. This approach was therefore convenient as the study used interviews as one of the main sources of data giving mostly people's perspectives of the system and how it worked. Therefore, in trying to make sense of the whole, a triangulation method was used to understand the system by analysing the information obtained from interviews, document analysis and observations.

The analysis of the research findings has also been guided by a conceptual framework developed from investigating various literatures on the topics of health management,

Health Information Systems and integration mainly in the context of developing countries.

All this analysis of data has therefore enabled me to determine and understand the HIS in Malawi, more specifically, the integration/fragmentation status of the HIS in the country, the reasons for this status and to provide recommendations of how the system can be improved.

4.7 Validity and Reliability

In qualitative case study research, validity and reliability of the evidence obtained is one of the criteria for evaluating the research. Therefore, several measures were taken to ensure the validity and reliability of the empirical material obtained for the research. These measures include:

- Use of several techniques to obtain and verify the data i.e. interviews, observations and document and software analysis.

- Clarifications were also sought whenever things did not appear to make sense.

- A preliminary report on the research findings was produced and distributed to some participants to verify the contents to ensure the content was correct.

4.8 Ethical Considerations

During the study, ethical considerations were also made as:

- Ethical clearance was obtained from the Ministry of Health before commencing the fieldwork. (*See appendix A*).

- Verbal consent was sought from participants to conduct interviews, take pictures as well as to access documents.

- Confidentiality and anonymity have been maintained throughout the study including the fact that no names have been disclosed of participants in this thesis as well as in the preliminary report of the fieldwork that was submitted. However, since the study at some point concentrated on a specific group of people, it may be easy to identify the individuals, as only one position exists in the district.

- Feedback was also provided to the participants through the preliminary report as an ethical consideration.

4.9 Limitations of the study

No tape recording was used during interviews and at times, it was difficult to record all the important details as the interview was in progress hence clarifications were usually needed after the initial interview.

The programme coordinators interviewed were not solely working as coordinators but also had other duties outside the programmes and so it was not possible to observe them, to see them in action performing their duties as coordinators hence the interviews and documents were the primary source of data on issues related to their work, information requirements, their data analysis and use.

Additionally, some potential participants in some of the districts were not interviewed as they were not available during the time of study hence some findings are only from single district case analysis and not as a result of a comparative analysis.

The study did not investigate thoroughly the information requirements of the programme manager at the national levels because of time limitations. Such an investigation would have assisted in obtaining an understanding of the reasons behind fragmentation at a higher level thus determining the factors contributing to fragmentation in the system. Thus, the empirical material obtained from this study informs the understanding of fragmentation mainly as per district level perspective.

5. Research Findings

The first objective of the study was to understand the routine Health Management Information System (HMIS) and this has been described in section 2.3 of chapter 2.

Once an understanding of the main routine HMIS was obtained, the study focused on few selected programmes, which appeared to have parallel information systems. The purpose was to understand how the parallel systems worked and why the data was required mainly at the district level. Thus, emphasis was placed on the tasks of the district programme coordinators and district health management in order to identify their data/information use and need.

Therefore, the first part of this chapter presents and analyses the findings on the parallel programmes. A comparison is made primarily between these systems and the HMIS, while also pointing out where there are overlaps among the parallel programme systems.

The duties and tasks of programme coordinators are presented in the second section of the chapter and this includes an analysis of the information inputs for these tasks.

Lastly, the duties and tasks of some members of the District Health Management Team (DHMT) are presented in the third section of the chapter, which also analyses their use of information for these tasks.

5.1 PROGRAMME-SPECIFIC REPORTING SYSTEMS vs. HMIS

The research findings indicated that some programmes had their own reporting systems whereby programme-specific forms were used to report data from the facilities to the district. This section presents more details on these programme systems for a selected few programmes namely Integrated Disease Surveillance and Response (IDSR), Malaria Control, Maternal and Child Health (MCH) and HIV/AIDS. The information systems of these programmes were studied and a comparison is made to the main routine HMIS (already presented in chapter 2). The comparison focuses on the issues of reporting

frequency, data elements, report format, and sources of the data. This section is focused on the district level but inevitably also looks at its links with the lower (facility) level and upper level.

It is important to realise that the MCH programme is further divided into sub-programmes namely Expanded Programme of Immunisation (EPI); Safe Motherhood and Family Planning. The HIV/AIDS programme is also sub-divided into Voluntary Counselling and Testing (VCT); Anti-Retroviral Therapy (ART); and Prevention of Mother to Child Transmission of HIV/AIDS (PMTCT).

Bearing in mind that the study used a comparative approach with case studies done in two districts, the findings presented are for both districts and in cases where differences exist between the districts, this is clearly spelled out.

5.1.1 Data Reporting Frequency – from facility

As mentioned in chapter 2, the reporting of frequency of data from the facilities to the district level, particularly to the Assistant Statistician is quarterly. On the other hand, for the programmes studied, the data reporting frequency using their programme-specific forms varies but the majority of the programmes report data on monthly basis with only the ART programme reporting quarterly. The disease surveillance programme (IDSR) additionally is required to report data weekly using a specific form but in practise, verbal reporting is mostly done especially when there is zero- reporting (i.e. there are zero cases but they still have to report). Table 5.1 below shows the details of reporting frequency for the programmes and to whom they are submitted.

Programmes	Facility Reporting frequency	Report Recipient
IDSR	Weekly and Monthly	IDSR coordinator
EPI	Monthly	EPI Coordinator[4]
Family Planning (FP)	Monthly*	FP Coordinator
Safe Motherhood (SM)	Monthly	SM coordinator
PMTCT	Monthly	PMTCT Coordinator, VCT coordinator**
VCT	Monthly	VCT coordinator
ART	Quarterly	MOH national level***
Malaria Control	Monthly	Malaria coordinator

Table 5.1: Programme Reporting frequencies- from facility

As seen from Table 5.1 above, there are some exceptions, which have been indicated by the asterisk symbol. For the Family Planning programme (*), the monthly reporting is only done in one of the districts studied while in the other district there is no parallel reporting of data for this programme.

For most of the programmes, the reports are submitted to their respective district programme coordinators. However, for the PMTCT programme (**), in one of the districts, the reports are submitted to the PMTCT coordinator but in the other district the facility, reports are submitted to the VCT coordinator.

The ART programme is also exceptional (***). The programme is only run in hospitals i.e. the District Hospitals, rural hospitals and some private hospitals and each of these

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[4] Also known as MCH coordinator

hospitals report directly to the national level i.e. to the Ministry of Health and not to the District ART coordinator.

The HMIS quarterly reporting frequency was considered as one of the factors contributing to the existence of parallel programme reporting systems as it was explained that for some of the programmes, data was required on a monthly basis. Thus, the HMIS was considered insufficient or rather incapable of providing timely data to the programmes.

5.1.2 Data Elements and Sources of the data

The data elements collected by the HMIS quarterly reporting form (known as HMIS 15) are those that were identified as the Minimum Data Set aimed to calculate pre-defined (HMIS) indicators. These data elements fall under issues of: Maternal services, Family planning, Child Health, Attendance, Tuberculosis, Supplies, Community health, Human Resources available, Finance, Physical facilities, Management and Supervision, New disease cases, Admissions and In-patient deaths. (*See HMIS reporting form in Appendix D.1*).

The programme reports contain details of their specific areas of interest and table 5.2 below shows the issues covered in each of the reporting forms of the programme. (*See Appendices D.2 to D.13 for programme-specific reporting forms*)

Marlen Stacey Galimoto

	Programmes							
	IDSR	**EPI**	**FP**	**SM**	**PMTCT**	**VCT**	**ART**	**Malaria**
Issues Covered	Disease Surveillance of: Cholera, Dysentery, Measles, Meningitis, Plague, Viral hemorrhagic fevers, Polio, Neonatal Tetanus, Pneumonia, HIV/Aids, Malaria, Schistosomiasis, Sexually Transmitted Infections	Vaccination Performance-coverage, dropout & wastage. Disease surveillance-Measles, Polio & Neonatal Tetanus	Clients of Family Planning methods	Births, EmOCs, Referrals, Maternal & Neonatal deaths.	ANC-VCT performance, MTCT_ARV performance, Deliveries, Infants, follow-ups	Clients attending VCT services, HIV prevalence	ART Cases, Services Outcome	Malaria cases, IPT & iron 4 ANC, Supplies-Anti-Malaria drugs, ITN, Malaria cases, Lab results
Report Format	Disease cases by age, In- or Out Patient, severity, deaths	Performance by Antigen	By method type	Organised under issues covered as above, *(See appendix*	Organised under issues covered as above *(See appendix D.7)*	By age group, by sex	Organised under issues covered as above *(See appendix*	Organised under issues covered as above *(see appendix*

				D.6)			D.11)	D.12)
Overlap and/ or duplication with HMIS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Overlap and/ or duplication with other programs	EPI, Malaria, ARV, VCT	IDSR, SM	No	EPI, PMTCT	SM, VCT, ART	PMTCT, ART, IDSR	VCT, PMTCT, IDSR	IDSR,
Data Sources	HMIS registers 8 & 9; Lab registers; HSAs' reports	HMIS registers 1,2, 4, 6,7,8,9, 3b; TBA reports; HSAs reports	HMIS register 5	HMIS registers 3a, 3b & 4	PMTCT registers- un official; HMIS register 2.	VCT registers; lab registers,	ART register- official; data from MSF	HMIS registers, 2, 8 & 9; ITN registers

Table 5.2:Programme reporting forms properties

As the table 5.2 above shows, some of the issues covered in the programme reports are also covered in the HMIS 15 form hence there are data overlaps. However, the data on the programme reports tends to be more detailed on the subject matter i.e. disaggregated in various aspects while the HMIS has aggregated data, for instance, the IDSR data is disaggregated by age group, severity of the cases etc (*See IDSR reporting forms in Appendices D.2 and D.3*). An example of this is where the HMIS has ´Schistosomiasis-new cases´ as a data element on that disease, while the IDSR has the same data but disaggregated i.e. ´Schistosomiasis -intestinal´ and ´Schistosomiasis-urinary´.

In other cases, the data on HMIS is not an aggregated form of the programme data but rather a subsection of the programme data, for instance, the EPI form (in *appendix D.4*) has data on vaccination performance by antigen and so has data, for example, on Polio 0, 1, 2 and 3 while the HMIS form has data on Polio 3 only.

In addition to this data overlap, there is also data duplication whereby there are some data elements that are on both the HMIS and the programme-specific forms and the case of the HMIS and EPI form just described above is an exemplary case of this duplication that exists. This duplication of HMIS data mainly exists with the Safe Motherhood, Family Planning, Malaria Control, VCT, PMTCT and EPI forms.

Furthermore, data overlap and duplication also exists among and between some of the programmes for instance between IDSR and EPI as they are both doing surveillance on Measles, Polio and Neonatal Tetanus.

However, these programme-reporting forms also contain other data elements that are neither on the HMIS form nor on the other programme forms studied.

Sources of the data

The initial starting point or source of routine data is during the interaction with the patient/client at the periphery health unit level where data is collected using patient booklets, forms and registers.

The sources of data for the quarterly HMIS form are mainly the registers i.e. HMIS registers 1-9. (*See appendix C for detailed list of HMIS registers*). Additionally the form

also obtains its data from the VCT register, ART register, District Health Profile, general files, Tuberculosis forms, Attendance registers, HSAs reports, Stock books and stock cards and the Pharmacy.

The table 5.2 above also shows the sources of the data for the programme reporting forms and these include the HMIS registers, lab registers, VCT registers, ART registers, and ITN registers. Even though the VCT registers and ART registers were not included as HMIS registers, they are official registers developed by Ministry of Health and other stakeholders.

However, there are exceptions whereby the programmes have their own data collection tools for instance the PMTCT programme has their own unofficial register (which was basically a note book) and this was because the programme was relatively new so the existing design of the HMIS tools did not collect the data the programme required.

5.1.3 Data Aggregation and Reporting- at and from district level

The Assistant Statistician aggregates the data from the HMIS facility reports using the DHIS to produce a district report. This is done on a quarterly basis. The content (i.e. data elements) of the district report is the same as that of the individual facility reports and is submitted electronically to the Health Management Information Unit (HMIU) at the ministry headquarters. The Statistician is also required to transmit the district data horizontally by providing it to the programme coordinators and this is done in form of Pivot tables, mainly so that the coordinators can prepare presentations for their programmes for DIP/HMIS review meetings.

On the other hand, aggregation and reporting for the programmes differs as can be seen in Table 5.3 below which provides a summary of the aggregation and reporting at district level for each programme.

Programmes	Data Aggregation tool	Reporting frequency	Report Recipient
IDSR	EpiInfo and Manual	Weekly and Monthly	CHSU- MOH
EPI	Manual	Monthly	Regional EPI office
FP	Manual and MS Word	Monthly	Reproductive Health unit - MOH
SM	Not done	Not done	Not done
PMTCT	Manual and MS Word	Quarterly	UNICEF
VCT	MS Excel	Monthly	HIV/AIDS- MOH, MSH, NAC.
ART	Manual	Quarterly	HIV/AIDS- MOH
Malaria Control	Excel, Not done (in 1 district)	Monthly	Malaria Programme- MOH

Table 5.3: Programme reporting frequencies- from district level

The programme-specific facility reports are aggregated to produce district reports and this is done by the programme coordinators. However, for the Malaria Control Programme (in one district) and the Safe Motherhood programme, the data is not aggregated to produce district reports but the programme facility reports are either submitted to the Assistant Statistician or are just filed.

Most of the programmes that aggregate their data do it manually i.e. using calculators except for the IDSR which has a computerised system, EpiInfo, which is used to aggregate the monthly data only (paper based aggregation is done for the weekly reports, if done at all!). Additionally, some programmes that have access to computers use basic computer systems such as Microsoft Excel and Microsoft Word to aggregate and compile a district report.

The programme district reports are then submitted to the next level of the administrative hierarchy, which is usually the national level, particularly, the responsible unit for the

programme at the Ministry of Health. However, some programmes namely EPI and PMTCT submit to the regional EPI office and to UNICEF respectively. Furthermore, the VCT programme coordinator submits reports to Management Sciences for Health and is also required to submit to the National Aids Commission (NAC) in addition to the HIV/AIDS unit in the Ministry of Health.

The emerging flow of information in the system is then as shown in figure 5.1 below where there are programme-specific reporting systems running parallel to the HMIS. This is in opposition to what was intended by the Ministry of Health to have the information flow where there is one point of transmission of data from one level to the next as depicted in Figure 2.8 in chapter 2.
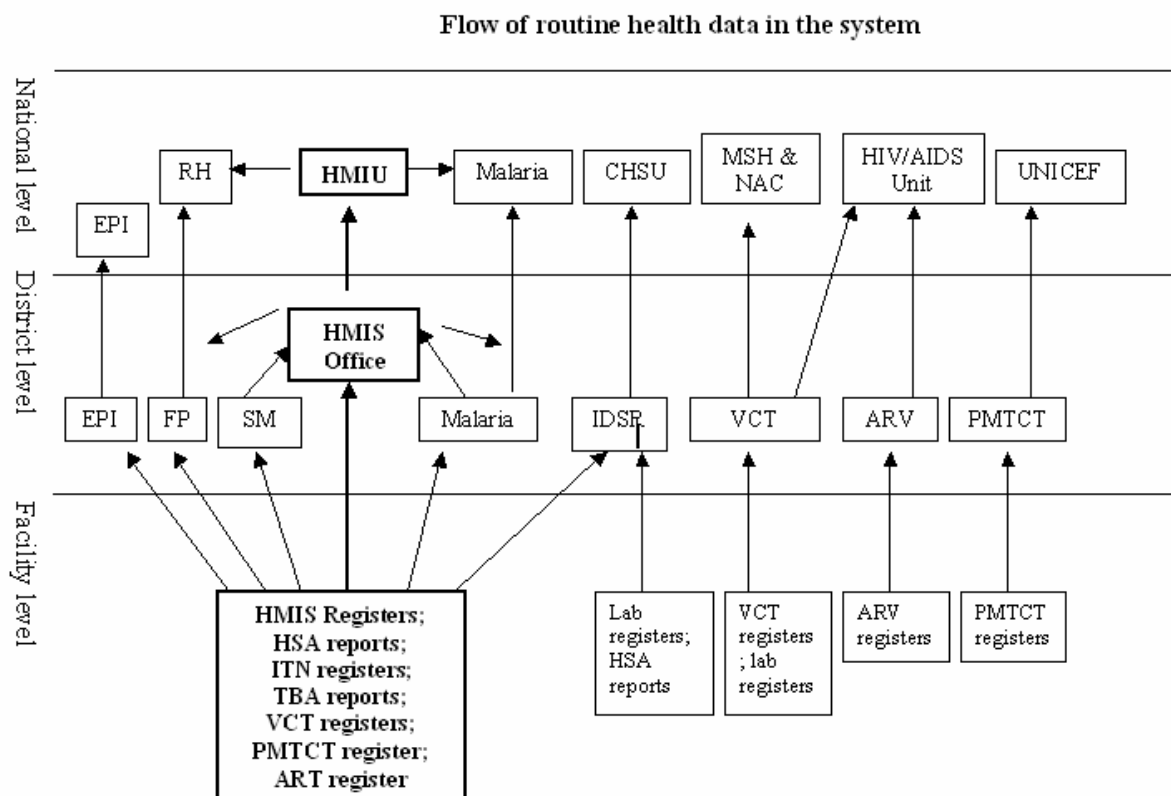
Figure 5.1:Flow of routine Health data

5.1.4 Data Analysis at district level

According to the literature, data analysis is expected to at least involve the calculation of indicators and there are different types of indicators. The Assistant statistician mainly did

this type of analysis where the HMIS data was used to calculate HMIS indicators that were presented in tables and graphs.

Other programmes such as EPI also calculated indicators such as coverage, wastage rate and drop out rates, and this was part of the data/information on the programme reporting form (*See appendix D.4*). The existence of these indicators on the forms made it possible for the programme coordinators to assess the performance of the programmes by comparing the calculated indicators on the form to national and international (WHO) programme targets. One EPI coordinator explained as below:

> "By looking at the coverage rates and dropout rates on the reports, we can compare with the WHO standards and this tells our performance..."

Some programme coordinators produced tables and graphs of the data for instance showing disease prevalence and trends, timeliness and completeness. Some of the programmes produced graphs and tables as part of quarterly or annual reports they were required to produce and submit to the national level.

Additionally, the graphical and tabular analysis of data by some coordinators also seemed to be stimulated when there was need to make presentations and produce reports on the programme performance for meetings, workshops or sometimes training sessions. Thus if there was none of these activities going on, it was not likely that there would be such data analysis where graphs are produced. For instance one coordinator explained:

> "I prepare graphs, for instance I am currently preparing graphs to present at the DIP/HMIS review meeting to be held this month."

When asked if he prepared any graphs for his own use, he replied:

> "Yes, I also prepare graphs for my own use but I haven't done that in a long time because I haven't had stationary."

Another coordinator also explained:

> "I don't produce graphs; it is the statistician who produces graphs…
>
> The graphs are mostly used for HMIS review meetings…."

When asked about the national level meetings, the coordinator explained:

> "The graphs are used during national level meetings where the data for all districts is reviewed….
> I ask the statistician to produce graphs for me for the meeting… I give him my programme data
> to use for making the graphs."

However, it appeared that calculation of indicators and drawing graphs was not what data analysis was all about to programme coordinators. Analysis was also considered to be done by assessing the quality of the data by checking the timeliness and the completeness of the reports submitted from the facilities. Furthermore, many coordinators considered that they analysed the data by merely looking at the data on the reporting forms and based on previous knowledge about that facility this provides a view of the performance of the facilities in that programme. This can be seen in one coordinator description of a certain facility:

> "[Facility Name] is the worst performing facility and I know this because when the reports come
> from this facility, the figures fluctuate a lot so it seems they are just guessing the figures, and they
> usually report late."

Another coordinator explained:

> "For example when I get the reports, I check how many EmOCs and deaths they had, how many
> patients were referred from this facility and if they have many cases it shows that they are not
> able to perform certain functions/service properly so it means they have problems and maybe
> need training."

Thus, this type of analysis was done by the coordinators when they received the report but also during data aggregation where they also checked for inconsistencies and possible errors. The Assistant Statistician also did a similar kind of analysis of the facility reports during data entry into the software system.

Regardless of the type of analysis performed, the analysis of data was strongly connected to the use of information, which is discussed in more detail in the following sections.

5.1.5 Data/ Information use at district level

The notion of information use does not have one clear universal understanding but the literature suggests various ways in which use of information can be demonstrable.

In trying to find out how the reported HMIS and programme data/information was used at the district level, the study investigated on the responsibilities, duties and tasks of the programme coordinators and some members of the district health management team. These responsibilities, duties and tasks are described in the following sections of 5.2 and 5.3.

5.2 PROGRAMME COORDINATORS DUTIES AND TASKS

This section describes the duties and tasks of the programme coordinators and Data Flow Diagrams (DFD) have been used to show the data/information inputs and outputs for each of the tasks. Their duties identified as coordinators were planning, supervision, ordering supplies, data management, conducting training, and conducting and/or attending meetings. However, the task of data management involves data aggregation, reporting and analysis, which have already been presented, in sections above and thus is not the main focus in this section.

5.2.1 Programme Supervision

The programme coordinators are required to supervise facilities and staff providing services and performing other duties related to the programme and this supervision involves visiting the facilities.

The supervision is supposed to be done either on a monthly or quarterly basis depending on the programmes.

During the visit, for some programmes, a supervision checklist is used to guide the areas for supervision and the issues covered include, for instance, on case definitions and management procedures, availability of supplies and data reporting.

As one of the areas of supervision is on data management, the compiled monthly data at the facility is referred to by most coordinators during supervision either to supervise data collection at the facility, or to verify and investigate further on data reported or to assess the performance of the facility in that programme.

The reports guide the coordinators in identifying problematic areas and these are further investigated during supervision. One coordinator explained that

> "By looking at the reports, I can see which facilities are having problems in terms of submitting on time and filling the reports (i.e. have gaps) and so I take note of these facilities and when I go for supervision I investigate the reason for this."

Another coordinator also explained that during supervision, she concentrates mostly on areas where she identified problems because the time is limited and does not allow for a thorough supervision to cover all important areas. Therefore, this shows that the data from the reports helps the coordinators to determine performance of a particular facility and this guides how the supervision is done. Another coordinator particularly referred to this kind of use of the reports as for "*desk supervision*".

Most programme coordinators are required to monitor the performance of the facility by referring to the data they collect. For instance, EPI supervision checklist requires that they compare the number of vials used against the number of children vaccinated, which is obtained from the routine data.

During the supervision, the coordinators discuss with the facility staff on their findings to get explanations for some observed situations and to provide feedback. Additionally they provide on-job training where necessary.

Thus, the actions taken as a result of supervision include on-job training or just giving feedback. In some cases, the required action may be a formal training or a workshop, which has to be planned.
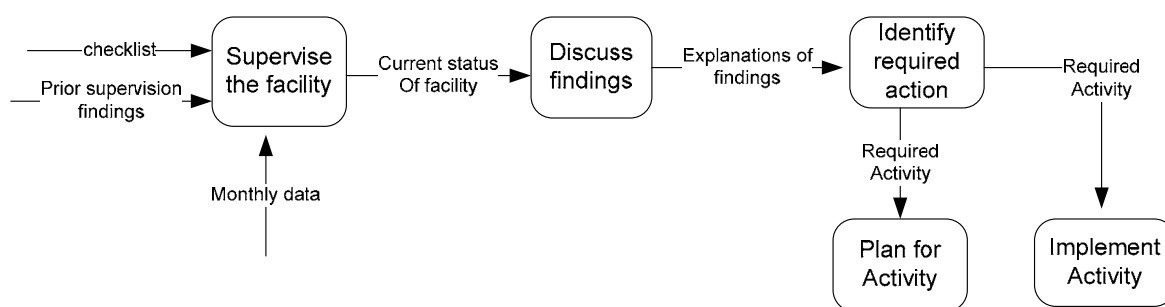
Figure 5.2:Programme Supervision Data Flow Diagram

5.2.2 Conducting Training

As programme coordinators, they are required to ensure that staff working in the programme has the necessary knowledge and skills. Thus, they are responsible for conducting training of staff. As mentioned in the previous section, some of the training is done in form of on-job training during facility supervision but sometimes it is done more formally i.e. through classroom training or a workshop.

Thus some of the training is based on problems identified e.g. through supervision or the facility reports submitted. For instance, One EPI coordinator explained:

> "By looking at the coverage rates and drop-out rates on the reports, we can compare with the WHO standards and this tells us the performance. If they are below the WHO standards then there is a problem and we may have to conduct a RED training."

Some of the formal training is also done as a routine i.e. on routine basis for instance the Malaria programme was required to conduct malaria case management training annually for new recruits but also to update on new treatments.

To actually conduct the training, the coordinator first has to write and submit a proposal to the District Health Management Team (DHMT) when he/she wants to conduct the training and if approved the training would be conducted.

The coordinator is usually one of the facilitators of the training and is therefore required to make presentations. The presentations made during the trainings are prepared using the programme's national guidelines and manuals for the programme and sometimes this includes presentation of the programme data.

Some of the coordinators produce a report after the training that is submitted to (some of) the DHMT members and to the Ministry and other stakeholders involved.
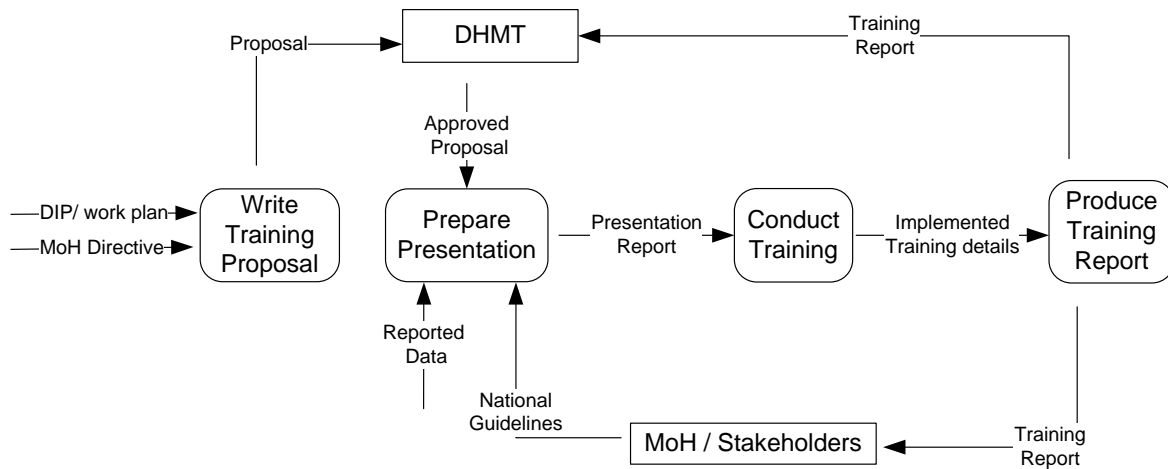
Figure 5.3:Training Data Flow Diagram

5.2.3 Conducting Meetings and Attending Meetings

District level meetings

Some programmes, such as IDSR and VCT, are required to hold quarterly district level meetings. For the IDSR, they conduct disease surveillance meetings and usually, the focus on few selected diseases which they monitor especially cholera. The participants include district health management, other related-programme coordinators, facility staff and stakeholders. For the VCT meetings participants are counsellors working in the facilities district wide.

The procedure for conducting these meetings is similar to that for conducting training whereby the coordinator is required to submit a proposal to DHMT and the meeting only occurs upon approval.

During the meetings, presentations are made which include presentation of the programme data. Discussions are also held on various issues such as the problems facilities are facing and solutions or suggestions are made on how to progress.

A meeting report is produced afterwards which is submitted to the DHMT and also the national level but also other stakeholders who may have provided financial support for the meeting.
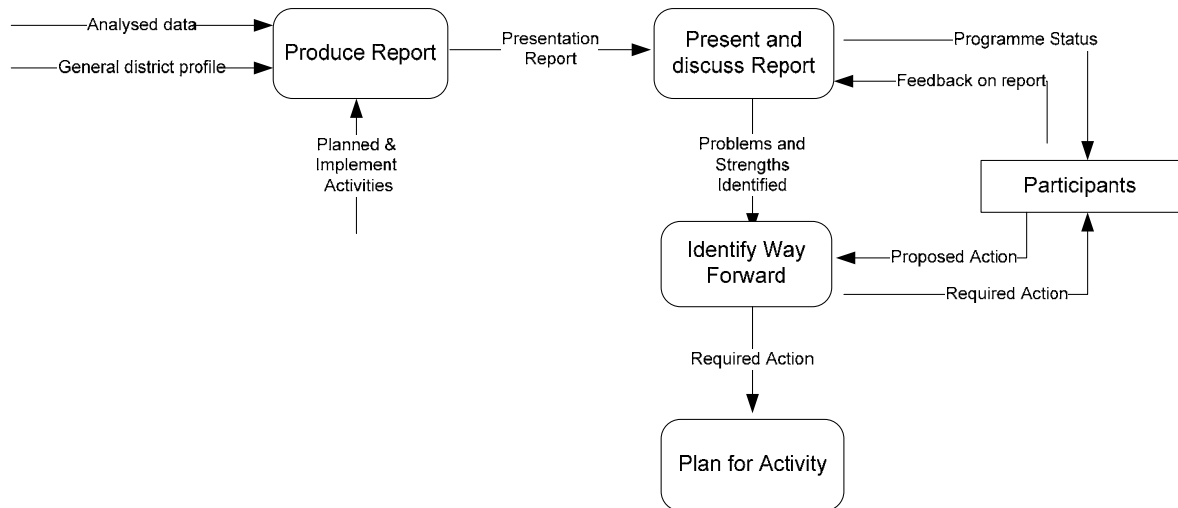
Figure 5.4:Data Flow Diagram for Meetings

There are several types of meetings that the coordinators attend and these are:

1. Programme specific regional or national level meetings.

2. DIP and HMIS review meetings. There are quarterly and annual DIP review meetings and HMIS review meetings. In Chikwawa district, the DIP review and HMIS review are jointly conducted thus they have DIP/HMIS review meetings while in the other district, Chiradzulu, these reviews are done separately i.e. they have separate meetings for each. In all cases, these meetings are organised by the Assistant Statistician who is also assigned the duties as DIP coordinator. The programme coordinators are part of the attendants but also the DHMT members, stakeholders and facility in-charges. These meetings are supposed to happen on a routine basis i.e. either quarterly and annually but their actual implementation significantly depends on availability of financial resources.

Programme-specific national or regional meetings

For some of the programmes they do not have programme-specific district level meetings but rather regional or national level review meetings and these occur either quarterly or annually.

Thus, the coordinators attend such meetings and are required to report on the programme performance for their districts and therefore their reports include presentation of the data for the period under review.

DIP/HMIS review meetings

For the DIP/HMIS review meetings, the coordinators are required to present on their programme performance and so their reports may include presentation of planned and implemented activities and the performance according to the reported data. This data is obtained from their programme reports but also from HMIS reports since the programme data may not include data for the specific HMIS indicators for instance the EPI programme uses data from HMIS because one of the important HMIS indicators is "*Percentage of fully immunised children under 1*" which is calculated from the data element "*Number of fully immunised children*" collected on the HMIS reporting form and not their programme reports.

However, the coordinators prefer to use their own programme data for the presentations wherever possible because they feel that there is under reporting in the HMIS data and the HMIS data is incomplete as seen in the following statements from two coordinators:

> "From our data we can see that we are performing very well i.e. the coverage is high but when you look at the HMIS data the figures are very low."

> "The HMIS data is only from activities that occur at the facility and does not include data from the community e.g. from during outreach clinic or campaigns while the data we have includes that from campaigns as well."

HMIS Review Meetings

The programme coordinators attend the HMIS review meetings which are held separate from DIP review meetings but do not make presentations on their programmes; it is the

Assistant Statistician who presents the HMIS data and indicators and then discussions are conducted based on the presented data.

These meetings serve many purposes including: as a means of providing feedback on the reported data but also, sharing the data to create awareness of the performance of the district and facilities for the services provided. Additionally the HMIS is able to verify the data for instance, one coordinator explained that:

> "At one time, a certain facility reported on the HMIS form that it had zero cases of Malaria and I knew that it could not be true so when I asked the facility they gave me a figure."

DIP Meetings

The coordinators also attend DIP review meetings and during these meetings, they present on the programmes and these presentations mainly consist of the activities that were planned for, those that were implemented and those that were not, the challenges and problems faced and the way forward.

5.2.4 Ordering and Distribution of Drugs and Medical Supplies

In general, the pharmacy at the district hospital is responsible for ordering supplies drugs and medical supplies for the hospital and the health facilities. The facilities submit reports monthly to the pharmacy with data on the stock on hand and quantity used in that month. The pharmacy uses this data to estimate the required quantity to be ordered from the Central Medical Stores for the whole district. The Medical Stores distributes the supplies directly to the facilities and the pharmacy receives supplies for the district hospital, for sub-health centre facilities and some private facilities.

Most of the coordinators are only responsible for ordering supplies from the pharmacy for use at the district hospital or for distributing to health facilities that have ran out of stock.

However, for some programmes particularly EPI and PMTCT, the coordinators order supplies from the regional office monthly and from UNICEF quarterly respectively and later distribute these supplies to the health centres.

For EPI, calculation of the amounts required is based on the estimated annual target population figure from the National Statistical Office. The amount distributed to the facilities is based on the facility catchment population figure that is provided by the facility and this is from head counts in the catchment area.

For PMTCT, the required amount of supplies is calculated from the programme data collected and reported by the facilities; therefore, the programme data is used for ordering and distributing supplies.

Additionally, for the IDSR programme, their data is used to estimate required resources in case of an outbreak especially cholera outbreak. For instance, the previous year's cholera attack rate is used to estimate the supplies required for preparedness of cholera outbreaks. The required supplies may be included in the district's budgetary plan (i.e. the DIP) or may be sourced from stakeholders such as the ministry or other stakeholders (such as the District Assembly and NGOs).
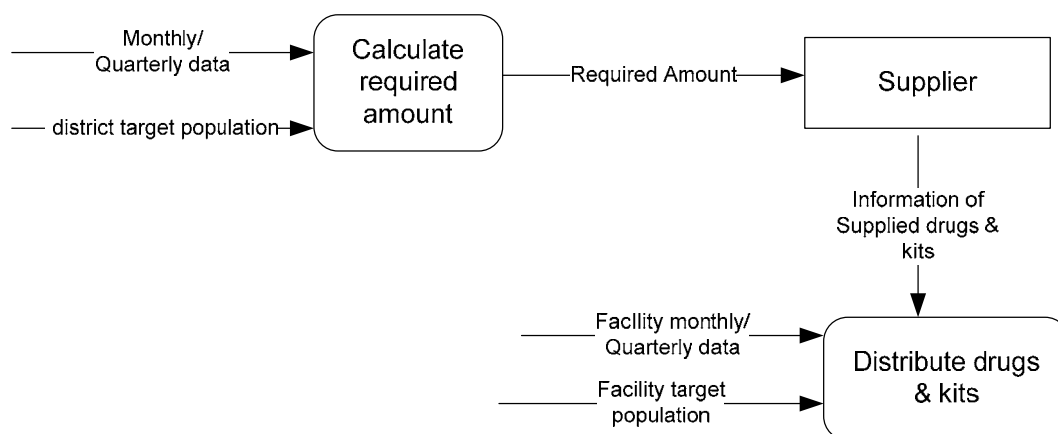
Figure 5.5: Data Flow Diagram for Ordering Supplies for Programmes

5.2.5 Planing for the Programme

All coordinators are involved in planning for activities for their programmes especially activities to be included in the District Implementation Plan (DIP).

The planning process, particularly, the identification of activities to be included, is based on information and knowledge obtained from various sources.

Some of the activities planned for are routine such as supervision, some trainings, meetings, and stationary. Additionally, some activities included in the DIP are as a result of directives or recommendations from the national level programme management.

Furthermore, some of the activities included in the DIP, such as trainings or campaigns are based on problems identified to exist from the programme reports, supervision, meeting discussions, as already explained in the above sections.

The preceding- or rather- "the current-ending" year's DIP also plays an important role in identifying activities to be included in the following year's DIP. The coordinators use this as a baseline as "*some of the activities that failed to be implemented in that year are carried forward to the next DIP*" (research interviewee).
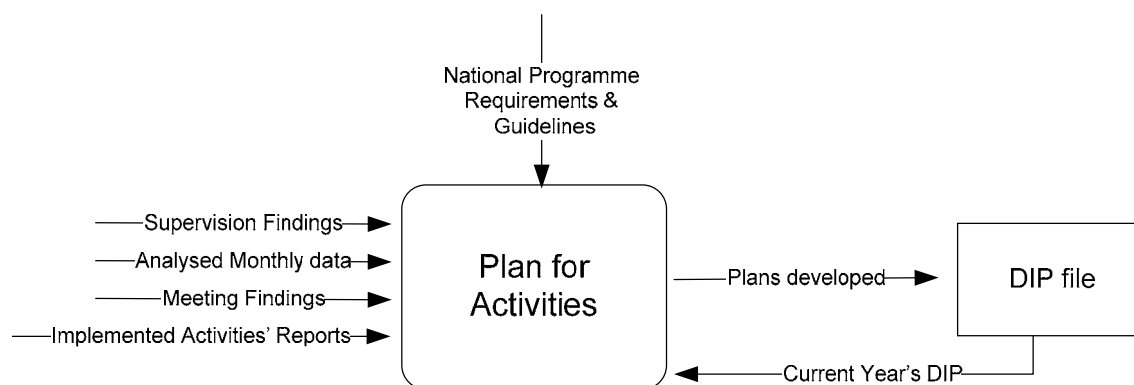
Figure 5.6:Planning Data Flow Diagram

In addition to identifying the activities to be planned for, the programme data shows the health status and thus is used to assist in identifying areas that need more interventions. For instance, the World Aids Day commemoration is one of the routine activities that is planned for in the DIP. However, the selection of the place to conduct the function is based on the HIV Prevalence from the data i.e. the area with the highest HIV Prevalence in the district is selected for the function.

5.2.6 Programme administration at district hospital

The programme coordinators are stationed at the district hospital and thus some of them are in charge of the service delivery for their programmes at the district hospital. This essentially involves the administrative tasks such as ordering resources from the

pharmacy (as stated in section 5.2.4), supervising subordinates at the hospital, and organising programme service delivery.

Some of the supervision of the subordinates also involves use of the data such as that in registers, for instance, one coordinator referred to the registers and patient forms to check if the patients were managed according to the required procedures.

The programme coordinators are responsible for ensuring that the services are organised in a way that meets the clients'/patients need. One coordinator gave an example of how data was used to modify service delivery in the Family Planning programme:

> "The reports show how the programme is performing, for example it was noted that there are low figures in Norplant clients and that most women were going to BLM [a private clinic] and we discovered that it was because when women came to get that service at the hospital, they were always told to come another day because no one was available to provide that service. So we decided to commit one day of the week for which someone is made available to provide this service at the hospital."

The ARV programme also explained that they hold programme team meetings on a monthly basis. During these meetings, they compile and try to "*balance the data*" and in so doing, they assess their performance for instance, to see how patients are responding to certain type of treatment, and the outcome of follow-ups done. From this they are able to adjust how patients are treated as well as how often follow-ups are done.

5.2.7 Other non-programme coordinator duties

The health officials working as programme coordinators performing the above-mentioned duties are primarily clinicians, midwives, nurses, and environmental health officers and therefore some are also involved in providing services i.e. actual interaction with patients and clients at the district hospital. Some of these services are directly related to their programme while others are out side the programmes in which they are in charge of.

This affected how they performed their programme-coordinator duties, particularly, with the general severe shortage of staff in the public health sector, the available personnel is required to see a large number of clients. Thus for the programme coordinators who also

provided services, this essentially meant that less time for performing other managerial work. One task that suffered from this situation was facility supervision. It was constantly explained that supervision of health facilities was not done as regularly as they were supposed to because they were busy with other duties such as seeing patients or clients at the hospital.

5.3 DISTRICT HEALTH MANAGEMENT TEAM (DHMT)

This section presents the responsibilities, duties and tasks of some of the DHMT members and the information inputs for these tasks. The DHMT comprises of the District Health Officer (DHO), District Nursing Officer (DNO), District Environmental Health Officer (DEHO), Administrator and the Accountant. However, this study focused more on the tasks and data/information use of mainly the DHO, DNO and DEHO.

The District Health Officer is the head of the team and is in charge of all health related activities in the whole district, the District Nursing Officer is responsible for activities in the area of nursing district wide and the District Environmental Health Officer is responsible for all preventive health care activities in the district. Thus, their duties include supervision, mobilising and allocating resources (including human resource), organising service delivery, disease control, attending meetings, and producing reports for national level. They are also involved in research surveys in their areas of interest e.g. the DNO was involved on survey on Infection Prevention and Reproductive Health and the DEHO was involved in research on water monitoring. Additionally, the DHO and DNO perform health care provision to patients and clients.

Planning and allocation of resource is mostly done during meetings such as the DIP meeting and monthly DHMT financial meetings where they decide which activities to implement for the month based on the DIP and the funding provided.

Supervision of facilities is done monthly, during which each officer supervises their relevant area. The members use the data at the facilities during supervision. For instance, during a facility supervision, it was discovered that at the facility, one day of the week they did not provide OPD services because the person responsible went to outreach

clinics so the DHMT was trying to find out the average number of OPD patients per day to figure out how to organise the staff so that OPD services are still provided on this day. Thus, they tried to use the data to estimate the workload at the facility to help in deciding what action to take. Unfortunately, the facility members felt they saw more patients than what was recorded in the registers because there was no proper recording in registers and so the DHMT could not base their decision on that data. In addition, the data was also used during the supervision to assess the quality of care provided at the facility for instance; the DNO used the labour chart to check how patients were managed.

As indicated earlier, the DHMT members are also required to attend meetings at national level. For some of these meetings they are required to present performance of the district in a particular area of focus and hence they require health data. Additionally, the members are also required at times to produce reports to submit to the national level, which also require health data. In these cases, the data is obtained from the HMIS Statistician. However, at times, the statistician may not have the particular data/information they require and so the data may be obtained from the specific programme coordinator.

Therefore, to summarise, DHMT members obtain data and information required for carrying out their duties from several sources. The members obtain routine health information mostly from HMIS and sometimes from the programme coordinators when it cannot be obtained from HMIS. For instance, the DEHO also obtains data from IDSR and Health Surveillance Assistants' reports. Other data is obtained from other systems such as the Integrated Financial Management Information System (IFMIS) for financial information and the Logistic Management Information System (LMIS) for information on drugs and medical supplies. Additionally, the members received important information during activities of supervision and meetings.

6. Analysis and Discussion

In this chapter, I analyse the empirical findings presented in chapter 5 based on the conceptual framework I developed from review of various literature as presented in chapter 3. Firstly, I analyse and discuss the managerial roles and functions performed by the programme coordinators and the district health management team with reference to the management literature, and therefore identify their information needs and how these roles and needs are actually fulfilled. Secondly, I analyse and discuss about the existing Health Information System with reference to what the HIS literature recommends. This includes the important issue of information use and the factors that influence it. Lastly, I summarise the reasons and factors contributing to the observed fragmentation/integration status of the HIS and propose strategies for reducing fragmentation to achieve an improved, more integrated system.

6.1 Health Management

There is no universal definition and understanding of the term "management" as discovered from the literature review, and thus the expectations differ between disciplines as well as sectors. In the context of the health sector, Lippeveld and Sauerborn classify management into three categories namely health system-, health unit- and patient/client- management. The health-system management is also known as strategic management and is considered to occur at higher levels. It is such type of strategic managerial work that various authors (such as Mintzberg, 1975; Management Sciences for Health; and Muquingue et *al*., 2002) describe and analyse.

As district programme coordinators, their primary duties and tasks include planning for the programme, managing programme data, supervising their subordinates and facilities on the programme, conducting trainings, conducting and attending meetings, and ordering supplies for the district which have been described in chapter 5. Using the classification of Lippeveld and Sauerborn of management, these duties and tasks fall under system management functions aimed at supporting the delivery of their programme services in the entire district. Thus, in this thesis, I consider the programme coordinators

as essentially district programme managers in their own right but also the District Health Management Team (DHMT) members as district health managers. With this view in mind, I use Mintzberg´s managerial framework to discuss the roles and responsibilities that the programme managers and the district health managers are expected to fulfil and the associated information needs. Furthermore, I discuss how these roles are actually fulfilled by these managers and the actual sources of information that are used to support these duties.

As presented in chapter 3, Mintzberg (1975) argues that the roles of managers can be classified into three related groups, which are interpersonal, informational and decisional roles. The interpersonal roles/relations arise from formal authority given to the managers and through these relations; the managers access various kinds of information leading to their informational roles. In turn, the information enables the managers to make decisions thus performing decisional roles.

6.1.1 Interpersonal roles

As indicated in Mintzberg´s framework presented in chapter 3, a manager has three interpersonal roles namely a figurehead, a leader and a liaison person.

Figurehead

As a figurehead, the manager is expected to perform duties of a ceremonial nature, which may not involve important decision-making but are still important to the smooth functioning of the organisation (Mintzberg, 1975). From the findings on the responsibilities, duties and tasks of the programme coordinators, it appears that this role does not seem applicable to the programme coordinators, as there is hardly any mention of activities of such nature. This is possibly due to the acute/non-routine/public relations nature of the task or little importance/relevance associated with it. This role however would appear to be more suited to the District Health Management Team members as they have higher formal authority as compared to programme coordinators and therefore have responsibilities on all health issues, district wide.

Leader

As a leader, a manager is responsible for the work of his/her subordinates and according to the framework; he/she is therefore required to (among other things):

- Know about the staff,

- Be responsible for training them; and

- Motivate the staff.

In this light, a programme coordinator would therefore require information on the staff in terms of their training and experience background just to determine the staff's knowledge levels, capabilities and skills related to the programme work they have to perform. In turn, this information would inform them on the training needs of the staff and so can organise and conduct the training. Additionally the information about the staff would also serve as input in identifying means to motivate the staff.

The information about the staff is closely related to human resource management and therefore a likely place to obtain it would be from the district human resource office(r). However, the findings indicate that this is not necessarily the case. Instead, the coordinators obtain information and knowledge about their subordinates through interaction with them during activities such as supervision and the meetings. For instance, the study discovered that during supervision some coordinators specifically check on the knowledge and skills' levels of the staff relevant for performing the programme tasks. The coordinators also provide on-job training if required during the supervisions thus the supervision is also a means for them to fulfil their responsibility of training the staff.

The findings also show the role that routine data and information mainly from the programme reports play in the "desk supervision" of subordinates done by the coordinators, which helps in:

- Identifying the staffs skills in programme data management and their general technical skills reflected in the programme's performance; and

- Consequently in identifying, organising and conducting the required training

Thus, through the regular programme-specific reports that are submitted, vertical programme information systems support the information needs of the coordinators in performing their leadership responsibilities to know and train the staff.

Additionally, the coordinators also obtain information from previous training reports which assist them in knowing who has (or has not) already received a certain type of training and therefore who needs to be trained particularly for the routine type of training. The coordinators also determine participants of proposed trainings by contacting their superiors i.e. the district health management team.

Furthermore, as leaders, the programme coordinators are also responsible for motivating the staff and as the literature explains, providing feedback is one mechanism that motivates the staff to perform better (Heywood and Rohde, 2001). The coordinators mainly provide feedback to the staff verbally during the supervisions and meetings such as the district programme specific meetings or DIP/HMIS review meetings described in chapter 5. However, bearing in mind that not many programmes (only 2 of the programmes studied) conduct their own district level programme meetings on a regular basis, supervision and DIP/HMIS review meetings are the main activities through which the coordinators perform/fulfil this particular leadership responsibility of motivating the staff.

Therefore, it is clear that the programme coordinators fulfil their leadership responsibilities through activities such as physical and desk supervision, district programme review meetings; DIP review meetings and HMIS review meetings. However, bearing in mind that the findings indicate that physical supervision by coordinators is not performed as regularly as is supposed to due to e.g. transport problems and workload, the desk supervision through the programme reports becomes the main means for the programme coordinators to know about the staff and organise trainings as this is done on a more stable regular basis. This implies that the vertical programme reporting systems are enabling and supporting the coordinators in fulfilling their leadership role in that aspect.

Additionally, the meetings also play an important role as they provide opportunities for the coordinators to interact and get to know the staff but also to provide feedback. Moreover, as the findings indicate the meetings that are usually conducted on a regular basis are the DIP and/or HMIS review meetings thus the institutionalised planning and review process and the HMIS also enable and support the coordinators' leadership roles.

The district management team members are also required to perform as leaders responsible for the work of their subordinates but at a higher level than programme coordinators. Similar to coordinators, the district health managers fulfil this role through physical supervision and meetings where they get to know about the staff and provide on-job training. Additionally, information about staff is obtained from the human resource officer and from general (written and/or verbal) reports from their subordinates.

Liaison

The programme coordinators are required to perform the role of liaison person, which involves establishing contacts with external stakeholders such as Non-Governmental Organisations (NGOs), as well as other programme coordinators just to ensure that their interests and related activities are aligned district wide. Therefore, this role particularly requires constant dialogue between the related parties to achieve collaboration.

The findings indicated that such dialogue mainly occurred with NGOs through formal and informal meetings. For instance, the ART programme manager in one district indicated close collaboration with its non-governmental stakeholder in implementing activities in the district, for example, there was collaboration in the development of a client form used to collect data required by both parties i.e. the ministry/ programme coordinator and the stakeholder. Such liaison relations and collaborations are particularly important in determining the integration/fragmentation status of the HIS as this case shows how good collaboration prevented fragmentation in the HIS where they could've had two separate data collection forms for each party. Additionally, such liaison contacts are useful and are a basis for mobilising resources, as shall be seen in discussing decisional roles of managers.

However, the findings also indicated that there were some programmes with shared interests for instance in the same diseases and therefore close collaboration between the programme coordinators was required but instead they worked in isolation. The reasons for working in isolation ranged from conflicting personal interests between the coordinators to perceived little importance for collaboration. Thus, there was little liaison and collaboration between programme coordinators.

Nevertheless, the programme managers also performed the role as liaison by being in contact with their superiors at the district i.e. management team members, regional and national levels of the health system. Even though in principle, the District Health Officer is the liaison person between the higher levels and the district level, but in practise, the district programme coordinators also performed this role, and this was mainly because of their duty of reporting data to the higher levels.

6.1.2 Informational roles

According to Mintzberg (1975), the manager's interpersonal roles give rise to three informational roles as monitor, disseminator, and spokesperson and that the liaison contacts build the managers information system. From the discussion in the preceding section it is clear that most contacts the coordinators have are along the programmes´ vertical lines. It would therefore be expected that the coordinators would mainly be informed by their vertically established contacts from the vertical reporting system. However, to be able to conclude if this is really the case, I analyse and discuss their informational roles in the sections below.

Monitor

As a monitor, the manager scans his environment for information through his contacts established as leader and liaison person (Mintzberg, 1975). In the case of the programme coordinators, this monitoring would particularly be aimed at informing them on performance of the programme but also on the external situation i.e. external to the programme. From this study, the programme coordinators were able to monitor the programme performance by obtaining information through the programme reporting

forms and so the vertical reporting systems enabled and supported their performance of this role.

Information on the external situation was obtained from other programmes through mainly DIP/HMIS meetings as already explained and thus the planning process and the HMIS particularly supported the coordinators´ role in this area. Furthermore, information on the external situation (e.g. on other districts' performance) was also obtained from the coordinators' superiors during regional/ national level programme meetings or programme reports.

All information that assisted the coordinators to perform as monitors was provided through a mix of both verbal and written official media and this is in opposition to Mintzberg´s (1975) argument that useful information for managers is mainly obtained through verbal informal form.

The findings also indicate that the district management members performed as monitors observing the performance of the district. This information required was achieved from various sources including from HMIS, mainly during the district review meetings, from programme reports such as IDSR, safe motherhood, individual general reports, survey data and reports from stakeholders such as NGOs and the District Assembly. External information was also obtained from the higher levels of the health system.

Disseminator

The study showed that programme coordinators also functioned as disseminators mainly by disseminating the information about the programme to the higher levels of the programme through the official district programme reports they produced and submitted. Similarly, the coordinator also disseminated information received from the top to his/her subordinates during programme meetings and supervision. Thus, the vertical programme system supported this role.

The district health manager also performed as disseminator by sharing the acquired information from the various sources mentioned in the preceding section to other team members but also their subordinates. The information was also disseminated to the higher levels through reports they produced, usually upon request.

Spokesperson

The expected role of the coordinators as spokesperson is similar to that as disseminator as it also involves sharing of information of the coordinator with his contacts. However, as a spokesperson, this is about sharing information outside his vertical unit (Mintzberg, 1975) i.e. with other programme coordinators or stakeholders. The findings show that coordinators mainly performed this role during DIP/HMIS review meetings where each coordinator presented and communicated information about their programme to their fellow coordinators and stakeholders. Additionally, the programmes that conducted district wide meetings where stakeholders were invited (such as the disease surveillance programme) also performed spokesperson roles through these meetings as they informed their stakeholders about their programmes. Nevertheless, the majority of the programmes did not conduct such district wide meetings thus most of the coordinators performed their role as spokesperson mainly enabled through the DIP/HMIS review meetings. However, as the findings have shown, the information input for these meetings is from both the HMIS and their vertical reporting systems.

The district health managers also performed the role of spokesperson by sharing the acquired information as a monitor to the stakeholders such as the District Assembly and other non-governmental organisations.

6.1.3 Decisional roles

Mintzberg (1975) explains that the information roles of managers are intended to be input to decision-making, and there are four roles associated with decision making which are: entrepreneur, disturbance handler, resource allocator, and negotiator. These roles assume that the formal authority given to the managers enables them to commit the unit to important new courses of action.

Entrepreneur and Disturbance handler

As an entrepreneur, a manager is expected to be more of a voluntary initiator trying to adapt to the changing conditions in the environment and therefore information about the external environment is crucial for this role. On the other hand, as a disturbance handler, the manager is simply responding to pressures, trying to solve problems and so the

manager needs to be informed about the problem areas and find ways of dealing with the problems.

From the research, the findings indicate that the activities the programme coordinators plan and/or implement are mainly aimed at responding to a particular problem identified from the various sources of information (as discussed when looking at their monitoring roles). Moreover, the majority of the new initiatives tend to originate from the national level. Thus, the coordinators can be considered more of disturbance handlers than entrepreneurs. For this reason, their approach of decision making can be perceived to fall under Lasswell´s classical decision-making model presented in section 3.2.2 of chapter 3 which views the decision making process as consisting of sub-processes/stages of problem identification, agenda setting, option appraisal, adoption and legitimisation, implementation, monitoring and evaluation (S*ee figure 3.7 in chapter 3*).

Just like Mintzberg (1975) explains that the information roles inform their decision making roles, it is therefore no surprise that in this case of programme coordinators, the decision making sub-processes of monitoring, evaluation and problem identification are fulfilled as they perform their role as monitor. The previous section 6.1.2 has already shown how the role as monitor is achieved and supported by the vertical programme reporting systems. Therefore, in that sense, the vertical programme reporting systems also supports their performance as disturbance handlers.

The process of agenda setting involves setting priority areas and for the problems identified to be set on the agenda, there is need of some kind of urgency in the problems. As a disturbance handler, the manager is simply responding to pressures thus the issue of urgency is also important for the coordinators in this role. The urgency attached to a problem is determined/influenced by a combination of individual and external factors of which some are shown in figure 3.8 in chapter 3. This implies that there is no guarantee that the problems identified through the data will be acted upon unless they are considered as a priority in the midst of all these factors. For instance, the findings show that the coordinators are more involved in work at the hospital and so this may become their main area of focus or interest. In turn they may give the problems associated with the hospital more priority and it particularly makes it easier for them to handle problems

at the hospital. This therefore implies that the coordinators are more likely to respond to data/information concerning the hospital than to the facilities.

On the external side, factors such as power, political influence, financial constraints as also shown in figure 3.8 may also influence urgency of the problem and thus the agenda. For instance, the ability of the coordinators to also influence the agenda is associated with the extent to which decision-making power has been given to them through decentralisation. Sadly in the Malawian case, the actual decentralisation of decision making power is only a recent phenomenon which has not been fully been implemented nor embraced in the health system and so the tradition (stemming from the previous centralised system) where the national level makes all the big decisions still exists and is evident in the fact that new initiatives are usually initiated from the top. Furthermore, this power factor also influences the observed fact the coordinators performed more as disturbance handlers than entrepreneurs.

Furthermore, as disturbance handlers, the coordinators are required to come up with solutions to the problems and the issues of option appraisal, adoption and legitimisation, implementation are closely related to identifying, adopting and implementing solutions for the problems on the agenda. From this study, these issues are closely related to the manager's roles as resource allocator and negotiator, which are discussed in the next two sections.

Resource Allocator

According to Lasswell´s classical model, there is need to identify and weigh the possible solutions for the problems on the agenda and then select the best option considering the important factors such as finances. The selected solutions then have to be adopted and legitimised and finally implemented. Implementation of the solutions particularly requires that resources such as human, financial and material resources are mobilised and allocated.

The study findings show that in trying to solve the problems identified, the programme coordinators are required to prioritise activities. This is particularly achieved through the planning and budgeting process, which allows the coordinators to adopt and legitimise

their solutions documented in the District Implementation Plan (DIP), the official document for operation for the district. However, there is limited involvement in the allocation of resources for their activities since during actual implementation, the district management team is the main resource allocator because they decide how much each programme receives depending on the amount given from the national level. As a result, this makes the programme coordinators mere recipients of what the management team decides.

In performing the role as resource allocator, the district managers require information about the proposed activities and the available resources including on the finances, human resource, and physical assets. Thus, the managers require information across various dimensions and from various sources. More specifically from the findings, the managers mainly obtained information about the proposed activities from the DIP as well as activity proposals. Information on the finances was obtained from the Integrated Financial Management Information System (IFMIS) where as information on the staff was obtained from the human resource officer (e.g., as staff return). Additionally, information on general administrative issues was sourced from the administrator and information on the drugs and medical supplies was from the Logistics Management Information System.

Some programme coordinators are also involved in allocating resources such as drugs and medical supplies for their programmes and as explained in the chapter 5, estimation of the required resources is based on information about the population as well as information from the programme reports.

Negotiator

As one of the decisional roles, a manager is involved in negotiations. In the health sector, this role is particularly important because there tends to be limited resources such that managers have to negotiate with their private sector- and NGO liaisons in order to lobby and mobilise resources for implementation of some of the activities that cannot be financed by the government budget.

To fulfil this role, it is essential that the managers be in liaison/ close dialogue with their stakeholders. Furthermore, the managers need sound facts or rather well-grounded information to justify their views, choices and need for resources. Thus, the information system plays a crucial role in providing the data they require to support their arguments.

Bearing in mind that the earlier discussion on the programme coordinators roles showed that they performed more as disturbance handlers roles than entrepreneurs, therefore most of the negotiations they were involved in were mainly aimed towards resolving identified problems. These negotiations were particularly fruitful where the coordinators had good communication with their liaison contacts in the system, for instance, one coordinator was able to respond to a problem identified from the programme reports by approaching and requesting for resources from her superior at the district level.

On the other hand, as discovered in section 6.1.1, some programme managers preferred to work in isolation and so even though negotiations between coordinators of related programmes was important to achieve coordination in their activities, this was hardly the case. This was also reflective in their information systems as the findings indicate duplication of information between the parallel reporting forms. The HMIS, however, through its review meeting attempted to facilitate information sharing and consequently collaboration with and among programme coordinators, which is essential in an environment where a Sector Wide Approach has been adopted.

The district health managers also performed as negotiators and this was particularly important for the District Health Officer (DHO), being the person in charge of all health issues in the district. The DHO was required to lobby for- and mobilise resources through negotiations with various stakeholders such as the District Assembly and other NGOs working in the district.

6.1.4 Conclusion on Managerial roles

Mintzberg explains that not all managers give equal attention to each role but differ depending on the type of manager. In the case of programme coordinators, I find that some roles are common as opposed to others and are mainly supported by their vertical programme structures and information systems. Additionally performance of other roles

are supported and fulfilled through integrated HMIS initiatives such as review meetings. Nevertheless, the majority of their managerial roles and responsibilities are met and supported by their programme-specific information. Thus, the programme-specific reporting systems tend to enable and support the programme coordinators in fulfilling their managerial roles.

The difference in attention given to the roles can also be seen between managers of different programmes in the health system for instance, all programme managers performed as monitors but reacted or responded differently to the information obtained thus differing in their decisional roles. Additionally, the findings showed differences within the same programme but different districts in the attention given to certain roles by the managers. For instance, in one of the districts, the programme manager modified the standard reporting form to include data that the coordinator required from the facilities to monitor performance district wide and thus this data was used for monitoring, problem solving (i.e. handling disturbances), plus ordering supplies (resource allocation). On the other hand, the other district's programme manager only obtained data from the standard form for the main purpose of ordering supplies.

Upon analysing the programme managers´ information needs and the content of the HMIS report, it can be concluded that in some cases it may be possible for the HMIS to meet some of the needs of programme managers for instance for monitoring programme performance, especially where there is evidence of data duplication. However, this would imply several changes. More specifically, switching from their vertical reporting systems to the integrated HMIS would require that the coordinators transfer some of the tasks that enable them to perform and fulfil some of their managerial roles. This, in turn, would require that new ways be identified to perform and fulfil those particular roles. For instance, the coordinators are able to fulfil leadership roles through analysis of the programme reports and so shifting to a system where the reports are not submitted to the coordinator implies that the coordinators have to find new (or use the other existing) means for fulfilling this role. This also implies changing, for instance, their interpersonal relations, as they would have to develop new liaison contacts with the Assistant Statistician who is in charge of HMIS to provide them with information for monitoring; and extra effort would have to be made to get this information as opposed to their own

readily available reports. Furthermore establishing close liaison with the Statistician could be a challenge because some programme managers seemed to prefer to work in isolation.

Additionally, not only would their tasks be different but also the coordinators responsibilities would have to be redefined. For instance, in their vertical systems, they are responsible for programme data management including training the staff in that area but with the HMIS in place, the Assistant Statistician also has a similar responsibility. Thus, there is duplication in some duties and so the coordinators´ duties would have to be redefined to eliminate such duplication.

On the other hand, in some other cases, for the HMIS to meet the information needs of the programme managers, changes on the HMIS side would also have to be made such as incorporating more data as shall be seen from the discussion in section 6.2.

The responsibilities of the district health managers are at a higher level than those of the programme coordinators and thus their roles are broader. The mangers therefore require a wider range of information including health data, financial information, drugs and medical supplies, and status of physical assets in order to get a complete overall picture of the district's performance. The required information was gained from a mix of verbal and written communication, however the primary sources of the written information included the HMIS reports, the programme reports, general reports from staff, survey data, reports from stakeholders, the DIP, activity proposals and reports, the Integrated Financial Management Information System, the Logistics Management Information System, staff returns from the human resource officer, and general administrative reports from the administrator but also from heads of sections.

6.2 Evaluation of the Health Information System

6.2.1 The design and development process

As discovered from the background of the HIS in Malawi, before the implementation of the integrated HMIS in 2002, the existing HIS had been unable to provide information in

a timely and useful manner which resulted in parallel reporting systems, primarily along vertical programme lines. Therefore, the development of the HMIS was a direct effort to eliminate the fragmentation that existed because of the vertical parallel reporting. More specifically, the HMIS aims to provide programme managers and staff with reports on how well each programme is functioning and to alert the service providers and programme managers to take timely necessary actions (Malawi, Ministry of Health and Population 2003).

To ensure that the system would indeed deliver the information needs of all potential users, the design and development process involved the development of standards such as the minimum indicators and the related data sets, and according to the Ministry of Health (2003), and these were developed through consensus with various stakeholders. Once a consensus on the indicators was reached, there was a revision of the tools for data collection, processing and reporting. Thus, this shows that the development process of the Malawian health information system is an example of a case where the recommended strategy proposed by the literature for developing an integrated health information system was actually applied. More specifically, authors such as Heywood & Rohde (2001), Bodart & Shrestha (2000), and Shaw 2005, and advocate for an IS development approach where standards are developed in form of minimum/essential indicators and essential data set. As mentioned in section 3.3.2 of chapter 3, this approach was applied in South Africa and was considered a success in overcoming problems of duplication in the data collected, inconsistency in the data definitions, irrelevance of the data, and also incapability of the information system to meet new needs arising in due time which are commonly observed in HIS of developing countries. Therefore, it would be logical to expect that the adoption of a similar approach for the HIS in Malawi would also overcome similar problems in the Malawian health system. However, this is not necessarily the case as discovered from the detailed analysis of the system in the other sections (6.2.2. to 6.2.5.).

One difference with the South African case worth noting is that in South Africa; the process was in a bottom-up manner while in the Malawian case a top-down approach was used where the national level was the key actor in the standardisation process.

6.2.2 The fragmentation/Integration Status at data collection stage

From such a development strategy of the HMIS in Malawi, it is no surprise that the research findings show that the majority of the tools used for data collection at the point of service delivery are the HMIS tools that were developed from the standardisation process. Thus at the facility data collection level, it can be considered that the HIS has been integrated to some extent as the main primary tools used are the standardised HMIS tools as presented in table 5.2 of chapter 5.

However, the findings also show that some programmes have their own data collection tools such as the PMTCT and ARV programmes of which some are official and others are not. This is the case because of two main reasons:

1. The introduction of the programmes after the design and implementation of the HMIS data collection tools;

2. The nature and the organisation of the programme services require separate programme-specific tools.

This implies that even though an integration approach/strategy was adopted and used in the design and implementation of the health information systems, fragmentation had crept back in the system because the HMIS had been unable to respond to and incorporate (in good time) new information needs arising over time due to changing health needs and health services. This implies that the system had not been flexible enough to meet new information demands arising with time as is expected from such a system (at least according to the indicated advantages of the design system approach in the South African context).

This inflexibility was particularly in the inability to modify the HMIS data collection tools to incorporate the new programmes´ information needs. This can be attributed to the centralised process that has been put in place for the modification of the tools, i.e. revision of data definitions, minimum indicators and dataset, the corresponding data collection tools and data processing is under the custody of the Health Management Information Technical Committee and approval of these revisions has to be done by the established committee on Health Information Policy. This is done in order to ensure that

national standards are maintained and to prevent a case where data is just collected with no clear purpose. Thus, this shows that there has to be a trade off between maintaining standards and enabling flexibility for the sake of being responsive to arising information needs.

On the other hand, as the HIS literature mentions, complete integration is impossible due to the differences in the nature and management of diseases as well as services. Chilundo (2004) particularly emphasises that it is important to respect the differences that exist between vertical programmes as they are influenced by characteristics of the diseases and the treatment specifities, among other factors. Thus, it is justifiable that programmes like VCT, ART had their own data collection tools particularly the registers because the nature and management of the disease or service programmes require that their services be provided separately and in such cases, the required data for the programmes cannot be integrated into the existing tools but rather require their own tools. However, it is essential that these tools are developed with the involvement and final approval of the authorities assigned such duties in the national HIS Policy i.e. the Health Management Information Technical Committee and the Committee on Health Information Policy, to ensure minimal data duplication. Furthermore, these tools should then be officially added to the family of HMIS tools. Nevertheless, it is also important to acknowledge that, as Kanyimbo (2006) discovered, in a scenario where a paper-based system is used duplication of certain types of data is difficult to avoid.

6.2.3 The fragmentation/integration status of data reporting- the information flow

From the findings of the data reporting/transmission pattern in the health system of Malawi presented in chapter 5, it is clear that even though an integrated strategic approach has been adopted for the design of the HIS, there are still programme reporting systems running in parallel to the "integrated" HMIS as shown in figure 5.1 of chapter 5. Thus, the net result is a fragmented information system and just like it has been discovered in other countries, this fragmented structure/system is characterised with data overlap and data duplication between the programme reporting forms and the routine HMIS reporting form but also between the parallel programmes themselves. Hence, the

current flow of information in the system is not only in opposition to what was planned for by the ministry as depicted in figure 2.8 of chapter 2; but it is also in contrast to what the literature recommends for a HIS based on principles of integration as shown in figure 3.11 in the chapter 3. The literature particularly proposes a flow where there is only one central point for compiling, storing and disseminating information at each level of the health system. More specifically the case in Malawi is that an institutional set-up supporting centralised data management at each level has been established where there is the Assistant Statistician in charge of the DHIS at the district level and at the national level, there is the Health Management Information Unit. However, simultaneously to this, other points of data management also exist for the specific programmes resulting in the structure of the information flow as depicted in figure 5.1 of chapter 5.

As indicated in the findings, this fragmented information flow is attributed to:

1. The inefficiency of the HMIS to provide programme data in a timely manner i.e. on a monthly basis.

   As discussed in section 6.1, the research findings show that the programme reporting systems enabled the coordinators to supervise and monitor the programme on a monthly basis and thus keeping them informed and up-to-date on their programmes especially as other means of doing this such as HMIS, physical supervision or meetings was not done on similar regular basis as the programme reporting. This advantage of the programme reporting systems is also recognised by others as Chaulagai et *al*. (2005) explain that the advantage of having the programme coordinators receive the reports is that they are informed about the facility performance as soon as the reports arrive.

2. The inability for the HMIS to capture all the data elements required by the programmes. This is related to the issue of relevance of the data collected to the stakeholders. As the findings indicated in chapter 5, the data reported by the programmes and HMIS differed in their format i.e. the HMIS data was either an aggregated form or just a subset of the programme data while the programme coordinators required detailed data on various areas to be able to determine the problem areas and take necessary action.

However, additionally one of the reasons for the need for the programme detailed data on all issues is similar to what Kanyimbo (2006) discovered- to satisfy information needs of programme managers at the national level. Kanyimbo (2006:34) clearly explains:

> "Some health workers and planners consider HMIS data insufficient. Some times the section heads and line managers at district level are required to make reports or provide data which is not part of the HMIS data 'by some bosses at the top'. In order to prepare for such instances, the district line managers and section heads collect this data in advance".

3. Just for record keeping as was also discovered by Kanyimbo (2006:34) "*Duplication of data elements between the HMIS tools and other tools mostly occur because many section heads 'just want to keep' data on the services they provide*". Therefore, it is clear that some collection of data by programmes i.e. parallel reporting systems was simply a continuation of the old system and was unjustifiable.

Reason1 given above implies that the quarterly reporting frequency chosen for the HMIS was not appropriate for meeting the requirements of programme managers thus the choice to have quarterly reporting defeated the purpose of the HMIS to provide timely information to the programme managers, resulting in parallel reporting systems.

Reason 2 implies that the HMIS indicators and data elements for the reporting form which were believed to be comprehensive and sufficient to cater for the information needs of all stakeholders including the managers for specific programmes were not sufficient i.e. they were incomplete and were not inclusive of all relevant data for the managers. This insufficiency can be attributed to the fact that during the development process, the information requirements of the programme managers were considered unjustifiable as Chaulagai et *al*. (2005:4) state ""*despite the fact that no programme was making adequate use of available information, each wanted to include all possible pieces of information in the routine data collection system*". However, I find that because of the decision to exclude some data expressed as required by the programmes, this has contributed to existence of parallel reporting systems to meet those needs, as was the case before the introduction of the HMIS in 2002.

Therefore, the choices on the reporting frequency and the data content of the reports can be seen to have defeated the stated objective of the HMIS of providing relevant, adequate and timely data to the programme coordinators resulting in parallel reporting systems. Furthermore, these choices can also be considered to support the dominating general attitude among health workers, as discovered by Chaulagai et *al*. (2005), that the ultimate aim of the HMIS is for submission of statistical reports to the higher level. Of course, this attitude also exists even in programme reporting systems and was justifiable, as it has been explained above that some collection of data was to meet information requirements of "bosses at the top".

Additionally, I perceived some fragmentation to exist in some cases because of lack of coordinators´ awareness that their parallel reporting systems had been abolished. This can be seen from the fact that for the same programme, in one of the districts the parallel programme reporting was operational while in the other district it was not as the coordinator explained that they had stopped since HMIS started.

Nonetheless, from studying the programme managers duties, information use and information needs, it appears that the reasons for the data elements in the HMIS reporting form being irrelevant and inadequate are two-fold because of the relationship between the information systems and the programme managers´ responsibilities. This relationship is interactive where each influences the other, that is, the programme manager's responsibilities determine the information needs and thus the information system (e.g. indicators and datasets as discussed in earlier in this section) but also the information system influences the managers' duties and responsibilities. For example, the managers were required to perform data management duties including training the staff in that area because they had specific programme reporting systems hence making their tasks and information needs centred on the vertical programme. This implies that attempting to have the HMIS support such programme information needs is unnecessary as this duty would be fulfilled by the Assistant Statistician and instead what would be required is that their programme managerial duties and tasks are redefined to suit the integrated system.

6.2.4 Data Analysis

According to the literature, particularly in the information cycle as presented by Heywood and Rohde (2001), data analysis is perceived to be mainly about calculation of indicators. The findings show that such analysis was mainly done by the Assistant Statistician who calculated indicators and produced graphs as mentioned in chapter 5.

However, the research findings indicate that in practise, the concept of data analysis is perceived differently especially by coordinators. Of course, calculation of indicators and presenting data in tabular/ graphical forms was among the ways to analyse the data. Nevertheless, additionally, data analysis was perceived to be performed as they assessed the quality of the data by checking the timeliness and the completeness of the reports submitted from the facilities. Heywood and Rohde (2001) consider such quality checking activities as simply mere data processing.

Furthermore, as the findings indicated, many coordinators considered that they analysed the data by merely looking at the data on the reporting forms and based on previous knowledge about that facility (gained from previous reports and supervision) this provided a picture of the performance of the facilities in that programme. Moreover, other programmes such as EPI compared the indicators on the programme reports to the WHO standards to assess a facilities performance. However, using Heywood and Rohde´s (2001) information cycle, such kind of analysis was rather considered to be part of the interpretation stage whereby comparisons are made to norms/targets, to other facilities, comparison over time.

Therefore, these findings show that unlike other studies that have indicated no or minimal evidence of data analysis in health systems of developing countries particularly at district levels (Mukama, 2003), in the Malawian context, analysis of data actually occurs through calculation of indicators.

Additionally, the study findings shows that, in relation to the information cycle, the concept of data analysis to practitioners in the health sector such as the programme coordinators is not only nor mainly about calculation of indicators as the HIS literature perceives. Instead it is rather broad, mostly involving mental acts of assessing and

comparing the raw data with their pre-existing knowledge gained from other means such as, supervision, previous reports and national programme standards and such analysis informs them of the performance of the facilities in that programme.

Therefore, this implies that there is an obvious difference between practitioners in the health system and academic researchers in the understanding of certain concepts since what the programme managers viewed as data analysis was perceived differently by Heywood and Rohde i.e. as issues falling under analysis, presentation, and interpretation in the information cycle. Thus there is need to take into consideration such differences between academicians and practitioners in the use of certain concepts.

Additionally, the findings show that all these kinds of data analysis were closely linked to- or stimulated for the use of the information in, for instance, monitoring the performance of the programme, identifying problem areas and taking corrective actions where possible. Therefore, data analysis can be considered a sign of use of information, which is discussed in more detail in the next section.

6.2.5 Information Use

As has already been mentioned, the notion of information use does not have clear universal definition and so there are various perspectives of what information use is. The literature on information use in HIS suggests various ways in which use of information can be demonstrable and these include:

- Developing of action plans directly showing a clear link to the information through indicators

- Formulating actionable recommendations based on a process of informed decision-making.

- Providing feedback

In presenting the findings on the duties of the district programme managers in chapter 5 and the discussion in section 6.1 of this chapter, I have analysed and discussed how managers at the district level actually perform their duties and the role that routine health

information plays in their duties and managerial roles. The findings have particularly shown how routine information is used in the several stages of decision-making using the classical decision making model. However, there were factors that affected the extent to which the information was actually used to induce action and these factors are discussed later in the subsection on factors affecting information use.

Furthermore, this study discovered the preference in use in the programme routine health information over that of the HMIS in many cases as the programme coordinators performed their managerial duties and roles and this preference was because:

1. Their programme data was easily accessible to them because they were in charge of storing the data.

2. They perceived their programme data to be more accurate and reliable than HMIS because their reports had less number of data elements, which were specific to their focus area and hence less prone to miscalculation, while the HMIS report was covering data on more issues making its compilation more cumbersome and prone to mathematical errors.

   The programme data was also perceived as more accurate because some coordinators felt they knew more about their programmes and hence they could easily identify discrepancies in the data reported as compared to the Assistant statistician.

3. They perceived the HMIS data to be incomplete in that it did not include data from community activities whilst they had such data. This is an already recognised problem as Chaulagai et *al.* (2005:6) state: "*Routinely collected facility-based data has known limitations. It does not capture all the cases that exist in a community.*"

4. The unavailability of the HMIS data on their required reporting frequency, as already discussed in section 6.2.3. Additionally late reporting in the HMIS data was also another reason for the preference.

Thus, this implies that, similar to Kanyimbo´s discovery, the existence of parallel reporting systems promoted non-use of data collected through the integrated system. However, Campbell (2003) indicates that use of programme specific information can still provide a foundation for use of the HMIS later on. Nevertheless, from this case study I find that most use of information was mostly implicit and induced through their obligations/duties to perform mandatory tasks such as data reporting and compilation and therefore removal of such a duty does not guarantee continued use of HMIS information as it will require an explicit un-mandatory effort to attain information which may not happen because of other factors such as high workload.

On the other hand, in contrast to the programme coordinators, the findings indicate that the members of the District Health Management Team had their primary source of health information as the HMIS and that data from the programme reporting systems was only used when the HMIS could not provide them with the data they required at that time.

Factors affecting Use of information

The findings have shown evidence of use of information in various managerial functions. However, differences exist on how the data was used for instance, between programmes. The literature identifies several factors as affecting how information is used. I will now analyse how such factors affected how the information was used at the district level with the assistance of the PRISM framework, which identifies three classes under which such factors fall in and these are environmental, behavioural and technical.

Environment factors

According to the PRISM framework, the environmental factors are related to the characteristics of the organisational and its context thus includes aspects such as the organisational hierarchical structure and functional structure (LaFond and Field, 2003).

In looking at the hierarchical structure, issues of power and authority of an individual at a certain position are at the core. The amount of power given to the programme coordinators to make decisions in various aspects affected to what extent they could act upon the information. For instance, one coordinator felt that there was nothing he could do to act upon the information as he stated:

"I see the graphs showing how we have performed but there is nothing I can do to change the situation because it is the ministry who decides what [amount of drugs] we get."

However, this was not only an issue of power but also the organisation of functions in the health system particularly that of ordering drugs and supplies- the logistics management system. As indicated in chapter 5, the way the general health system is organised is such that the ordering of drugs and supplies is done independent of the HMIS and the programmes. Calculation of supplies needed is based on data on consumption of supplies with no input from health information like the disease trends. Therefore, even though the coordinator observed the disease trends and felt they required more resources, the system limited the ability of the coordinator to act upon the information in that sense. On the other hand, programmes like EPI and PMTCT ordered their own supplies and therefore, were able to use the data to estimate the required amount of supplies. Thus the way the programmes were organised (in terms of functions and procedures), and consequently the duties assigned to the coordinators either enabled or hindered the coordinators´ ability to act upon the information.

Additionally, the issue of power is related to that of decentralisation, and as explained earlier in section 6.1.3 of this chapter, the actual decentralisation of decision making power from the national level to the district levels is only a recent phenomenon which has not been fully been implemented nor embraced in the health system. Therefore, the tradition, stemming from the previous centralised system, where the national level makes all the big decisions still exists and is evident in the fact that new initiatives are usually initiated from the top. This actually can be seen to have contributed to the observed fact the coordinators performed more as disturbance handlers than entrepreneurs and this implies less use of information to induce/initiate new courses of action.

The nature of the disease and of the associated decisions also play significant roles in determining the extent to which information will be reacted upon. Sauerborn (2000) looks at the nature of the decisions in terms of risk i.e. high-risk or low-risk decisions. In this case, it shows that diseases such as cholera were given more attention because of the high risk involved and so the programme coordinators were likely to respond to data on Cholera, where as even though Malaria was identified as having high prevalence, it was not given much attention because "*we are used to it being there*" (research interviewee).

Resource constraints in the public health sector such as financial, transportation and even human have shown to be a hindrance in performing functions such as supervision and meetings at district level as already explained in chapter 5. This in turn affects the use of information i.e. no meetings or supervision, no use of the information for those purposes. In another sense, this also meant more use of the programme reports for desk supervision thus for performing managerial roles

Additionally as discussed in section 6.1.4 the coordinators were more involved in work at the hospital, making it their main area of focus or interest. In turn, it particularly made it easier for them to handle problems at the hospital. This therefore implies that the coordinators are more likely to act and respond to data/information concerning the hospital activities than to the facilities.

Behavioural factors

The attitude of a manager towards his work as well as towards information has a significant impact on how the information is used. This attitude may be informed by environmental or even technical factors. The case where one coordinator felt he had no power to act upon the data shows that his attitude towards his decisional roles. Yet, the coordinator for the same programme in the other district explained that he used the data to lobby for resources. Thus, the extent to which he acted upon the data was influenced by his attitude towards the function he was required to perform.

The attitude towards the data also influenced how the coordinators used it. One common attitude discovered was that coordinators felt that their data was more accurate than that of HMIS; even though the primary sources of data were the same registers as explained earlier in this section. This attitude is reflected in the fact that the coordinators preferred to use their data as opposed to HMIS data for meeting presentations.

The difference between the coordinators in terms of their decisional roles also influenced the extent to which data was used to induce action. For instance, it was observed that some coordinators performed more of disturbance handler roles and thus formulated plans based on the information while other coordinators simply planned activities that were routines or directives from the national level.

Technical factors

As already mentioned, the study has shown there is existence of parallel reporting systems and that the coordinators preferred to use their programme-specific data as opposed to HMIS data when ever possible.

As previously discussed, one of the reasons discovered for the use of routine programme information as opposed to that from HMIS was that the HMIS reporting form did not capture all the data elements required by the programmes as explained in section 6.2.3. This shows that the essential dataset- a technical aspect of the system particularly promoted and hindered use of programme information and HMIS information respectively.

The standards in terms of procedures are also important and these can be considered as technical aspects of the HIS. As discovered from earlier discussions, the use of programme information has been attributed to untimely availability of HMIS data due to the quarterly reporting frequency of the routine HMIS. This therefore shows another case of where the defined technical aspects of the system influenced the use of the information produced from that system.

6.2.6 Conclusions and Recommendations on the HIS

From the discussions in section 6.2, it has been discovered how the Ministry of Health has adopted and applied the much recommended and advocated integration strategy of developing minimum indicators and essential data sets. However, despite applying such strategies, the research has discovered that this has still not eliminated fragmentation in the health information system.

From this study, the reasons for fragmentation can be summarised as being:

1. The inflexibility of the HMIS to modify the HMIS data collection tools in a timely manner to incorporate the new programmes´ information needs. This is attributed to the centralised process put in place for the revision and modification of the minimum indicators, dataset and data collection tools.

2. The nature/characteristics of the disease or service that some of the programmes is focused on require that programme services be provided separately and hence they also require separate programme-specific data collection tools.

3. The inefficiency of the HMIS to provide programme data in a timely manner i.e. on a monthly basis as the reporting frequency of the HMIS is quarterly.

4. The inability for the HMIS reporting forms to capture all the data elements required by the programme coordinators for their local use as well as reporting purposes to higher authorities.

    Nevertheless, the inability of the HMIS to meet the coordinators´ needs was also attributed to the fact that their roles were defined based on the fact that they would have programme reporting systems thus making their tasks and information needs to be centred on their programme systems.

5. The programme coordinators desire to collect information for record keeping purposes.

6. Lack of awareness by the coordinators that their programme reporting system had actually been abolished.

Furthermore, this fragmentation was reflected in the preferred use of programme data against HMIS data by the programme coordinators mainly because:

1. The programme data was easily and readily accessible to them.

2. They perceived their programme data to be more accurate and reliable than HMIS.

3. They perceived the HMIS data to be incomplete and inadequate, as it did not include data from community activities whilst they had such data.

4. Late reporting of the HMIS data

Additionally, it is important to note that other organisational factor such as power and the designated responsibilities also influenced the extent to which the coordinators were able to use the available information.

With all these reasons in mind, I now summarise the possible ways to deal with the fragmentation of which some have already been discussed elsewhere in this chapter.

1. There is need to ensure there is flexibility in the system that allows incorporation of new data elements in the data collection tools when new programmes are introduced. This requires reconsidering the procedure/protocol for modifying the minimum data sets and the related data collection tools at facility level. However, bearing in mind that these data collection tools include documents such as registers, there is need for some stability in the system, as the registers cannot be changed every month or fortnight. An annual review of the minimum indicators and dataset, however, would be sufficient in trying to achieve a balance between maintaining standards and achieving flexibility thus adaptability to the changing information needs.

2. For cases where completely new tools are required for the new programmes, it is essential that these tools are developed with the involvement and final approval of the authorities assigned such duties in the national HIS Policy i.e. the Health Management Information Technical Committee and the Committee on Health Information Policy, so as to ensure minimal data duplication. Furthermore, these tools should then be officially adopted as part of the HMIS tools.

3. Modify the HMIS reporting frequency to monthly in order to meet programmes´ information requirements as the study particularly revealed that the coordinators require information on their programmes on a monthly basis for monitoring of the programme performance and identifying problematic areas that need attention.

4. On the same issue of time, improving the timeliness of HMIS reporting from the facilities to the district level is essential for the system to be able to provide the programme coordinators with their required information in good time. Moyo (2005) and Chunda (2006) propose ways in which the data quality including

timeliness of reporting can be improved in the Malawian Public health system and these include increased awareness of the importance of data at the facility level but also motivation of the staff through training, supervision, review meetings and other means for providing feedback.

5. Revise the HMIS indicators and modify the data elements collected on the HMIS reporting form to incorporate data required by the programme managers. This however may result in a longer list of data elements on one form, therefore an alternative would be to go back to using separate HMIS reporting forms for the different health service types to report the data from facility to the district level. This separation would also assist in ensuring that the task of compiling the HMIS data does not appear too cumbersome.

    Additionally, the programme coordinators at district level need to be made aware of the possibility to negotiate with the Assistant Statistician to incorporate other data elements that they require that is not necessarily required at national level instead of resorting to introducing their own separate reporting forms. This already is the idea behind the minimum dataset (/hierarchy of standards) adopted by the Ministry of Health as part of the HIS policy and strategy. Similarly, the statisticians should be made aware of this possibility and therefore be flexible in modifying the HMIS data elements. Nevertheless, the District Health Officer and the management team must be aware and approve any such modifications to ensure that they are indeed reasonable changes so that things do not get out of hand

6. Revise and redefine programme coordinators´ responsibilities to reflect the adopted integrated HMIS approach for data management.

7. It is also important that as a move towards integration, the programme managers should be able to feel that the HMIS data is as reliable and accurate as theirs is and feel confident to use it. To achieve this, firstly there is need to increase awareness to programme coordinators that the HMIS data *is* their data, especially shown by the fact that the primary source of the data is the same. Therefore, they should share the responsibility with the Assistant Statistician of improving the

quality of the data starting from the level of the registers. One way for the coordinators could assist in improving the data quality would be for them to supervise on their related HMIS registers when they go for supervision i.e. they should supervise on how the facility workers are filling the registers as opposed to only supervising on the programme aggregated facility reports, as is usually the case.

8. It is also important that the accessibility of HMIS data to the coordinators is increased in trying to promote the use of HMIS information as opposed to programme data wherever possible at the district level. Making this accessibility electronic would actually provide an advantage over their programme paper-based forms. This may be achieved by having the DHIS on a Local Area Network such that the coordinators can access the information from other computers they have access to. Of course, the Statistician would reserve all the rights for modifying the data in the system. Additionally, this would require that the programme coordinators be trained in the DHIS system, which may also increase their sense of ownership/being part of the system. However, bearing in mind the physical infrastructure status of the districts, establishing a network may be of considerably high costs and thus difficult to implement, but the benefits from such a network would be long-term.

9. The programme coordinators and the Assistant Statistician should ensure that programme data from community activities such as outreach clinics and campaigns is also included as they aggregate the data for the HMIS report.

10. Programme managers at national level should ensure that all district coordinators are aware of their operational information system, that is, if they have abolished their programme-specific reporting systems, all their district programme coordinators should be made aware of this development.

These strategies above will help to address the various reasons given throughout the research for the existence of fragmentation in the health information system of Malawi. It would, however, be expected that elimination of fragmentation caused by parallel reporting will not be achieved through a voluntary move by the programme coordinators

to HMIS as long as they have their reporting systems as data management is one of their duties as coordinator. Furthermore, the traditional thinking that major changes come from the top still exists because of the previous centralised system of operation that has not completely faded away and the concept of decentralisation is fairly new hence it has not been fully embraced. Thus, it would only be through a national level consensus and directive to stop using programme specific reporting and therefore redefine the district programme coordinators´ duties that a true comprehensive integrated HMIS can exist in the health system.

7. Conclusion

In this chapter, I summarise the main findings of the research while relating to the objectives that were set out to be achieved through this research. I also present the contributions made by this study both in theoretical terms and in practical terms. Lastly, I propose areas for further research that would be useful in understanding and improving the design and implementation of health information systems mainly in developing countries.

7.1 Research summary

This study falls under the domain of design and implementation of health information systems mainly in developing countries and it is focused on the issues of fragmentation and integration in such systems. Concisely, the study has aimed at identifying where fragmentation exists in the health information system of Malawi and understanding why it exists with a purpose of making conclusions on whether and how the identified fragmentation could be reduced. Thus, the specific study objectives have been to:

1. Understand the information flow of the main routine Health Management Information System (HMIS).

2. Understand the routine Health Information Systems for the specific programmes and their relation with the main routine HMIS.

3. Identify the information requirements of the specific programmes and the overall district health management through an understanding of the responsibilities of district programme manager and of district health managers.

4. Identify the sources of information used to meet the managers´ information requirements in order to understand their actual use of information for their responsibilities.

5. Make conclusions on the aspects contributing to fragmentation in the overall routine Health Information System and formulate recommendations on how to reduce the fragmentation.

Therefore, in the sections, that follow, I present a summary of the main findings of the research in regards to the above-stated research objectives with the main issue being the fragmentation/integration status and the reasons behind that status.

More specifically, in the sections 7.1.1 and 7.1.2, I present a comparative summary of the main findings on the routine HMIS and the specific programmes which relate to the achievement of objective one and two presented above. In section 7.1.3, I give the main findings in relation to the managers´ responsibilities; information needs and information use at the district level and these are in relation to objective three and four above. Throughout these sections, I also make conclusions in relation to fragmentation/ integration, thus achieving objective five. The recommendations for improving the observed situation are presented in section 7.2.2, as part of the practical contributions of this thesis.

7.1.1 Data Collection

From the research, it has been discovered that the strategy used for the design and implementation of the HMIS in Malawi was based on principles of integration where minimum indicators and datasets were developed through consensus building and these datasets formed the basis for designing data collection tools at the lower levels. Thus, it is no surprise that the research findings revealed that the majority of the tools used for data collection at the patient/client facility level were the HMIS tools that were developed from the standardisation process.

However, the findings also indicated that some programmes had their own data collection tools of which some were official (developed and approved at national level) and others were not (i.e. basic notebook registers). These programmes had their own tools because:

1. The programmes were relatively new i.e. they were introduced after the design and implementation of the HMIS data collection tools;

2. The nature and the organisation of the programme services required their own separate programme tools.

Therefore, in this regard, I conclude that at the facility- data collection level, the HIS was integrated to a large extent, as the main primary tools used were the standardised HMIS tools. Nevertheless, just like Kanyimbo (2006) discovered, fragmentation had crept back in the system because the HMIS had been unable to respond to and incorporate (in good time) new information needs arising over time due to changing health needs and health services. This is closely related to the issue of flexibility and as discussed in chapter 6, there is limited flexibility in the system for modifying the minimum dataset and the associated data collection tools. Thus, reducing or preventing fragmentation resulting from this requires increased flexibility in the system to allow timely incorporation of new data elements in the data collection tools.

On the other hand, Kanyimbo (2006) discovered that data duplication where the information system is paper based is difficult to avoid. Similarly from this study, I find that some fragmentation in the HIS is inevitable especially where the nature/characteristics of the disease or service programmes require that their services are provided separately as was the case for the ART programmes. In such cases, the required data for the programmes cannot be integrated into the existing data collection tools; instead, they require their own tools.

7.1.2 Data reporting

The research discovered the existence of reporting systems for specific health service programmes that were running parallel to the main routine HMIS. This resulted in a fragmented picture of the flow of information in the overall Health Information System that was in opposition to the national policy expectations as well as what the HIS literature recommends.

A detailed comparison of the programme reporting systems and routine HMIS revealed there were:

- Cases of data duplication between the programme reporting forms and the routine HMIS reporting form but also between programmes sharing areas of interest.

- Cases of data overlap where the data elements on the HMIS form were either a subset or an aggregated form of the data elements on the programme reporting forms.

- Data elements unique to the programme reporting forms.

- Differences in the reporting frequencies where most of the programmes reported on monthly basis and the HMIS reported on quarterly basis.

- Differences in data aggregation tools at the district i.e. the HMIS used a computer software system, DHIS, and the majority of the programmes used manual or simple basic software applications such as MS Excel and Word.

- The sources of heath data for the HMIS reporting form and the programme reporting forms were mainly from HMIS data collection tools at the facility level.

The discovery of data duplication in such a scenario is not new and has been fairly discussed in other previous research on HIS in developing countries (Lungo, 2003; Chilundo, 2004; Damitew and Gebreyesus, 2005; Kanyimbo, 2006; Shidende, 2005; and Sheikh, 2005). This existence of data duplication between programme forms and HMIS forms in itself implies the HMIS could very well supply the programmes with the information they required and that having their own reporting forms would not be necessary. However, the research revealed that the existence of such parallel reporting was generally perceived as being a result of:

1. The insufficiency of the HMIS in providing data to the programmes in a timely monthly manner.

2. The insufficiency of the HMIS forms in capturing all the data elements as required by the programmes at district and national levels. This is similar to the discovery by Kanyimbo (2006) that the line managers at district level are

sometimes required to make reports or provide data that is not part of the HMIS data 'by some bosses at the top'.

3. For record-keeping purposes. This is also similar to what Kanyimbo (2006) discovered as he states that duplication of data elements between the HMIS tools and other tools mostly occurred because many section heads 'just wanted to keep' data on the services they provided.

In order to validate the perceived insufficiency of the HMIS in providing monthly, relevant and complete data to meet the programmes´ information needs; the research had to investigate on the programmes´ information requirements at the district level and the actual sources of the information- thus the use of the information. This was done through a study of the district programme coordinators´ duties and tasks. Additionally a similar study was done on the duties and tasks of the district health managers´ for the same reasons. The findings related to these studies are summarised in the section that follow.

7.1.3 Managerial roles, Information requirements and Data/Information use

For Programme Coordinators

The study revealed that the coordinators´ responsibilities, duties and tasks included programme data management, facility supervision, planning for the programme, conducting trainings, conducting and attending meetings, and ordering medical supplies. Additionally these coordinators were also involved in health care service provision at the district hospitals.

From the investigation and the analysis of the programme coordinators´ duties, it was discovered that they required health information for various purposes, for instance monitoring, which helped them in identifying the required tasks and activities to perform. This monitoring was required on a frequent monthly basis to ensure that the coordinators were kept informed and up-to-date with the activities and the performance of the programme to identify required interventions in good time. Furthermore, the coordinators

in carrying out their duties also required other types of information on resources such as staff and medical supplies.

The study revealed that the programme-specific reporting systems enabled and supported the programme coordinators in fulfilling their managerial roles but also performance of other roles was also supported and fulfilled through integrated HMIS initiatives such as review meetings. Nevertheless, in comparison with the HMIS, the programme reporting systems supported the programme coordinators´ managerial information needs largely than the HMIS. Thus, it was justifiable that they had parallel reporting systems especially when the health data was required monthly and in a disaggregated form that was not provided by the HMIS data. Consequently, this implies that in order to reduce fragmentation caused by the unsatisfactory content of the HMIS forms it would be necessary to modify the HMIS reporting form to incorporate the data elements required by the programme managers.

On the other hand, the analysing of the programme coordinators´ information needs and the content of the HMIS report, also revealed that in some cases, it would've been possible for the HMIS to meet their information needs on an appropriate timely basis. Nevertheless, the coordinators preferred to use the programme data instead of HMIS, which is similar to what was discovered by Kanyimbo (2006), and in this case, the preference was because:

1. Their programme data was easily accessible to them because they were in charge of storing the data.

2. They perceived their programme data to be more accurate thus reliable than HMIS because their reports had less number of data elements and these were specific to their focus area and hence less prone to miscalculation, while the HMIS report was covering data on more issues making its compilation more cumbersome and prone to mathematical errors

3. They perceived the HMIS data to be incomplete in that it did not include data from community activities whilst they had such data. This is an already recognised problem as Chaulagai et al (2005:6) state: "*Routinely collected*

> *facility-based data has known limitations. It does not capture all the cases that exist in a community.*"

These three reasons imply in order to eliminate this bias and promote use of the information from the integrated HMIS; there would be a need to improve the accessibility, reliability/ accuracy and completeness of the HMIS data. Precise suggestions for achieving this are provided in the section 7.2.2 of this chapter as practical recommendations.

Furthermore, the study also discovered that even though the information was useful and important for carrying out their duties, their actual use of information was highly subjective to other factors that determined how they performed their duties. For instance, transport constraints and human resource shortage contributed highly to ´un-performance´ of supervisory visits thus resulting in limited use of the information for this task/duty. For this reason I concluded that it would not be appropriate to conclude from their actual use of information if the data was required on monthly basis or not because of such external factors involved, but instead their information needs were in a better position to determine the required reporting frequency.

Additionally, the study revealed that for the integrated HMIS to be able to meet their information requirements in order to eliminate the parallel reporting systems, it would not be a straight-forward issue of improving the integrated HMIS but it was rather complicated as there were other implications related to the way the coordinators´ actually performed and fulfilled their managerial roles and responsibilities. For instance, the analysis of the research findings revealed that the programme reporting systems enabled and supported the programme coordinators in fulfilling managerial roles especially through their mandatory duty of managing data i.e. receiving facility reports, compiling and producing district reports. This implied taking away this duty would require the coordinators to find new ways of fulfilling their roles, which would require for instance developing new liaison contacts with the Assistant Statistician to provide them with information for monitoring. Considering the discovery that some programme coordinators preferred to work in isolation, it implied that establishing new close liaison with the statistician might be a challenge for some of them.

Furthermore, removing their data management responsibility also implies that an extra explicit effort would have to be made to get information to fulfil their role as monitor and this is opposed to the implicit means they obtained this information through their mandatory data management task. In that sense, the parallel reporting systems worked to the advantage of the programmes managers than the integrated system as it enabled them to fulfil their roles.

In addition to highlighting how the programme reporting systems enabled the coordinators to fulfil managerial roles, the study also revealed that the coordinators´ roles and responsibilities revolved around their vertical reporting systems such that introducing the HMIS would also require that their responsibilities be redefined as some of their responsibilities such as training staff in data management would be transferred to the Assistant Statistician in charge of the integrated HMIS.

For District Health Managers

The district health managers performed a similar range of duties as the programme coordinators of supervision, planning, allocating resources, and attending meetings; but at a higher level than the coordinators. In addition, some of the district managers also performed health care service provision due to the staff shortages in the districts.

Being at a higher level of management, the district health managers required information of a wider range than that required by the coordinators and this information was on health statistics, finances, human resources, physical assets and medical supplies. The district managers obtained their required health data mainly from HMIS but also from other programme-specific reports where the HMIS could not provide the required information. Additionally, information was also obtained from survey data, general staff reports, implemented activity reports as well as the DIP, activity proposals and reports, the Integrated Financial Management Information System, the Logistics Management Information System, staff returns from the human resource officer, and general administrative reports from the administrator and from heads of sections.

7.2 Research Contributions

In this section, I summarise the theoretical and practical contributions that this research makes.

7.2.1 Theoretical Contribution

This research has used a combination of literature and frameworks from the management and the Information Systems disciplines and so this research contributes in these respective disciplines.

More precisely, the study has used a combination of general management literature from Mintzberg and a more specific health management literature to guide the analysis and understanding of the managerial roles and responsibilities of programme coordinators and the relation to the health information system. In this regard, the study recognises the importance of programme managerial roles and responsibilities in influencing the outcome of a health information system i.e. whether it is a success or a failure. For instance, the study on the managers´ roles such as their interpersonal roles particularly highlights how such managerial aspects influence the acceptability of a system. For example, where there is collaboration across programmes an integrated information systems is likely to result and be supported as was seen in the case of the ART programme, however, where isolation was preferred integration would not be favourable for such managers.

In relation to this, the study also recognises the influence the health information system has in shaping the managers´ responsibilities as well as how they actually fulfil certain managerial roles. For instance, because of the parallel reporting systems, the coordinators were assigned the duty to compile and manage programme data, and through such a duty, they were able to know about the performance of the staff in their programme and hence fulfil their leadership role. Thus with this perspective, the study re-emphasises the interdependent interactive relationship that exists between the technical and social aspects of a health information system where you have both sides affecting/influencing the other. Hence, it is essential to consider this interactive relation when designing, developing and implementing information systems, more specifically integrated HIS in

developing countries to ensure success. This interactive relationship of IS aspects has been discussed by other authors such as Boddy et *al*. (2005).

Additionally, the study also shows that achieving a business-oriented style of management in the public health sector, for instance, where you have managers operating as entrepreneurs, is a major challenge as there are several factors influencing it such as the existing dominant traditional centralised way of thinking and operating even in the wake of decentralisation. Along the same lines, the study also shows that it is difficult for the programme managers to shift from an isolated programme-independent way of operation to an integrated sector-wide approach where they have to collaborate with peers at the same level because they are used to working in isolation.

The study also contributes in its approach on investigating the information needs/requirements of programme managers at district level. Wilson (2000) explains that the IS community tends to equate information requirements of users with the way the users actually use an information system that is available. This is probably the same perspective that the ministry applied when formulating the minimum datasets as it is stated that "*despite the fact that no programme was making adequate use of available information, each wanted to include all possible pieces of information in the routine data collection system*" (Chaulagai et al. 2005:4). This eventually led to exclusion of other data that this study has shown to be important input for managerial work (at least at the district level). In this light, the study used a different approach in trying to determine the information needs and information use of programme coordinators by firstly seeking to understand their responsibilities, duties and tasks in general; then the information they required to know to be able to perform these duties and tasks; and then how they actually knew this information, i.e., the sources of information/information use.

The study, through its analysis of the existing HIS i.e. the integrated HMIS and the vertical programmes in comparison with what is advocated for in the literature contributes to the HIS design and development domain by showing the practicality of some of the recommended HIS design and implementation frameworks such as the information cycle, the PRISM framework and the hierarchy of standards.

More specifically the study shows that, in relation to the information cycle, the concept of data analysis to practitioners in the health sector such as the programme coordinators is not only nor mainly about calculation of indicators as the HIS literature perceives but rather it is mostly about mental acts of assessing and comparing the raw data with their pre-existing knowledge gained from other means such as, supervision, previous reports and national programme standards and this analysis informs them of the performance of the facilities in that programme. Not denying the fact that indicators are important and indeed a better means for analysing data as the HIS literature explains, the study however shows that the absence of calculation of indicators presented in graphs or tables does not necessarily mean that there is no data analysis performed as the findings show that it is also performed through other ´less-obvious´ means.

The study and analysis of the use of information by programme coordinators contributes to the continuous discussion on use of health information in the public health sector of developing countries. Most previous research has expressed lack of information use in the health sector for decision-making. In contrast, the study revealed evidence showing that there is use of health information by district programme coordinators in the various stages of the decision-making process of Lasswell´s classical model, mainly for monitoring, evaluation, identifying problems and solutions and thus activities required to be implemented. Additionally, other research such as that by Østmo (2007) has also shown evidence of information use at the facility levels of the health system. Furthermore, unlike the HIS literature which tends to imply that the lack of evidence of actions performed as a result of information means there is no information use, the study, in contrast, reveals that even in the absence of such demonstrable action, there is still use of information as discovered from the study on managers´, only that the extent to which this information eventually leads to demonstrable action depends on many other factors including the urgency of the matter, the power given to the coordinators, how the health system functions are organised, and the resources (non) availability.

Along the same lines of information use, the study revealed a bias towards use of programme data over data from the integrated HMIS for reasons related to the issues of data relevance, accessibility, data quality which many other authors have already emphasised the importance (Chaulagai *et al*., 2005; Chunda, 2006; Damitew and

Gebreyesus, 2005; Lungo, 2003; Moyo, 2005; Sauerborn, 2000). Nevertheless, Campbell (2003) indicates that use of programme specific information can still provide a foundation for use of the HMIS data. However, the research shows that most use of information was mostly implicit and induced through their duties to perform mandatory tasks such as data compilation and reporting and therefore removal of such a duty does not guarantee continued use of HMIS information as it would require an explicit un-mandatory effort to attain information which may not happen because of other factors such as workload, resource constraints.

This research study also contributes to the discussion of integration of health information systems in a context of developing countries. Many previous research conducted on HIS in developing countries such as Ethiopia, Mozambique, Tanzania and Zanzibar have discovered fragmentation in the existing HIS and have attributed it to various aspects including lack of standards, lack of supportive HIS policy and strategy, lack of a coordinating unit for HIS, gap between the IS design and the social reality, and donor influences (Chilundo, 2004; Damitew and Gebreyesus, 2005; Lungo, 2003; Shidende 2005 and Sheikh 2005). Therefore some of the strategies advocated for achieving fragmentation include developing a HIS policy and strategic framework, developing standards such as minimum indicators and datasets, establishing a central coordinating HIS unit at each level. The Malawi case study provides a fairly different context and a practical case of where some of these advocated integration strategies specifically that of developing minimum datasets, developing a HIS policy framework supporting the process, and establishing a central HIS coordinating unit were actually applied and present in the HIS context.

However, considering the fact that despite the implementation of such recommended strategies, fragmentation still existed in the HIS, the study therefore re-emphasises the important role of other aspects of the HIS that contribute to fragmentation. In particular, the study re-emphasises the importance of ensuring that the minimum indicators and associated data sets are indeed a result of a consensus of the stakeholders. Furthermore, it shows that the policy framework and standardisation procedures should not be too rigid/centralised but instead should be flexible and possibly decentralised to enhance adaptability of the system over time, that is, there has to be a balance in trying to achieve

uniformity through standardisation for comparability and flexibility/ adaptability for ensuring relevance of the information over time. These issues of flexibility and standardisation have been discussed by other authors in HIS contexts as well as general IS contexts (Braa & Hedberg, 2002; Damitew and Gebreyesus, 2005; Hanseth et al., 1996; Lagebo and Mekonnen, 2005; Shaw, 2005). In the HIS context, the authors advocate for the adoption of a hierarchy of standards approach for achieving standardisation and flexibility in the system.

7.2.2 Practical Contributions

In recent years, academic/scientific research has been conducted on the HIS in Malawi where the researchers looked at issues of data quality of the HMIS (Moyo, 2005; Chunda 2006). Additionally, Chaulagai et *al.* (2005) have presented and discussed on the design and implementation of the HMIS in Malawi as well as the result from this. This study builds upon- and re-enforces some of the discoveries from these previous works. Additionally it attempts to provide a broad assessment and analysis of integration level and status of the information system in the public health system of Malawi which looks at the main routine HMIS but also the parallel programmes´ reporting systems and in so doing providing more insight on the overall situation of the HIS.

Furthermore, the study also builds upon and re-enforces discoveries from the research by Kanyimbo (2006) who presents the level of HIS integration in Malawi at the point of service delivery through his analysis on the data collection tools used by various sections in the hospital.

In addition, the study provides a broader account of the HIS as perceived from various levels, people and stages and systems (or rather sub-system) of the overall HIS, thus attempting to provide an overall analysis of the HIS but also an analysis of the individual parallel programme reporting systems. As Chilundo (2004) indicates in his model to guide practical efforts for integration, such analysis is required as it provides a diagnosis/picture of the existing information systems and rationalities, which informs the actual, HIS implementation process. In other words, the analysis attempts to bridge the design-reality gap that Heeks (2002), states is the cause of many failures in IS/IT

projects. Therefore, the assessment/analysis of the HIS in Malawi performed through the research is important input for future re-designing/restructuring of the HIS system.

More specifically, this study contributes in identifying reasons behind the observed existing fragmented status in the health information system especially when explicit commendable and ´advocated-for´ efforts have been made by the government to eliminate this through the HMIS system.

Lastly, the study sheds light on the possible strategies that may be deployed in trying to overcome the identified factors contributing to fragmentation. More specifically, I make the following specific recommendations for reducing fragmentation and thus improving the overall Health Information System for the Malawi health sector:

1. Modify the HMIS reporting frequency. The study has revealed that the coordinators require information on their programmes on a monthly basis for monitoring of the programme performance and identifying problematic areas that need attention. Therefore, in an attempt to eliminate parallel reporting for this reason, the likely move would be for the HMIS to shift from quarterly reporting to monthly.

2. On the same issue of time, improving the timeliness of HMIS reporting from the facilities to the district level is essential for the system to be able to provide the programme coordinators with their required information in good time. Moyo (2005) and Chunda (2006) propose ways in which the data quality including timeliness of reporting can be improved in the Malawian Public health system and these include increased awareness of the importance of data at the facility level but also motivation of the staff through training, supervision, review meetings and other means for providing feedback.

3. Revise the HMIS indicators and modify the data elements collected on the HMIS reporting form to incorporate data required by the programme managers. This however may result in a longer list of data elements on one form, therefore an alternative would be to have separate HMIS forms for the different health service types used to report the data from facility to the district level.

Additionally, the programme coordinators at district level need to be made aware of the possibility to negotiate with the Assistant Statistician to incorporate other data elements that they require which are not necessarily required at national level instead of resorting to introducing their own separate reporting forms. This already is the idea behind the *minimum* dataset adopted by the Malawi HIS strategy. Along the same lines, the statisticians should be made aware of this possibility and therefore be flexible in modifying the HMIS data elements. All in all the DHO/DHMT must be aware and approve any such modifications to ensure that they are indeed reasonable changes so that things don't get out of hand.

4. There is also need to reconsider the procedure for revising the minimum data sets and the related data collection tools at facility level such as the registers to one that is more flexible for the introduction of new health service programmes. There is however, a need to balance between achieving flexibility for adaptability to changing information needs and maintaining standards and one possible way to achieve such a balance is to ensure annual review of the indicators and datasets and consequently the data collection tools.

    For cases where completely new tools are required for the new programmes, it is essential that these tools are developed with the involvement and final approval of the authorities assigned such duties in the national HIS Policy to ensure minimal data duplication. Furthermore, these tools should then be officially adopted as part of the HMIS tools.

5. Redefine programme managers responsibilities to reflect the integrated HMIS approach for data management.

6. It is also important that as a move towards integration, the programme managers should be able to feel that the HMIS data is as reliable and accurate as theirs is and feel confident to use it. Therefore, there is need to increase awareness of programme coordinators that the HMIS data *is* their data, especially shown by the fact that the primary source of the data is the same. Thus, the coordinators should share the responsibility with the Assistant Statistician of improving the quality of the data starting from the level of the registers. This could possibly be achieved by

having the coordinators supervise on their related registers when they go for supervision i.e. how the facility workers are filling the registers as opposed to only supervising on the programme aggregated facility reports, as is usually the case.

Additionally, the coordinators and the Assistant Statistician should ensure that programme data from community activities such as outreach clinics and campaigns is also included as they aggregate the data for the HMIS report to improve the completeness of the HMIS data.

7. Increasing accessibility of the HMIS data is also a possible strategy that may promote the use of HMIS information as opposed to programme data wherever possible at the district level. Making this accessibility electronic would actually provide an advantage over their programme paper-based forms. This may be achieved by having the DHIS on a Local Area Network such that the coordinators can access the information from other computers they have access to. However, the Statistician would reserve all the rights for modifying the data in the system. Additionally, this would require that the managers be trained in the DHIS system, which may also increase their sense of ownership/being part of the system.

8. Programme managers at national level should ensure that all district programme coordinators are aware of their operational information system, that is, if they have abolished their programme-specific reporting systems, all their district programme coordinators should be made aware of this development.

These strategies above will help to address the various reasons given throughout the research for existence of fragmentation in the health information system of Malawi. It would, however, be expected that elimination of fragmentation caused by parallel reporting will not be achieved through a voluntary move by the coordinators to HMIS as long as they have their reporting systems as data management is one of their coordinator duties. Furthermore, the traditional way of thinking where major changes come from the top still exists because the centralised system of management has not completely faded away as the concept and implementation of decentralised management is fairly new and has not been fully embraced nor implemented. This implies that, similar to what

Damitew and Gebreyesus (2005) discovered in the Ethiopia context, it would mainly be through a top-down approach where a national level consensus and directive to stop using programme specific reporting and therefore redefine the coordinators´ duties that a true comprehensive integrated HMIS can exist in the health system of Malawi.

7.3 Further Research

The research showed that the managers especially members of the DHMT have a vast range of information needs including health data and drug logistic data. These systems are perceived as separate subsystems of the national HMIS, operating independently but only being linked at the top level. However, a brief study of the Logistics Management Information System indicated that there would be a potential benefit in integrating the health data e.g. on the disease trends with the drug consumption levels as this could assist in ordering more accurate required amounts of medical supplies. Therefore, a potential area for research would be to investigate the social and technical practicalities for integrating the HMIS with the Logistics Management Information System in the Malawian context. Macueve (2003) conducted a similar research along these lines in Mozambique. However, noting that the social and technical contexts of Malawi and Mozambique are different, of which one obvious difference are the existing information systems in place in the countries, I believe that conducting such a study in Malawi would be useful in providing practical and theoretical insights on the subject matter.

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Appendices

Appendix A: Ethical Clearance

Picture 1: Letter requesting for research permit

UNIVERSITY OF OSLO

Malawi Ministry of Health Att. Chris Moyo	**Department of Informatics** P.O. box 1080, Blindern 0316 Oslo Norway

Gaustadalléen 23
Phone: +47 22 85 24 10
Fax: +47 22 85 24 01

Addis Ababa, 23. May, 2006

FACULTY OF MATHEMATICS
AND NATURAL SCIENCES

Request for Master thesis studies in the Health services of Malawi

The Department of Informatics, University of Oslo, runs a master programme in information systems where the students do their one year theses work on health information systems. This research is connected to the EU funded project Beanish, where the College of Medicine constitutes the Malawian partner, and the University of Oslo is the main contractor.

Currently, three of the master students would like to do empirical studies in Malawi,

- Marlen Stacey Galimoto, female, citizen of Malawi
- Gro Alice Hamre, female, citizen of Norway
- Jon Sandvand, male, citizen of Norway

The students will complete their coursework before mid June and thereafter they will arrive in Malawi. They should complete their field studies before Christmas. The method of data collection might include interviews, observations, questionnaires and reading of documents. The professors Jørn Braa and Jens Kaasbøll from the University of Oslo will visit the students during their empirical investigations and guide their studies.

One possible topic for master thesis is to find reasons for successful implementation and operation of the system, so that successes can be replicated. Another topic is integration of information systems in the health sector.

The University of Oslo therefore kindly requests that the student will be allowed to carry out such studies in the health facilities and administration of Malawi after agreement concerning time schedule, privacy and other issues has been settled.

Best regards

Jens Kaasbøll	Phone:	E-mail	Fax:
Professor	+47 93 25 31 40	jensj@ifi.uio.no	+47 22 85 24 01
Head of International Master Programme in Information Systems			

Marlen Stacey Galimoto

Picture 2: Letter of Research approval

Telephone: + 265 789 400
Facsimile: + 265 789 431
e-mail doccentre@malawi.net
All Communications should be addressed to:
The Secretary for Health and Population

In reply please quote No. MED/4/36c

MINISTRY OF HEALTH
P.O. BOX 30377
LILONGWE 3
MALAWI

28 July 2006
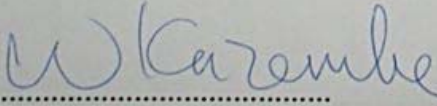
Ms M S Galimoto
Private Bag 471
Lilongwe

RE: P. # 400: Integration of Health Information Systems

Thank you for the above titled proposal that you submitted to the National Health Sciences Research Committee (NHSRC) for ethical and scientific review. Please be advised that the NHSRC has **reviewed** and **approved** your application to conduct the above titled study.

- **APPROVAL NUMBER**   : NHSRC 400.
  The above details should be used on all correspondence, consent forms and documents as appropriate.
- **APPROVAL DATE**   : 28/07/2006
- **EXPIRATION DATE**   :This approval expires on 27/07/2007
  After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the NHSRC secretariat should be submitted one month before the expiration date for continuing review.
- **MODIFICATIONS**: Prior NHSRC approval using standard forms obtainable from the NHSRC Secretariat is required before implementing any changes in the Protocol (including changes in the consent documents). You may not use any other consent documents besides those approved by the NHSRC.
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the NHSRC using standard forms obtainable from the NHSRC Secretariat.
- **QUESTIONS**: Please contact the NHSRC on Telephone No. (01) 789314, 08588957 or by e-mail on doccentre@malawi.net
- **Other:**
  Please be reminded to send in copies of your final research results for our records as well as for the Health Research Database.

Kind regards from the NHSRC Secretariat.

....
FOR CHAIRMAN, NATIONAL HEALTH SCIENCES RESEARCH COMMITTEE

PROMOTING THE ETHICAL CONDUCT OF RESEARCH
Executive Committee: *Dr.C.Mwansamb (Chairman), Prof. E. Molyneux (Vice Chairperson)*
Registered with the USA Office for Human Research Protections (OHRP) as an International IRB
(IRB Number IRB00003905   FWA00005976)

Appendix B: Interview guide

Appendix B.1: Interview Guide about general HMIS

Record details on: Meeting Place, Date, Start Time, End time, Language, Interviewee´s name, position, Institution.

1. What data is collected?

2. Who collects the data?

3. How is the data collected i.e. what instruments are used?

4. How is the data analysed? What instruments are use to analyse the data?

5. How is the data reported and to whom?

6. How many reports are produced?

7. What are the uses of your information within the dept. and outside?

8. Which of the data collected are used? By whom? For what?

9. Do you ever get feedback on data you report?

10. What are the problems related to data collection, reports preparation and information flows from the health facilities to higher levels?

11. What gaps do you feel exist between the information you have and the information you need (what other data would like to have)

12. How can the information system and the use of information be improved?

Appendix B.2: Interview Guide for Programme Coordinators and DHMT

1. What are your responsibilities as coordinator of the programme?

2. For each of these duties, what data do you use and need to perform these duties?

3. Where do you find the data required?

4. Is the data easily accessible for you when you need it? If not, how can it be improved?

5. If you need data for a long time, do you refer to the reports from the facilities or do you get if from the HMIS officer?

6. Do you get any data on financial information for the programme? If so, what is the content of the data and how often? How do you use this data?

7. How do you get supplies for the programme and funding for the activities?

8. Do you get data from HR, what data is this on and how often? How do you use this data?

9. What is the worst or best performing facility?

   a. Why, what are the issues there?

   b. How did you know this about the facility?

   c. How did you respond to this situation?

Appendix C: List of HMIS Registers

- **HMIS 1: TTV Register** - records all Tetanus Toxoid vaccines given to all pregnant and all women of childbearing.

- **HMIS 2: Antenatal Care (ANC) Register** - records any services rendered at the ANC clinic

- **HMIS 3A: Maternity Inpatient and Delivery Register: Admissions Book**- captures data on maternity admissions

- **HMIS 3B: Maternity Inpatient and Delivery Register: Discharge Book**- records the conditions of mother, services given and outcome of delivery including the condition of mother and baby at the time of discharge.

- **HMIS 4: Postnatal Register**- captures data on postnatal services given to mothers.

- **HMIS 5: Family Planning Register**- records on family planning services given to clients.

- **HMIS 6: Under One Children Register**- collects data on immunisations, Vitamin A supplementation and growth monitoring services given to under-one children.

- **HMIS 7: Under Five Register** – collects data on growth status and Vitamin A supplementation given to children under five attending the clinic.

- **HMIS 8: Outpatient Register**- records data on diagnosis of diseases and services given at the Outpatient departments of the facility.

- **HMIS 9A: Ward Register Admission Book**- records data on admissions.

- **HMIS 9B: Ward Register Discharge Book**- records on services given to in-patients and the outcome.

Appendix D: Reporting Forms

Appendix D.1: HMIS quarterly reporting form

Picture 3: HMIS quarterly reporting form page 1

Indic No.	Data Elements (DE)	Month April	Month May	Month June	Quarterly Total
	Maternal Services				
39	Number of pregnant women starting antenatal care during their first trimester	2	6	6	14
40	Total number of new antenatal attendees	109	140	127	376
40	Total antenatal visits	329	379	340	1046
41	Number of deliveries attended by skilled health personnel	27	23	24	74
42	Number of women with obstetric complications treated at obstetric care facility	O	O	O	O
43	Number of caesarean sections	O	O	O	O
44	Total number of live births	97	87	31	215
44	Number of babies born with weight less than 2500g	O	O	5	5
45	Number of abortion complications treated	O	O	O	O
46	Number of eclampsia cases treated	O	O	O	O
47	Number of Postpartum haemorrhage (PPH) cases treated	O	O	O	O
48	Number of sepsis cases treated	O	O	O	O
49	Number of pregnant women treated for severe anaemia	O	O	O	O
51	Number of newborn treated for complications	O	O	O	O
52	Number of postpartum care within 2 weeks of delivery	16	18	10	44
	Family Planning				
53a	Number of persons receiving 3 months supply of condoms	1	O	1	2
b	Number of persons receiving 3 months supply of oral pills	6	8	4	18
c	Number of persons receiving Depo-Provera	355	418	379	1152
d	Number of persons receiving Norplant	O	O	O	O
e	Number of persons receiving IUCD	O	O	O	O
f	Number of persons receiving sterilisation method of FP	O	O	O	O
	Child Health				
55	Number of fully immunised under 1 children	29	64	56	149
56	Number of under 1 children given BCG	120	66	99	285
56	Number of under 1 children given Pentavalent-III	41	70	73	184
56	Number of under 1 children given polio-III	51	86	81	218
56	Number of under 1 children given measles 1st doses at 9 months	30	64	51	145
57	Number of Vitamin A doses given to 6 - 59 months population	88	102	49	239
62	Number of under-weight in under-fives attending clinic	29	44	19	92
	Attendance				

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Marlen Stacey Galimoto

Picture 4: HMIS reporting form page 2

Indic No.	Data Elements (DE)	Month April	Month May	Month June	Quarterly Total
30	Number of 15 - 49 years receiving volunteer and confidential testing and serostatus result	47	73	73	193
31	Number of 15 - 49 age group tested HIV positive	26	26	22	74
32	Number of HIV positive persons receiving ARV treatment	114	113	87	344
34	Number of pregnant women receiving VCT and serostatus result	1	16	51	68
35	Number of pregnant women tested HIV positive	1	6	7	14
36	Number of HIV positive women treated for PMCT	14	13	7	34
62	Total number of children attending under-five clinic	934	1197	820	2951
103	Number of OPD attendance	1402	1027	730	3159
	Tuberculosis				
65	Number of confirmed TB new cases	0	3	1	4
66	Number of smear negative and extra-pulmonary cases completed treatment	3	0	0	3
67	Number of new sputum positive cases proved smear negative at the end of treatment	0	0	0	0
	Supplies				
23	Was there any stock outs of SP for more than a week at a time (Y/N)	NO	NO	NO	NO
23	Was there any stock outs of ORS for more than a week at a time? (Y/N)	NO	NO	NO	NO
23	Was there any stock outs of cotrimoxazole for more than a week at a time? (Y/N)	Y	Y	N	NO
23	Was there any stock outs of SP, ORS and co-trimoxazole for more than a week at a time? (Y/N)	Y	Y	N	NO
24	Number of functioning ambulances	0	0	0	0
76	Number of insecticide treated nets distributed	400	400	400	1200
	Community Health Activities				
25	Number of households with access to safe drinking water	324	209	300	
26	Number of households with at least a sanplat latrine	40	40	41	
38	Number of HBC patients followed-up and provided treatment	0	0	0	0
	Human Resources Currently at Work				
7	Clinical Officer	0	0	0	
	Doctors	0	0	0	
	Dental Surgeon	0	0	0	
	Dermatologist	0	0	0	
	Medical Officer	0	0	0	
	Obs/Gynaecologist	0	0	0	
	Ophthalmologist	0	0	0	
	Paediatrician	0	0	0	
	Pathologist	0	0	0	
	Physician	0	0	0	
	Surgeon				

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Marlen Stacey Galimoto

Picture 5: HMIS reporting form page 3

Indic No.	Data Elements (DE)	Month April	Month May	Month June	Quarterly Total
	Environment Health Officer	1	1	1	
	Health Surveillance Assistant	6	6	6	
	Medical Assistant	1	1	1	
	Nurses				
	Registered	3	3	3	
	Enrolled/Midwife	0	0	0	
	Community	3	3	3	
	Pharmacist	0	0	0	
	Physiotherapist	0	0	0	
	Radiologist	0	0	0	
	Technicians	0	0	0	
	Laboratory	0	0	0	
	Pharmacy	0	0	0	
	Radiography	0	0	0	
	All other positions	8	8	8	
	Total personnel currently at work	18	18	18	
	Finance				
56	Total income from cost sharing	0	0	0	
	Physical Facilities				
17	Do you have functioning water supply system? (Y/N)	Y	Y	Y	
17	Do you have functioning electricity? (Y/N)	Y	Y	Y	
17	Do you have functioning communication system? (Y/N)	Y	Y	Y	Y
17	Do you have functioning water supply, electricity and communication system? (Y/N)	Y	Y	Y	
	Management and Supervision				
13	Is the health centre committee functional? (Y/N)	Y	Y	Y	Y
15	Were you supervised by DHMT members using the integrated supervision checklist? (Y/N)	Y	Y	Y	Y
	New Cases (OPD plus Inpatient)				
27	Sexually transmitted infections - new cases	28	34	56	118
29	Syphilis in pregnancy	0	0	0	0
31	HIV confirmed positive (15 - 49 years) new cases	28	25	21	74
37	Opportunistic infections-new cases	98	106	149	353
58	Acute Respiratory Infections-new cases (under 5)	147	90	46	284
60	Diarrhoea non-bloody - new cases (under 5)	50	20	30	100
64	Malnutrition - new cases (under 5)	6	7	4	17
69	Malaria - new cases (under 5)	396	155	163	714
70	Malaria - new cases (5 & over)	245	189	144	587
78	Neonatal tetanus - confirmed new cases	0	0	0	0
79	Cholera - confirmed new cases	0	0	0	0
81	Measles - confirmed new cases	0	0	0	
82	Acute Flaccid Paralysis-confirmed new cases	0	0	0	0
83	Ebola - confirmed new cases	0	0	0	0
84	Meningococcal meningitis - confirmed new cases	0	0	0	0
85	Plague - confirmed new cases	0	0	0	0

Facility Code: 2805

Page 3 of 4

Marlen Stacey Galimoto

Picture 6: HMIS reporting form page 4

Indic No.	Data Elements (DE)	Month April	Month May	Month June	Quarterly Total
86	Rabies - confirmed new cases	0	0	0	0
87	Yellow fever - confirmed new cases	0	0	0	0
88	Dysentery - new cases	0	0	0	0
90	Eye infections - new cases	0	0	0	0
91	Ear infections - new cases	12	17	24	53
92	Skin infections - new cases	13	12	10	35
93	Oral conditions (including dental decay) - new cases	15	14	10	39
94	Schistosomiasis - new cases	10	16	17	43
95	Leprosy - new cases	2	1	2	5
96	Common injuries and wounds (except RTA)	0	0	0	0
98	Number of road traffic accidents	24	29	16	69
	Admissions	1	0	2	3
20a	Bed capacity	14	Change the bed capacity if it is different from		
b	Total number of admissions (including maternity)	27	23	24	74
c	Total number of discharges	27	23	24	74
d	Total inpatient days	40	40	43	123
	Inpatient Deaths (including Maternity Deaths)				
102	Total number of inpatient deaths from all causes (excluding maternity)	0	0	0	0
50	Number of direct obstetric deaths in the facility	0	0	0	0
59	Acute Respiratory Infections-inpatient deaths (under 5)	0	0	0	0
61	Diarrhoea non-bloody (under 5) - Inpatient deaths	0	0	0	0
64	Malnutrition - inpatient deaths (under 5)	0	0	0	0
68	TB - inpatient deaths	0	0	0	0
69	Malaria - inpatient deaths (under 5)	0	0	0	0
74	Malaria - inpatient deaths (5 & over)	0	0	0	0
80	Cholera - Inpatient deaths	0	0	0	0
89	Dysentery - Inpatient deaths	0	0	0	0
98	Number of road traffic accidents - inpatient deaths	0	0	0	0

Facility Code: 2805

Report prepared by   Signature   Date 4/7/06

Report verified by   Signature   Date 4/7/06

Report approved by   Signature   Date 4/7/06

Notes: 1) HMIS-13 has to be completed before transcribing data onto this form
2) Management team has to analyse data and provide feedback to its staff before sending report to DHO
3) This quarterly report is due on **15th of October, January, April and July**

Page 4 of 4

Marlen Stacey Galimoto

Appendix D.2: IDSR Monthly reporting form

Picture 7: IDSR Monthly reporting form

onthly surveillance summary report form in Malawi   37513

alth Facility _____ District _____ Region _____ Month _____ Year _____

Number of sites that are supposed to report _____

Number of sites that reported on time _____

Number of sites the reported late _____

		Out-Patient	In-Patient	
		Cases	Cases	Deaths
Malaria <5 years	Uncomplicated			
	Severe			
Malaria ≥5 years	Uncomplicated			
	Severe			
Malaria in Pregnant Women	Uncomplicated			
	Severe			
In-Patient Malaria with severe anaemia (<5 years)				
Uncomplicated Malaria < 5 years, lab-confirmed				
Uncomplicated Malaria 5+ years lab-confirmed				
Pneumonia (<5 years)				
Severe Pneumonia (< 5 years)				
very severe Pneumonia (< 5 years)				
Diarrhoea with dehydration				
New AIDS cases				
Male Urethral Discharge				
Male Non-vesicular Genital Ulcer				
Female Non-vesicular Genital Ulcer				
Diarrhoea with blood				
Schistosomiasis urinary				
Schistosomiasis intestinal				

Zero reporting for immediately-reportable, case-based disease/conditions:
Total cases and deaths previously reported this month on case forms or line lists

	OUT PATIENT CASES	IN-PATIENT CASES	DEATHS
AFP			
Cholera			
Measles			
Meningitis			
Neonatal Tetanus			
Plague			
Viral Hemorrhagic Fever			
Diarrhoea with blood			

NOTE: Official counts of immediately notified cases come only from case forms or line lists. The counts from the zero-reporting boxes are not official counts.

Analysis, interpretations, comments, and recommendations on both out-patient and in-patient data

Other information:
Look at the trends in the District Analysis Book. Comments on observed trends? Abnormal increase in cases, deaths, or case fatality ratios? Lack of decrease of previous increasing trends? Improving trends?

Conclusions:
Actions taken:
Recommendations:

Sent	Date: _____	Received	Date: _____
Report	Person: _____	Report	Person: _____

• Record above the total number of cases and total number of deaths for each disease/condition except for TB and leprosy which is reported quarterly on separate form
• Pneumonia, and severe pneumonia are defined according to WHO Integrated Management of Childhood Illnesses(IMCI) definitions. Update District Analysis Book if receive late reports from health facilities. If late reports are received from health facilities from previous months, send a separate sheet to the national updating numbers

Marlen Stacey Galimoto

Appendix D.3: IDSR weekly reporting form

Picture 8: IDSR Weekly reporting form

179801

DISTRICT REPORT ON DISEASES UNDER WEEKLY SURVEILLANCE IN MALAWI

Report ID Number (CCC-DDD-YYYY-WW) ____-___-____-__ (County code-District code- Year-Week number)

Year: _____

Week: ___   Week beginning Date __/__/_____   Week ending Date __/__/_____

Health Facility Name: _____

District Name _____   Total population: _____

Number of sites expected to report: _____

Number of sites that reported on time: _____

Number of sites that reported late: _____

Region: _____   Country: **Malawi**

Diseases	Cases	Deaths	Lab confirmed cases	Laboratory specific findings			
					Number		Number
Bloody diarrhoea				SD1		Other Dysentery pathogens	
Cholera				V. cholerae 01		V.cholerae 0139	
Measles							
Meningitis				N.mA		N.mC	
				N.m W135		Hib	
				Pneumo		Other CSM pathogens	
Plague							
Viral haemorrhagic fever				Cremea-Congo		Dengue	
				Ebola		Lassa	
				Marburg		Rift valley	
				Other VHF pathoegens			
Acute Flaccid Paralysis							
Neonatal tetanus							

Source(s): _____

Date of report __/__/_____

Reporting officer: _____

Comments

Marlen Stacey Galimoto

Appendix D.4: EPI monthly reporting form

Picture 9: EPI Monthly reporting form

FORM NO. EPI/VAC/011

HEALTH FACILITY MONTHLY VACCINATION PERFORMANCE AND DISEASE SURVEILLANCE REPORT FORM

NAME OF HEALTH FACILITY_____ DISTRICT_____ REGION South

MONTH August   YEAR 2006   Total population: 9978

* Total no. of planned Imunization sessions: 8   Total no. of cancelled Imunization sessions 0 (0 %)
reasons for cancellation: 0   *(Please fill each and every column: DO NOT LEAVE ANY COLUMN BLANK)*

A) VACCINATION PERFORMANCE

Childhood Vaccinations

Age	Monthly Target	BCG Doses	BCG Cov	Polio 0	Polio 1	Polio 2	Polio 3	Polio Cov	DPT-HepB+Hib 1	DPT-HepB+Hib 2	DPT-HepB+Hib 3	DPT-HepB+Hib Cov	Measles Doses	Measles Cov
Under 1	42	71	169%	31	50	48	60	143%	65	64	69	164%	55	131%
Over 1	0				0				0				0	
Total	42	71	169%	31	50	48	60	143%	65	64	69	164%	55	131%

Drop-out Rate: Polio: 20%   DPT-HepB+Hib: 6%   Overall: 22%

BCG Vials Used (A)	BCG Vials Discarded (B)	BCG Total (A + B)	BCG Wastage Rate	Polio Vials Used (A)	Polio Vials Discarded (B)	Polio Total (A + B)	Polio Wastage Rate	Measles Vials Used (A)	Measles Vials Discarded (B)	Measles Total (A + B)	Measles Wastage Rate
4	0	4	12	10	0	10	6.0%	6	0	6	8%

DPT-HepB+Hib Vials Used (A)	DPT-HepB+Hib Vials Discarded (B)	DPT-HepB+Hib Total (A + B)	DPT-HepB+Hib Wastage Rate	TT Vials Used (A)	TT Vials Discarded (B)	TT Total (A + B)	TT Wastage Rate
99	0	99	0%	8	0	8	10%

Tetanus Toxoid Vaccination

	MONTHLY TARGET	TT 1	TT 2 Doses	TT 2 Cov	TT 3	TT 4	TT 5	TT 2+ Doses	TT 2+ Cov
Pregnant Women	42	24	21	50%	5	2	1	8	19%
Others (15-45 years)	199	58	14	7.0%	6	3	1	10	5%
Total	233	82	35		11	5	2	18	

VITAMIN A SUPPLEMENTATION

Children Under one year	Children over one year	Postnatal mothers
13	138	46

Adverse effects Following Immunization -AEFI (detailed report form must be submitted immediately for each case)

	BCG	OPV	DPT-HepB+Hib	MEASLES	TT
Cases	0	0	0	0	0

(C) DISEASE SURVEILLANCE
Suspected Measles Cases

Number of cases reported	Number of cases investigated	Number of cases with blood specimen collected
0	0	0

Acute Flacid Paralysis (AFP)

No. cases Reported	No. cases investigated	Number of cases investigated Within 0-14 days	Number of cases investigated Above 14 days	No. with one stool specimen collected	No. require follow up at 60 days
0	0	0	0	0	0

Neonatal Tetanus (NNT)

Number of NNT cases Reported	Number of NNT cases investigated	Total number of neonatal deaths (NNDs)	The number of neonatal deaths with unkown cause	Total number of NNDs with unkown cause investigated
0	0	0	0	0

Date of submission to District: 1/9/06   Reporting Officer: _____

Date Received at District: 4/9/06   Receiving Officer: _____

Send this report to your District MCH Coordinator before 7th day of the following month.   0

Marlen Stacey Galimoto

Appendix D.5: Family Planning reporting form

Picture 10: Family Planning monthly reporting form page 1

REPUBLIC OF MALAWI
MINISTRY OF HEALTH

CODE....................
Office use only

MONTHLY SUMMARY FORM FOR FAMILY PLANNING CLINIC

A: METHOD OF CONTRACEPTION

District.......................... Name of Clinic:............. Month............. Year............
(Please complete all above spaces)

Method of Contraception	Clients	Subsequent 1st Visit	This Year Revisit	Restarting	Discontinuing	Cycles/ Units
1. Lofemenol						
2. Ovrette						
3. Other Oral						
4. Lippes						
5. Copper T						
6. Other IUCD						
7. Depoprovera						
8. Norplant						
9. Tubal Ligation	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX					
10. Vasectomy	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX					
11. Condom Reg Client						
12. Spermicides Tabs						
13. Other Methods						

Clients Counselled : New.................................. Old............................ Dropouts..............

Clients Changing Methods..

Total Non-Registered Clients Issued Condoms...

Postnatal Check-ups: 1 Week...................... 6 Weeks...................... Absentees:..............

Comments : _____

_____

_____

_____

_____

Marlen Stacey Galimoto

Picture 11: Family Planning reporting form page 2

B. AGE OF NEW CLIENTS

Method	>20	20-24	25-29	30-34	35-39	40-44	45-49	49+
Oral								
IUCD								
Depoprovera								
Norplant								
Vasectomy								
Tubal Ligation								
Others								

C. PARITY OF NEW CLIENTS

Method	0	1	2	3	4	5	6	7	8	9	9+
Oral											
IUCD											
Depo											
Norpla.											
Vasec											
Tubal L.											
Others											

D. REASON FOR DISCONTINUATION (DISCONTINUING CLIENTS ONLY)

Method	Want Another Child	Abnormal Bleeding	Pelvic Infection	Severe Headache	Pregnancy	High Blood Pressure	Other Side Effects
Oral							
IUCD							
Depo							
Norpla.							
Vasec							
Tubal L.							
Others							

Prepared by:.............................. Signature.......................... Date..........................
MED.

Marlen Stacey Galimoto

Appendix D.6: Safe Motherhood reporting form

Picture 12:Safe Motherhood reporting form

MONTHLY SAFEMOTHERHOOD REPORT FORM

Name of Facility:... District:...

Month:......July.. Year:......2006.............................

Name and position of officer completing the form:

....

01	Catchment population	14, 000
02	Maternity admissions	83
03	Women delivered	26
04	Babies born	26
05	Stillbirths	mac 1
06	Neonatal deaths (0 - 7 days)	0
07	Women with EOC	0
08	Total maternal deaths	0
09	Direct obstetric maternal deaths	0
10	Referrals from other facilities	0
11	Referrals from TBAs	0
12	Referrals to other facilities	5
13	Caesarean sections	0

Emergency Obstetric Care Functions: Tick if any of the following procedures was performed during the month (for a pregnant or postpartum case):

		TICK
14	iv or im. antibiotics	
15	iv or im oxytocics drugs	
16	Removal of retained placenta	
17	iv or im anticonvulsants	
18	Removal of retained products	
19	Vacuum Extraction/Forceps/Destructive Operation	
20	Caesarean Section	
21	Blood transfusion	

Marlen Stacey Galimoto

Appendix D.7: PMTCT reporting form for UNICEF

Picture 13: PMTCT reporting form to UNICEF

Marlen Stacey Galimoto

Appendix D.8: Customised PMTCT reporting form

Picture 14: Customised PMTCT reporting form

Appendix D.9: VCT reporting form for MoH

Picture 15: VCT reporting form for MOH

COUNSELLING & TESTING MONTHLY REPORT

HEALTH FACILITY: _____ 2005

FOR THE MONTH OF: JANUARY

INDICATOR	FIGURES
	808
Total Pre-Counselled Clients	806
Total HIV Tested	806
Total Post-Counselled Clients	440
Total number of (a) Male	368
(b) Female	68
(c) PMTCT	64
(d) Breastfeeding Mothers	381
(e) 15 – 24 Years	401
(f) 25 – 49 Years	26
(g) > 49 Years	21
(h) TB Clients.	79
(i) Diagnostic	94
(j) STI	21
(l) ARV	203
TOTAL NUMBER OF REACTIVE CLIENTS	79
(a) Male	124
(b) Female	5
(c) PMTCT	28
(d) Breastfeeding	50
(f) 15 – 24 Years	138
(g) 25 – 49 Years	16
(h) > 49 Years	20
(I) TB Clients.	54
(i) Diagnostic	09
(j) STI	17
(l) ARV	50
TOTAL NUMBER OF COUPLE	04
TOTAL NUMBER OF DISCORDANT RESULTS	02
TOTAL NUMBER OF CLIENTS REFUSED TEST	1
CLIENTS RECEIVED NEVERAPINE (a) Mothers	1
(b) Babies	75
TOTAL NUMBER OF CLIENTS REFFERED TO OTHER SERVICES	

Compiled by: _____ Signature: _____

DATE: 05 / 02 /2005

Marlen Stacey Galimoto

Appendix D.10: VCT reporting form for MSH

Picture 16: VCT reporting for MSH

HIV MONTHLY REPORT FORM

District	
Hospital	
Month	MAY 2006

HIV test group	Number	
	Male	Female
VCT (walk-in clients)	25	26
ANC (Routine Counselling and Testing)		
New ANC visits		
Tested	N/A	N/A
Positive		
# Persons Nevirapine provided to		
TB (Routine Counselling and Testing)		
New	38	30
Tested	14	14
# TB patients receiving Cotri Prophylaxis	14	04
STI (Routine Counselling and Testing)		
Number visits		
Tested	01	04
Diagnostic Counselling and Testing (OPD and wards)	03	10
Blood Donor tests		
VCT tests at other sites		
Mobile unit		
HC 1		
HC 2		
HC 3		
HC 4		
	Balance beginning of month	Balance end of month
HIV Test Kits		
Determine HIV	13	19
Heamastrip	0	0
Unigold	23	19
Bioline	0	0

This form is to be used by MSH staff only and once the data collected it shoulsd be sent to MSH in Lilongwe

Marlen Stacey Galimoto

Appendix D.11: ART reporting form

Picture 17: ARV reporting form, page 1

Quarterly ARV Assessment: *(assess for the quarter being evaluated)* __Q 2. 2006__

<u>Case Data:</u>

Number of patients started on ARV therapy in the last quarter __127__

Number of men started __42__   Number of women started __85__

Number of adults (13 and above) __123__   Number of children (12 and below) __4__

Occupation: Housewives __46__ Farmers __18__ Soldiers/Police __1__ Teachers __3__

Business __10__ Health care workers __1__ Students/school __1__ Other __46__

Reasons for starting: Stage III __14__ Stage IV __10__ CD4 count __3__

Indicate number started because of TB __15__ (PTB __12__ EPTB __3__ Not known __0__)

Indicate number of pregnant women started on ART from PMTCT __0__

<u>Outcome Data:</u>

Number alive and on ART __112__

(Number alive and on first line regimen (Start) __111__)

(Number alive and on alternative first line regimen (Substituted) __1__)

(Number alive and on second line regimen (Switch) __0__)

Number who have died __10__

Number who have defaulted __0__

Number who have stopped __0__

Number who have transferred out __5__

Of the number alive and on ARV therapy:

Number who are ambulatory __112__

Number who are at work __112__

Number who have side effects __1__

Number adults on 1ˢᵗ line regimen with pill count done in last month of quarter __112__

Number with the pill count in the last month of the quarter at 8 or less __112__

<u>Of those who died:</u>   Number in month 1 __8__ Number in month 2 __1__

Number in Month 3 __0__ Number after month 3 __0__

Marlen Stacey Galimoto

Picture 18: ARV reporting form, page 2

Cumulative ARV assessment: for patients registered up to Q2. 2006

Case Data:

Total number of patients ever started on ARV therapy_____634_____

Number of men started___259___   Number of women started___375___

Number of adults (13 and above)_626_   Number of children (12 and below)_8_

Occupation: Housewives_286_ Farmers_114_ Soldiers/Police_9_ Teachers_18_

Business_69_ Health care workers_15_ Students/school_11_ Other_____ 186

Reasons for starting: Stage III_525_ Stage IV_99_ CD4 count_10_

Indicate number started because of TB_150_ (PTB_129_ EPTB_21_ Not known_286_)

Indicate number of pregnant women started on ART from PMTCT_____0_____

Outcome Data:

Number alive and on ART_____430 388_____

(Number alive and on first line regimen (Start)____28 386____)

(Number alive and on alternative first line regimen (Substituted)___2___)

(Number alive and on second line regimen (Switch)_____0_____)

Number who have died_____150_____

Number who have defaulted_____13_____

Number who have stopped_____6_____

Number who have transferred out_____77_____

Of the total number alive and on ARV therapy:

Number who are ambulatory_____388_____

Number who are at work_____430 388_____

Number who have side effects_____1_____

Number adults on 1st line regimen with pill count done in last month of quarter___388

Number with the pill count in the last month of the quarter at 8 or less___430 388

Of those who died: Number in month 1_61_ Number in month 2_44_

Number in Month 3_15_ Number after month 3_30_

Marlen Stacey Galimoto

Picture 19: ARV reporting form, page 3

Number of HIV-related diseases diagnosed in the quarter:

Specify the quarter:_____

TB patients registered in TB Register_____225_____

Kaposi's Sarcoma patients_____63_____

Cryptococcal meningitis patients in Diflucan Register_____

Oesophageal candida patients in Diflucan Register_____

Appendix D.12: Malaria Control Programme reporting form

Picture 20: Malaria Control reporting form for Chikwawa

Health Facility Level Monthly Reporting Format

Health Facility Level
Monthly Malaria Control Program Activity Reporting Form

I. General Information

Name of Health Facility:	Month: MAY	Year:2006

Catchment Population: 18304

II. Malaria Cases

Reported cases and deaths	Under five years	Five years & over	Pregnant Women	Total
Total # of cases(in patients $ out patients)	174	101	6	275
Total # of admissions	4	0	0	4
Total # of deaths	0	0	0	0

III. Intermittent presumptive treatment (IPT) and Iron supplementation

IPT	1st Dose	2nd Dose	Total
Number of pregnant women received SP	36	62	
Number of pregnent women received iron supplements			

IV. Supplies
1. Insecticide Treated Mosquito Nets (ITNs)

1.Health Facility Based Distribution (HFBD)		2. Community Based Distribution (CBD)	
# of ITNs in stock(beginning of the month)	0	# of CBD sites in the district	
# of ITNs received (during the month)	0	# of ITNs in stock (beginning of the month)	
# of children U5s received ITNs	0	# of ITNs received (during the month)	
# of P/W received ITNs	0	# of ITNs distributed / sold	
# of ITNs in stock (at the end of the month)	0	# of ITNs in stock (at the end of the month)	
# of HFs experienced ITNs stock outs (if any)	N/A	Amount of money collected (MK)	
Average duration of stock out-weeks (if any)	N/A	# of CBD sites with stock outs (if any)	
		Average duration of stock out (if any)	

2. Anti-malaria Drugs

Anti-malarial drugs		Balance in stock	# of Hfs with stock - outs	Average duration of stock - out
SP of tablets	tabs	2000		
Paracetamol of	tabs	0		4 Weeks
Oral quinine	tabs	1200		
Quinine IV / IM of Ampoules		60		
50% dextrose of				
Others				

Name of person reporting...................Signature...................Date.02/06/2006...................

Marlen Stacey Galimoto

Picture 21: Malaria Control reporting form- Chiradzulu

MALARIA CONTROL PROGRAMME

MONTHLY MONITORING OF MALARIA MORBIDITY MORTALITY

DISTRICT: ....

MONTH: ....

YEAR: ....

NAME OF REPORTER: ....

NUMBER OF HEALTH FACILITIES IN THE DISTRICT: ....

NUMBER OF HEALTH FACILITIES REPORTED: ....

	UNDER 5 YEARS	5 YEARS AND ABOVE	Total
Clinical malaria outpatient:			
Malaria inpatient:			
Severe malaria inpatient:			
Malaria deaths:			
Outpatient:			
Number of MP-slides taken:			
Positive MP-slides:			
% Positive:			
Inpatient			
Number of MP-slides:			
% Positive:			
	Anaemia	Severe Anaemia	Total
Under 5 inpatient			
Under 5 inpatient anaemia deaths			

[This copy to be sent within 4 weeks after the end of the month to the RHO (Attention: Regional Malaria Manager and to the CHSU when the RHOs are phased out].

Marlen Stacey Galimoto

Appendix E: Detailed MSH Leading and Managing Framework

Leading & Managing Framework
Practices that enable work groups and organizations to face challenges and achieve results

Leading

SCANNING
- Identify client and stakeholder needs and priorities.
- Recognize trends, opportunities, and risks that affect the organization.
- Look for best practices.
- Identify staff capacities and constraints.
- Know yourself, your staff, and your organization — values, strengths, and weaknesses.

ORGANIZATIONAL OUTCOME: Managers have up-to-date, valid knowledge of the organization and its context; they know how their behavior affects others.

FOCUSING
- Articulate the organization's mission and strategy.
- Identify critical challenges.
- Link goals with the overall organizational strategy.
- Determine key priorities for action.
- Create a common picture of desired results.

ORGANIZATIONAL OUTCOME: Organization's work is directed by well-defined mission, strategy, and priorities.

ALIGNING/MOBILIZING
- Ensure congruence of values, mission, strategy, structure, systems, and daily actions.
- Facilitate teamwork.
- Unite key stakeholders around an inspiring vision.
- Link goals with rewards and recognition.
- Enlist stakeholders to commit resources.

ORGANIZATIONAL OUTCOME: Internal and external stakeholders understand and support the organization's goals and have mobilized resources to reach these goals.

INSPIRING
- Match deeds to words.
- Demonstrate honesty in interactions.
- Show trust and confidence in staff, acknowledge the contributions of others.
- Provide staff with challenges, feedback and support.
- Be a model of creativity, innovation, and learning.

ORGANIZATIONAL OUTCOME: Organization displays a climate of continuous learning and staff show commitment, even when setbacks occur.

Managing

PLANNING
- Set short-term organizational goals and performance objectives.
- Develop multi-year and annual plans.
- Allocate adequate resources (money, people, and materials).
- Anticipate and reduce risks.

ORGANIZATIONAL OUTCOME: Organization has defined results, assigned resources, and an operational plan.

ORGANIZING
- Ensure a structure that provides accountability and delineates authority.
- Ensure that systems for human resource management, finance, logistics, quality assurance, operations, information, and marketing effectively support the plan.
- Strengthen work processes to implement the plan.
- Align staff capacities with planned activities.

ORGANIZATIONAL OUTCOME: Organization has functional structures, systems, and processes for efficient operations; staff are organized and aware of job responsibilities and expectations.

IMPLEMENTING
- Integrate systems and coordinate work flow.
- Balance competing demands.
- Routinely use data for decision making.
- Coordinate activities with other programs and sectors.
- Adjust plans and resources as circumstances change.

ORGANIZATIONAL OUTCOME: Activities are carried out efficiently, effectively, and responsively.

MONITORING & EVALUATING
- Monitor and reflect on progress against plans.
- Provide feedback.
- Identify needed changes.
- Improve work processes, procedures, and tools.

ORGANIZATIONAL OUTCOME: Organization continuously updates information about the status of achievements and results, and applies ongoing learning and knowledge.

MSH MANAGEMENT SCIENCES for HEALTH
M&L | Management & Leadership Program

Figure 7.1: MSH Leading and Managing Framework

(Source: MSH website)

Marlen Stacey Galimoto