UNIVERSITY OF THE WITWATERSRAND

SCHOOL OF PUBLIC HEALTH

RESEARCH REPORT FOR MASTER OF PUBLIC HEALTH

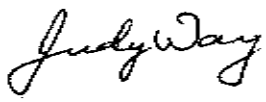
FORECASTING ANNUAL DISTRICT DRUG AND BUDGET REQUIREMENTS: WHAT EXISTS? WHAT IS NEEDED?

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the Degree of Master of Public Health

Shiou-Chu (Judy) Wang
Student Number: 0707615J
6th May 2011

DECLARATION

I, Shiou-Chu Wang, declare that this dissertation is my own work. It is being submitted for the degree of Master of Public Health in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.



.....

6th May 2011

.....

ABSTRACT

Introduction: Malawi's health budget has been allocated to the districts on a per capita basis, including a fixed proportion for drugs, since 2006 in line with its decentralization policy. Districts are expected to propose implementation plans without estimating their drug requirements. Health information systems have been in place to collect epidemiological and logistical data to enable decision-making for health services. However, drug supply has been problematic due to mismatches between the availability of drugs in the Central Medical Stores and demand for services in health facilities. This study explores the prospects of district managers forecasting drug requirement and estimating drug budgets. The specific objectives are to determine how district health officers and pharmacy technicians monitor their drug expenditure; to determine their knowledge about the use of current health information systems; and to determine their perceptions, capacity and willingness to forecast drug and budget requirements.

Materials and Method: This is a cross sectional descriptive study. District health officers and pharmacy technicians-in-charge from 27 districts were selected and sampled from 29 districts. A self-administered structured questionnaire was used for data collection. The approved drug budget and expenditure for the fiscal year 07/08 and 08/09 was collected from the National Local Government Finance Committee. A

Chi-square test analysed the questionnaire data.

Results: The respondents performed basic drug expenditure monitoring. However, their capacity to use analytical techniques to monitor a drug budget and set priorities proved inadequate. Two systems, the Logistics Management Information System and the Health Management Information System, are considered useful, but half of the respondents feel they will spend more time planning and monitoring drug supply and expenditure. However, they understand the benefits of forecasting drug and budget requirements and are willing to do so, despite having less confidence in the supply capacity of Central Medical Stores (CMS).

Discussion: Some of the literature presents similar results concerning health workers' willingness to control drug costs in spite of their limited capacity. Training health workers in the management of drug budgeting and inventory has been successful in some programmes. The concern about poor data in the health information systems in this study is identical to previous assessments. Hence, the development of health information systems toward a user-friendly approach featuring multi-functions is suggested in some articles. In response to the concerns about Central Medical Stores, a government official has reported on the government's efforts toward restructuring the CMS into an autonomous organization.

Conclusion: Advantageously, several enabling factors exist for forecasting drug and

budget requirements for the districts, namely motivation, availability and use of health information systems. However, training in analytical techniques, revising the current health information systems, and expediting the reform of CMS, are required.

ACKNOWLEDGEMENTS

It is almost impossible to undertake this study without the assistance of other individuals. I may not be able to name them all but I am grateful to all of them.

I would like to thank Dr. Julia Moorman, my supervisor, for her tireless advice and support. Special word of thanks is given to Mr. Godfrey Kadewele, the Deputy Director of Department of Health Technical Support Service Pharmaceutical Division, Ministry of Health of Malawi, for his encouragement and moral support. I would also like to thank Mr. Joseph Wu, a lecturer for Epidemiology at Mzuzu University in Malawi, for his advice on data analysis. My appreciation is also given to Dr. Solomon Chen for his instruction on using Endnote for the management of the literature. I am thankful to my colleagues at the Management Sciences for Health / Strengthening Pharmaceutical Systems programme in Malawi for their assistance in delivering and collecting questionnaires and for their understanding and support. I would also like to express my gratefulness to the respondents for their participation. I cannot afford to miss Mr. Ozy Abram from Uni-Edit who assisted me in editing my report. Finally, I would wish to thank my parents for their understanding and moral support.

The journey would have been much longer and tougher without all these supports. I thank you all.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

NOMENCLATURE

CMS	Central Medical Stores. A government owned organization that is responsible for the procurement and distribution of health commodities for all public sector health facilities. Its structure includes the Headquarters for procurement and administration, and three regional medical stores for distribution.
DA	District Assemblies, the local government authorities based in the district level. According to the Malawi decentralization policy, central administration authority and implementation responsibilities are devolved to the District Assemblies from the central level.
DHO	District Health Officers, the overall in-charge of the health districts
DIP	District Implementation Plans. The health districts develop their annual activities and necessities for service delivery.
EHP	Essential Health Package. A package of core primary health care services that was articulated in 2003 in Malawi.
HMIS	Health Management Information System. A monitoring and evaluation system which captures patients' clinical data and produces health information reports
HMN	Health Metrics Network. A global partnership dedicated to strengthening national health information systems.
HTSS-Pharm	Department of Health Technical Support Services - Pharmaceutical Division. The department includes three Divisions – Pharmaceutical, Diagnostics, and Physical Asset management. The Pharmaceutical Division oversees the national pharmaceutical services.

LMIS	Logistics Management Information System which tracks the movement of essential pharmaceuticals and produce stock reports. It includes manual record keeping (stock cards) and monthly reporting procedures, as well as electronic data capturing procedure using Supply Chain Manager.
MOF	Ministry of Finance
MOH	Ministry of Health
MLGRD	Ministry of Local Government and Rural Development
NHSRC	National Health Sciences Research Committee of Malawi
NLGFC	National Local Government Finance Committee
RMS	Regional medical stores. The depots that receive health commodities from CMS and distribute them to the public health facilities.
SCMger	Supply Chain Manager. A software for the Logistics Management Information System, which is used in the district pharmacies to capture each facilities' inventory data and provide resupply information and logistics reports.
SWAp	Sector Wide Approach. Pooled funding to a sector from multi-donors.

CHAPTER 1 INTRODUCTION

1.1 Introduction

This chapter offers an overview of the pharmaceutical[1] management cycle and its application to the planning and monitoring of pharmaceutical supply and expenditure. The background of the health and pharmaceutical supply and management systems in Malawi is then described. This is followed by a literature review encompassing decentralisation, pharmaceutical supply and budget allocation, as well as health information systems. The problem statement follows, along with the justification for the study. Finally, the aim and objectives of the study described in this research report are set out.

1.1.1 Overview of Pharmaceutical Management Cycle

The management of pharmaceutical supplies is a key component of any health system. A sound pharmaceutical supply system requires effective management with respect to selection and procurement of drugs and their subsequent distribution, and

[1] "Drugs", "medicines", "pharmaceuticals", "medical supplies" and "health commodities" are terms all used in various papers to mean medicines and medical supplies. The National Health Services Research Committee of Malawi requested the researcher to use the term "pharmaceutical(s)" in the research proposal because they supposed that pharmaceuticals include drugs and medical supplies. Therefore, "pharmaceutical(s)" will be used primarily in this paper. However, when citing from other papers, the term used in the cited papers will remain the same. The term "drug budget" will be used to stand for the budget for pharmaceuticals since the term is widely used in Malawi.

use. This system is built in the context of management support (human resources, financing and information) as well as a policy and legal framework, as shown in Figure 1.1 (MSH, 1997).

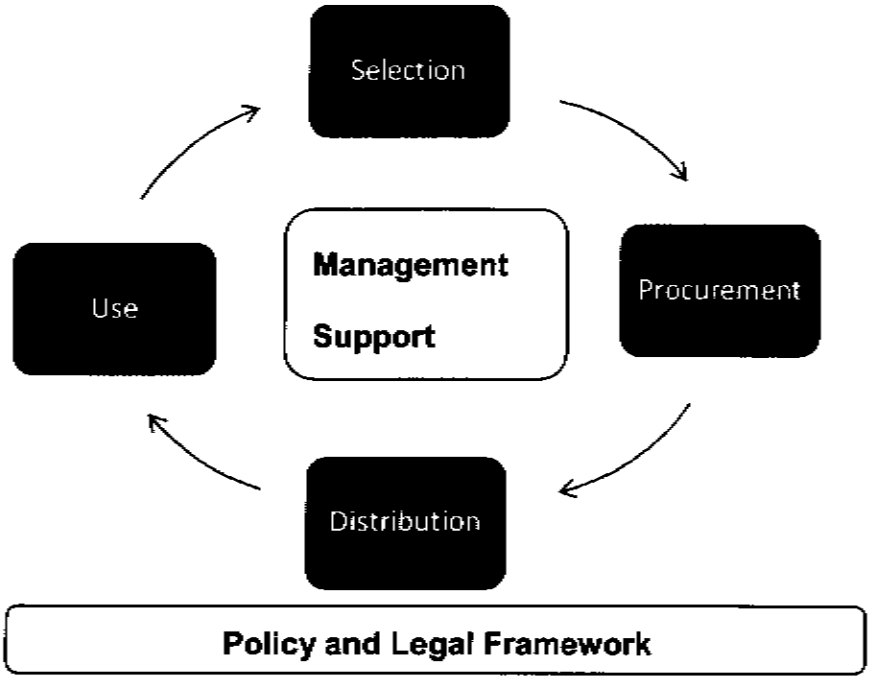


Figure 1.1 Pharmaceutical Management Cycle

Figure 1.1 illustrates the cyclic nature of the pharmaceutical management system. This system, with the guidance of policy and regulation, includes item selection usually based on a list of essential medicine; an estimation of the quantities required for a defined period of time (quantification), along with a budget estimation; the procurement of pharmaceuticals based on the selected items and the estimated quantities with respect to the available budget; the distribution of the

pharmaceuticals based on inventory information (consumption, stock level, and requirement); and use, based on standard treatment guidelines. The distribution (logistics) and use (consumption) information is then used for selection and quantification: i.e. a new cycle starts. This pharmaceutical management cycle requires sound management support to ensure qualified or trained staff operate the system; sound financial management for drug funds, and reliable information systems to generate accurate data for the health mangers to work with. This pharmaceutical management system is to achieve one of the objectives of WHO health system framework: a well-functioning health system ensures equitable access to essential medical products, vaccines and technologies of assured quality, safety, efficacy and cost-effectiveness, as well as scientifically sound and cost-effective use (WHO, 2010).

A consistent pharmaceutical supply is undoubtedly one of the key factors to ensure quality health services. However, a shortage of pharmaceuticals has been a challenge in countries with limited resources, including Malawi (Korte, Richter, Merkle & Gorgen, 1992; Kemp, Atiken, Legrand & Mwale, 2003; Lufesi, Andrew & Aursnes , 2007; Carson, Boivin, Chirwa A, Chirwa S & Chitalu, 2008; Tetteh, 2009). Problems at any stage of the pharmaceutical management cycle could lead to a

shortage of pharmaceuticals. These include inadequate capacity for selection and quantification, an inappropriate system or inadequate capacities for procurement and distribution, irrational use of pharmaceuticals, poor quality of health information, shortage of funds, and inefficient financial management.

The pharmaceutical management cycle starts with a planning process involving selection and quantification. This process forecasts the pharmaceutical and budget requirements based on past usage and what services will be provided in the future. The forecast then guides the procurement and distribution. Therefore, a dependable forecast should lead to a reliable pharmaceutical supply.

Forecasting pharmaceutical and budget requirements cannot be conducted without subsequent monitoring of the pharmaceutical supply and expenditure. The monitoring process is comprised of a number of elements. Firstly, to monitor the actual approved budget amount and whether it is allocated in accordance with the forecasted requirement; secondly, to monitor whether the actual pharmaceutical requirement is consistent with what was forecasted, and to identify whether there is any abnormal consumption; thirdly, to monitor whether the suppliers satisfy the requirement of the districts; lastly, to monitor the payments to the suppliers and

analyse the expenditure pattern. Lessons learned from the monitoring process will assist the next planning and implementation cycle.

Effective planning and monitoring require reliable information. Health information systems provide morbidity data, pharmaceutical use and logistics data, as well as expenditure data through data collection and analysis. However, without good quality data that is properly utilized, the information systems will not serve their purpose.

This study will use these concepts to determine whether the forecasting of pharmaceutical and budget requirements by district managers would be feasible in Malawi. This should help identify existing capacities, which are advantageous in this regard, along with any weaknesses that need to be addressed.

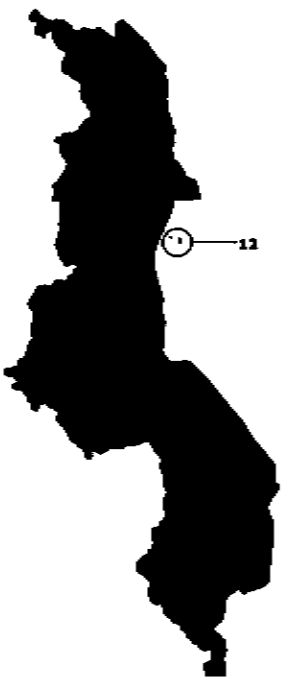


Figure 1. 2 Map of Malawi with regions and districts

1.2 Background

1.2.1 Health System

Malawi is a land-locked country in southeast Africa. It is bordered by Zambia to the northwest, Tanzania to the northeast, and Mozambique on the east, west, and south. Its

size is 118,484 km^2 with 20% covered by Lake Malawi. The total population is estimated at 13,066,320 (NSO_Malawi, 2008). Malawi is divided into three Regions (Northern, Central and Southern), which are subdivided into five health zones and then into 28[2] districts (see Figure 1.2) Although there are 28 districts, there are 29 health districts as in 2009, Mzimba District was divided into two health districts[3] – Mzimba North and Mzimba South. Each zone has between four and seven districts. There are between three and forty-seven health centres in a district. Every health district, except four, has a district hospital. Health centres and rural hospitals are responsible for primary care, while district hospitals handle secondary care. There are four central hospitals in the main cities providing tertiary care. They also provide some secondary care for the district in which they are situated, and primary care when patients bypass the referral system. All these levels of health care services are provided free of charge to all patients.

1.2.2 Health Sector Reform

In recent years, health sector reforms in Malawi have focused on decentralisation to enable health districts to take responsibility for health care and deliver a more efficient service. Some core functions, such as planning and financial management

[2] Number 18 on the map includes two districts: Mwanza and Neno districts. Neno district was created from a division of Mwanza District.
[3] The Ministry of Health established two District Health Offices in Mzimba District – Mzimba South and Mzimba North. The current Mzimba South District Health office was the former Mzimba District Health Office.

have devolved to District Assemblies (DA) (Conticini, 2004).

A District Health Management Team (DHMT), which is headed by a District Health Officer (DHO), has been established in all districts to oversee primary and secondary health services in its catchment area. The main function of the DHMT is to coordinate the provision of promotive, preventive, curative and rehabilitative services, to ensure that sufficient resources are available, and that they are effectively and efficiently used. With the implementation of the decentralisation policy, the DHMT was integrated into the District Assembly (DA) structures, whereby the DHOs now report directly to the District Commissioners (DC). The main role of Ministry of Health is now to provide technical support to the local assemblies in the efficient implementation of their health plans (HMN, 2009).

In 2004, the government of Malawi and its development partners signed a memorandum of understanding for the financial support to its six-year Programme of Work (POW) under the umbrella of Sector Wide Approach (SWAp). The basis of POW is the Essential Health Package (EHP), which is a prioritised minimum package of services to combat 11 major diseases or health conditions. The EHP has been provided free of charge at the point of delivery to all Malawians (Carson et al.,

2008, Health Metrics Network, 2009). The essential pharmaceutical list for the implementation of the EHP was developed in 2003. Pharmaceutical procurement, distribution, and management, as well as planning and budgeting, have been the most important supportive services of the Essential Health Package (Pearson, 2010). The new Malawi Standard Treatment Guidelines (MSTG) and Malawi Essential Medicine List (MEML), which were revised in 2009, provide more guidance on the rational use of medicines. They also play a role in the cost control of the medicines by limiting the prescriptions to the essential medicine list.

1.2.3 Planning and Allocation of Health and Drug Budget

A National Local Government Finance Committee (NLGFC) was established in 2001 to provide technical support for financial management to local authorities. Section 149 of the Constitution specifies the mandate of the NLGFC as follows: to receive all estimates of revenue for and expenditure of all local Assemblies; to examine and supervise the accounts of local government authorities in accordance with any Act of Parliament; to make recommendations relating to the distribution of funds allocated to local government authorities; to prepare a consolidated budget for all Local Government Authorities and estimates after consultation with the Treasury, which shall be presented to the National Assembly for information purposes before the

commencement of each financial year; and to make an application to the Minister of Finance for supplementary funds, where necessary (Ministry of Local Government and Rural Development, 2005).

NLGFC publishes the approved budget and expenditure estimates for all local Assemblies in the "Ministry of Local Government and Rural Development Consolidated Local Authorities [financial year] Budget Estimates". The committee consolidates 9 months of expenditures from all the districts, and adds the estimated expenditures for the remaining 3 months (adjusted from the 9-month expenditures). This makes the estimated expenditures for a year. NLGFC suggested there is approximately a 3% bias from their actual expenditures. NLGFC makes an application for supplementary funds based on its 3-month estimates where necessary.

Since 2004, all levels of the health facilities have the same priority, which is to implement the delivery of core primary health care services - the Essential Health Package. All the districts should include the EHP in their District Implementation Plans (DIP) annually. Since the fiscal year 2006/07 (FY06/07), funding for health services is channelled to each District Assembly by the Treasury Department of the

Ministry of Finance (MOF) on a per capita basis.

However, the planning of the drug budget[4] is not included in the DIP because this is not required. The Ministry of Health, based on the district population, annually proposes the health budget for each district implementation plans. Thirty percent (30%) of the district health budget is proposed for pharmaceuticals. However, the final allocation is subject to the availability of funds in the Ministry of Finance (MOF).

Prior to 2006, money for drugs was not sent to districts at all but was retained in the Treasury and it was paid directly to Central Medical Stores. According to NLGFC, most of the districts were unable to provide drug budget and expenditure information for FY06/07 due to capacity constraints. The drug expenditure estimates data for FY07/08 and FY08/09 shows 32% of the districts overspent their drug budget. This raises concerns about whether the drug budget was allocated equitably, and whether the districts managed their budgets efficiently.

1.2.4 Pharmaceutical Management and Supply System

There are two key offices in the Ministry of Health that are crucial in pharmaceutical

[4] "Drug budget" is widely used than "pharmaceutical budget" in Malawi. It is the budget for all pharmaceuticals, including medicines and medical supplies.

supply and services: the Department of Health Technical Support Services Pharmaceutical Division (HTSS-Pharm) and Central Medical Stores (CMS). HTSS-Pharm is the central pharmaceutical authority for Malawi's public health system. It takes the leading role in policy and strategic plans, and provides technical support to the public health facilities in pharmaceutical services.

CMS is a government owned organization responsible for the procurement and distribution of pharmaceuticals for all public health facilities. Its organizational structure includes a headquarters and three regional medical stores (RMS). The headquarters is responsible for procurement, while the RMS are responsible for the distribution of pharmaceuticals to the health facilities. RMS are not only the sales depots for public health facilities, but also the optional suppliers of faith based health facilities and non-governmental organizations. CMS has been undergoing a process of strengthening its capacity and there are plans to make CMS an autonomous body. (Glocoms, Nyasa_Times, 2010).

The whole procurement process in CMS takes between 12 and 18 months. After receiving a consignment, CMS distributes the pharmaceuticals to Regional Medical Stores. The allocation of pharmaceuticals to each Region is based on their

population: i.e., 20% of the total supply goes to the Northern Region, 35% to the Central Region and 45% to the Southern Region (Carson et al., 2008).

Prior to the fiscal year 2006/07, all public health facilities were obliged to procure their pharmaceuticals from RMS. The funds for pharmaceuticals were retained in the Treasury, and were paid directly to CMS after the districts sent their invoices to the Accountant General. Since FY06/07, the drug budget has been released to the districts and central hospitals on a monthly basis in line with the decentralisation policy. The districts and central hospitals now pay RMS after they are supplied with pharmaceuticals. In the meantime, owing to the erratic availability of pharmaceuticals in the RMS, the Ministry of Health has allowed the districts and central hospitals to procure pharmaceuticals from private suppliers, with prior approval by the CMS, in the event of the RMS not having the pharmaceuticals they need (Carson et al., 2008). This was a significant development for the districts and central hospitals in terms of their "decision space[5]" for the use of their drug budget.

However, the districts have accrued drug bills with CMS. In some instances, however, it has been discovered that the level of unpaid bills reported by CMS has been at

[5] Bossert introduced "Decision Space" in 1998 as an analytical approach for the assessment of decentralisation. It defines decentralisation as the degree of choice that local officials have over different health system functions (Bossert et al 2007).

variance with the actual drugs ordered and received by the districts (NLGFC, 2010).

1.2.5 Health Information Systems

There are two health information systems in all the district hospitals and health facilities that are related to the planning of pharmaceutical supply: The Health Management Information System (HMIS) and Logistics Management Information System (LMIS). HMIS is a manual data collection system that collects patients' demographic information, diagnosis and treatment in all health facilities. The data is submitted monthly to district hospitals for consolidation. A district statistician is responsible for capturing and collating the data from all facilities into a computer and then submitting the results to Central Monitoring and Evaluation Division (CMED) on a quarterly basis.

The HTSS-Pharm introduced the Logistics Management Information System (LMIS) to all district hospitals and primary health facilities in 2005. A Logistics office was established in 2004 within the department to oversee the supply chain management issues, and to provide necessary technical assistance. All pharmacy technicians and at least one health care worker in the public health facilities were trained in 2004 on how to operate this system. LMIS is a paper based data collection system that

collects data on the consumption of pharmaceuticals and available stock in the facilities. The facilities submit LMIS reports to the pharmacies in the district hospitals on a monthly basis. The district pharmacy technicians consolidate all reports using Supply Chain Manager (SCMger) software, which calculates the quantities required to top up each facility so that they have a three-month stock of pharmaceuticals. The requisitions for the district hospital and health facilities are then submitted to RMS. RMS in turn distributes the pharmaceuticals directly to the facilities according to the requisitions and availability in their warehouses. RMS rations pharmaceuticals among facilities in circumstances where the pharmaceuticals are inadequate for all requisitions. Figure 1.3 illustrates the flow of logistical information and pharmaceutical supplies. Figure 1.3 also indicates the annual quantification process which will be described in the next section.

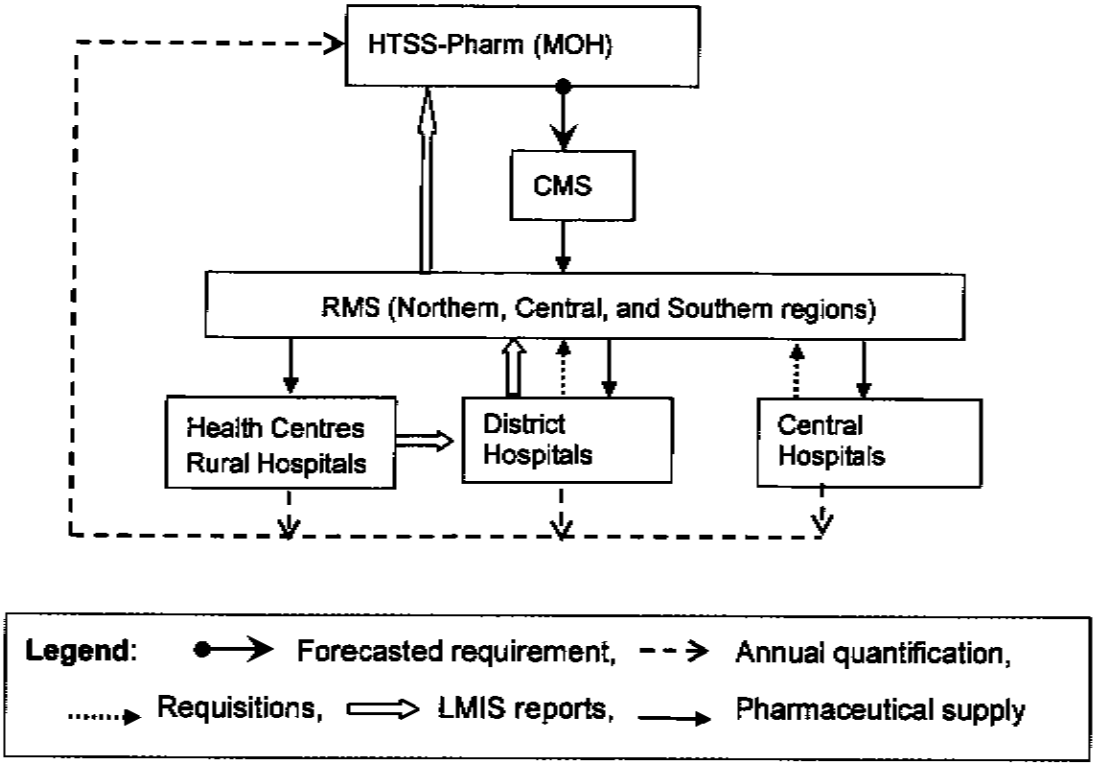


Figure 1.3 Supply chain and information flow in the public sector

1.2.6 Pharmaceutical Procurement Plan

Prior to 2006, there was no forecasting activity for pharmaceutical procurement. CMS procured pharmaceuticals for the country based on its procurement data from the previous years. The HTSS-Pharm began to facilitate national quantification for pharmaceuticals for the coming fiscal year in 2006. The forecasted quantities are for the country as a whole, rather than for individual districts. In order to determine quantities required, inventory data for selected items in all facilities is physically collected and compared to that in LMIS due to concerns about the quality of LMIS reports. One pharmacy technician from each district is involved in this physical

inventory. One DHO and 3 senior district pharmacy technicians were selected from all districts to participate in the quantification activity. In 2006, forecasts were made for 80 essential medicines in this way and this increased to 120 in 2007 (Carson et al., 2008). Previous procurement data was used for the procurement of the remaining items. Inventory data is collected on an increasing number of items each year and by 2010 had expanded to more than 300 for forecast. HTSS-Pharm incorporated other departments and vertical programs, such as diagnostics and dental departments, malaria, HIV, and family planning programmes, into the procurement plan for the first time. HMIS data was also used for the vertical programs in addition to the LMIS or physical inventory data. All the forecasted quantities were then imported to "Pipeline" software to generate a procurement plan. Figure 1.3 also illustrates the flow of information for quantification.

1.2.7 Challenge in pharmaceutical supply

Despite the efforts of the government of Malawi to implement health sector reform, pharmaceutical supply remains challenging. Since the implementation of SWAp, good progress has been made in regard to EHP. However, the results are reversible due to pharmaceutical shortages and the weaknesses of the pharmaceutical procurement system (Carson et al., 2008, Pearson, 2010). Carson et al (2008)

conducted a SWAp midterm review in January 2008 in Malawi. The aim of the review was to assess the progress made in ensuring increased availability of quality EHP services as well as increased utilisation of health services. They observed at the time of their review that only 34% of the drugs and medical supplies were available in regional medical stores, 33% in District Pharmacies; and some health centres only has 7.5% of their supplies. Lufesi et al (2007) investigated 37 health centers in Lilongwe, Malawi in July and August 2005 on the availability of eight essential medicines for the treatment of pneumonia and malaria. The results showed that medicines for treating pneumonia were out of stock for, on average, 6 months for one year of observation; anti-malarial medicines were lacking for periods ranging from 42-138 days. The main reason for the shortage of medicines was the insufficient deliveries from regional medical stores.

1.3 Literature Review

An exhaustive literature review reveals that little has been specifically written on the estimation of district drug and budget requirements. However, those related to decentralisation, resource allocation and budgeting, pharmaceutical supply and management, and health information systems, were reviewed.

The decentralisation of health services to the district level in Uganda was intended to

improve the quality of health services and pharmaceutical supplies in the hospitals. A qualitative and quantitative study of two district hospitals in Uganda (Anokbonggo, Ogwal-Okeng & Obua, 2004a) found facility utilization increased significantly with only a slight improvement in the availability of some essential drugs. However, supplies continued to be strained because of an increase in patients, low revenue, and financial mismanagement. This study indicated that a good drug supply is essential to the management of patients. It emphasised the importance of proper planning and management of funds and how the incapacity to implement the policy is due to a lack of training.

Their subsequent qualitative study found decentralisation improved the attitude of the stakeholders at the district level and was an advantage for the planning and management with a prerequisite of proper training (Anokbonggo, Ogwal-Okeng & Ross-Degnan, 2004b).

Bossert, Bowser and Amenyah (2007) used a "decision space" approach to analyse how decentralisation affected the performance of the logistics systems in Ghana and Guatemala. The study found the districts or facilities involved in enforced and uniform inventory control and LMIS reports had fewer shortages of essential drugs,

and had better record keeping providing information for forecasting and the procurement plan. The study also found the districts with a higher decision space over their budget and procurement plans had larger cash reserves and fewer shortages of drugs. In conclusion, the results indicate that "less choice" (i.e. more centralized) was associated with superior inventory control and information management; while "more choice" (i.e. more decentralized) over planning and budgeting was associated with "better performance". This study suggested planning and budgeting requires local knowledge of conditions to develop realistic budgets, with good inventory and logistical information the keys to support these functions. (Bossert et al., 2007)

Arredondo and Orozco (2006) conducted a cross-sectional study by in-depth interview with service providers and users in Mexico, which identified the positive and negative effects of decentralisation on health financing and governance. The strengths of decentralisation included: better management of information; improved decision-making according to local problems; greater autonomy for resource management; improved expenditure planning; a more rational prioritisation of needs; and increased allocation at the operative level. The weaknesses included the absence of an accountability system, in addition to a lack of human resources and technical skills to implement, monitor, and evaluate changes in financing. This study

revealed a wider decision space on governance and financing after decentralisation; however, the technical capacity was yet to develop for implementation and monitoring (Arredondo et al, 2006).

A study in Pakistan observed the per capita budget allocation, with little recognition of the utilisation rate in terms of varying health needs, resulted in disparities between facilities. The study applied a costing methodology outline by Hanson and Gilson to estimate the district health budget compared to the central allocated budget on a per capita basis. It found the districts were underfunded in most areas, including medicines. The study also found one of the causes of the imbalances in the budget allocation was poor maintenance of expenditure information in the facilities. This resulted from a lack of confidence in the current budget allocation. Clearly then, expenditure and information management in the health facilities are significant concerns (Green, Ali, Naeem & Vassall, 2001).

The literature detailing the involvement of health care workers in the control of pharmaceutical costs was also reviewed. A study in Tunisia where the health facilities were given a theoretical budget showed how the health care workers were responsible for budget management to control drug use. The health workers

received training in the estimation of the requirements for their health centres. The results demonstrated health care workers were able to manage their drug budget efficiently. Prescription habits were also changed because of the need for rational prescription and cost containment (Garraoui, Feuvre & Ledoux, 1999).

Other literature discussed the use of health information in financial and inventory management. Some of these articles are operational assessments or evaluations, rather than structural research. Korte et al (1992) analysed the financing options for health services available to decision makers by article review. They suggested the inefficient utilization of limited funds aggravated the problem of a low health budget. Therefore, an adequate database is required for effective management (Korte et al., 1992). An assessment of the essential drug programme and the impact of rationalisation of supply management in the Northern Province of South Africa, found more reliable data could be obtained in the assessment than in the baseline study, due to the improvement of the inventory management and computerisation of hospital records. However, the inventory management in the clinics was still not properly managed. The financial management information was lacking despite increased awareness about expenditure. The assessment team recommended an improvement of inventory management in the clinics by training staff and

implementing appropriate supervision. Furthermore, the financial management system must be applied and the pharmacists should be trained in expenditure control measures (Summers, Conry, Joubert, & Singh, 1998). An evaluation of an automatic information system in terms of its effect on cost containment observed a 70% decrease in inventory (Awaya, Ohtaki, Yamada, Yamamoto, Miyoshi, Itagaki, Tasaki, Hayase & Matsubara, 2005). However, literature on the effectiveness of the manual information system in pharmaceutical financial management is scarce.

With regard to use of the health information system for decision-making, the Health Metrics Network (HMN) conducted an assessment using version 4.0 of the HMN Health Information Assessment tool. It found the information generated from Malawi's health information systems was generally poor and used less by the district managers compared to the central and zonal authorities (HMN, 2009). DHOs' decision-making behaviour may be explained by the following two studies. A qualitative comparative case study in two districts in Zambia identified five forms of information: written, verbal, observational, experiential and training, apart from HMIS, which were used by DHOs for decision-making (Mutemwa, 2005). A study in the Eastern European country of Georgia used a pre-post quasi-experimental design to investigate the health system barriers that affected the use of health information at

the district level. It found that despite improvements to the availability and quality of the data after the implementation of an intervention package, the data was not in use at the district level. The problem stems from a weak accountability relationship within Georgia's health system (Hotchkiss, Eisele, Djibuti, Silvestre & Rukhadze, 2006).

1.4. Problem Statement

When the districts prepare their implementation plans, they draw the blueprint of the health services for the forthcoming year. A comprehensive implementation plan should include the planned human resources, equipment, and pharmaceuticals required to ensure quality health services.

However, pharmaceutical planning has been excluded from the district implementation plan. The districts have never been requested to forecast the need for pharmaceuticals required for the health services, nor do they estimate the drug budget. The drug budget was, therefore, allocated as a fixed proportion (30%) of the district health budget - a per capita basis without consideration of the actual need of the districts. This may result in overspending if the districts were under-budgeted.

Despite the quantification activity conducted at the national level, the pharmaceutical

needs and budgets of individual districts are not estimated. This could cause a mismatch between the budget allocated and pharmaceutical demand in the districts. In addition, without the projected demands for the districts, CMS cannot effectively distribute its consignments to the RMS. RMS would not satisfy the districts' needs. Carson et al (2008) observed a supply and demand mismatch between CMS and the RMS. Lufesi et al (2007) attributed the shortage of medicines in the health facilities to their erratic availability in the RMS.

A health information systems assessment report highlighted how the poor quality of health information data could lead national decision making in the wrong direction (HMN, 2009).

Although the HTSS-Pharm conducted a physical inventory countrywide to collect logistical data from the stock cards in the facilities as one of the data sources for national pharmaceutical forecasting activity, this data source was the same for LMIS. There was little benefit for the countrywide physical inventory if the data quality of the stock cards was questionable. A major issue is that the health care workers in the facilities do not understand the significance of the health information systems. They generate data without using it themselves, and without feedback from the central

level (HMN, 2009). This could lead to the usage of incomplete and inaccurate data for central level planning, including national drug quantification[6] for the procurement plan. This could be one of the factors that caused the mismatch between the forecasted quantities and the actual needs.

Poor timeliness and the periodicity of health expenditure data (HMN, 2009) raises concerns about how the districts monitor their drug expenditure. The monitoring process is part of the planning framework. Therefore, if the districts make no provision for a drug budget, their motivation and capacity to monitor drug expenditure could prove questionable.

Therefore, forecasting drug and budget requirements could provide an incentive for the use of health information by the districts. This could foster improvements in the management of the budget and the pharmaceutical supply. Hence, this study will determine whether the district managers and pharmacy technicians have the capacity and willingness to forecast their drug and budget requirements.

[6] The term used by HTSS-Pharm is "National drugs and medical supplies quantification". However, forecasting and quantification are used interchangeably in Malawi.

1.4 Objectives of the Study

The ultimate aim of this study is to explore the possibility of district health officers estimating their annual drug and budget requirements in line with the district implementation plans.

A well-managed supply chain system starts with proper planning. Therefore, it is important to learn whether the districts could forecast pharmaceutical requirements and provide reliable information to the MOH for equitable budget allocation. CMS would in turn feed this information into its procurement and distribution plans. This study aims to determine the capacity and willingness of the District Health Officers and pharmacy technicians to forecast drug and budget requirements, as well as their perceptions of forecasting district pharmaceutical requirements and developing annual drug budgets based on the needs of the districts.

Specific Objectives:

1. To determine how the DHOs and pharmacy technicians currently monitor their drug expenditure.
2. To determine the knowledge DHOs and pharmacy technicians have about the use of current health information systems.

3. To determine the perceptions, capacity and willingness of DHOs and pharmacy technicians to forecast pharmaceutical and budget requirements.

CHAPTER 2 MATERIALS AND METHODS

2.1 Introduction

This chapter describes how the study sample was selected, how the questionnaire was developed, and how the data was collected and analysed. This study was conducted in Malawi between February and August 2010, including data collection and analysis.

2.2 Study Design

This is a cross-sectional descriptive study.

2.3 Study Population

The study population is all twenty-nine District Health Officers (DHO) and all twenty-nine pharmacy technicians[7] in-charge in these districts. Forecasting pharmaceutical and budget requirements at the district level requires the commitment of the key stakeholders: i.e. district health officers and pharmacy technicians. Therefore, they are the target groups for this study.

[7] At the time of data collection (February-June 2010), each district had two pharmacy technicians (except Lilongwe and Blantyre Districts, which had three pharmacy technicians). The senior pharmacy technician is generally in-charge of the department. He/she may have more opportunities to communicate with the DHO than their junior counterpart does. However, the pharmacy technicians generally share responsibilities by periodically swapping internal duties. Therefore, all pharmacy technicians could understand the department's operations and business.

2.4 Study Sample

Two districts, Likoma and Mzimba North, have been excluded from the 29 districts. There is no government facility in Likoma district, and Likoma Island has limited transport and therefore, it was inaccessible for the researcher. Mzimba North district was only established in January 2009, so there is no information on any previous drug budget and expenditure. Therefore, the DHOs and pharmacy technicians-in-charge from the remaining 27 districts were selected.

2.5 Questionnaire Design and Pilot Study

A self-administered structured questionnaire with 20 questions was produced in English since it is one of the official languages in Malawi and all the respondents are English literate. All questions were classified into four sections:

Section A - the background of the respondents, including their cadres and length of stay: the options for the cadres are DHO and PT. The length of stay in the district uses 12 months as the cut-off point because the planning, implementation and monitoring cycle takes 12 months. Respondents were not requested to indicate their names and districts because the questionnaire was anonymous.

Section B - the current practice of monitoring drug expenditure: this section collects

information about whether the respondents monitor their drug expenditure and if so, how. Since knowing the budget amount is the starting point of the monitoring process, the respondents are requested to indicate their drug budget (rounded up to the nearest million Malawi kwacha) for the fiscal year 2008/09. This data will be compared with the data of the approved FY08/09 budget collected from NLGFC.

Section C - respondents' knowledge about and their use of existing information systems: this section collects information on whether the respondents were aware of HMIS and LMIS, whether they have ever used them for any pharmaceutical procurement, and whether they found it useful. The LMIS monthly reporting form is the most commonly used tool in the system, therefore, the content of the LMIS reporting form is used as the indicator in the question on how much the respondents understand LMIS.

Section D - perceptions, capacity and willingness about forecasting annual pharmaceutical and budget requirements at the district level: this section collects information about whether the respondents agree with the benefits of forecasting pharmaceutical and budget requirements; whether they think they would be able to prioritise their needs; and if they are willing to annually forecast drug and budget requirements for their districts.

All questions were single-choice. In section A, the respondents were asked to select their cadres and length of stay. In sections B, C, and D, they had to choose one of four possible responses – "Yes", "No", "I am not sure" and "I don't know."

The pilot study was conducted with three pharmacy technicians at Kamuzu Central Hospital in Lilongwe, and a physician who was a former DHO. The physician was working in one of the faith based hospitals in Lilongwe at the time of the pilot study. It was difficult to find clinicians who used to be DHO; only one was found and available at the time of the study. All the pharmacy technicians had received training in LMIS and had at least five years working experience in procurement, inventory management and dispensing. Two had worked in district hospitals.

The pilot study was conducted separately with the physician and the pharmacy technicians due to their different working stations. Each took 15 minutes to respond to the questionnaire. The questions for which they had queries were marked. After completing the questionnaire, they provided suggestions on how to make some of the questions clearer, and provided sub-questions to some questions regarding practice or experience for more information. The questionnaire was hence revised with corrections of a few inappropriate wordings, and sub-questions were added to

some questions. The sub-questions are multiple-choice with an "other and please specify" option for any response not in the given options. The questionnaire is attached in Appendix 2.

2.6 Ethical Considerations

The ethics approvals were obtained from the Ethics Committee of the University of Witwatersrand (clearance certificate M090347, see Appendix 3) and the National Health Service Research Committee (NHSRC) in Malawi (approval number: NHSRC#661, see Appendix 4). Permission to access the participants was granted by the HTSS-Pharm, Ministry of Health (Permission letter dated 2nd February 2010, Appendix 5). A letter of introduction to the study, highlighting anonymity and informed consent (see Appendix 1), was given to the respondents with the questionnaire and the permission letter. The participants were requested not to give any identifying sign or information on the self-administered questionnaires. In order to maintain anonymity and confidentiality, the participants were asked not to submit their consent forms. Their consent was assumed as they responded and submitted the questionnaire.

2.7 Data Source and Data Collection

The data on the districts' approved drug budget and expenditures for the financial years 2008/09 was collected electronically from National Local Government Finance Committee (NLGFC).

The data on the DHOs and pharmacy technicians' practices and opinions was collected via the self-administered questionnaires. Each questionnaire, introduction and consent letter, permission letter, and a reply envelope with written receiver's address and prepaid postage, were sealed in an envelope as a package. The questionnaire packages were sent to the respondents through the following ways:

a. The researcher facilitated some training activities in February 2010 in three regions in her work capacity. One pharmacy technician from each district was invited. The researcher gave the packages to each pharmacy technician. If the pharmacy technician was in charge in their respective district, most of them responded and submitted the questionnaire before the end of the training activity. The junior pharmacy technicians were asked to convey the package to their colleagues who were in charge.

b. Field visits to all district hospitals were conducted by the researcher and her colleagues in their work capacity in March 2010. Questionnaire packages were

delivered through this activity to the DHOs and those pharmacy technicians-in-charge who did not assign any one to the aforementioned training. A few pharmacy technicians responded and submitted the questionnaire. None of the DHOs responded.

The researcher telephoned all DHOs within one month of their receiving the questionnaires. Some respondents sent the questionnaire by post between April and June 2010. Some of the questionnaires were collected during field visits in May 2010.

2.8 Data analysis

The returned questionnaires were assigned sequence numbers (ID). The data was coded as follows:

Section A: question A1- 1 for DHO, 2 for PT; question A2- 1 for less than 12 months, 2 for 12 months or above.

Section B, C, D: 1 for "Yes", 0 for "No", 5 for "I don't know" or "I am not sure".

The data was entered into a Microsoft Excel spreadsheet following the sequence numbers by the researcher. An assistant and the researcher crosschecked all data twice against the questionnaires. Any mistakes were immediately corrected. The StatCalc of Epi info 3.3.2 was used to analyse the data from the questionnaires. A

Chi-square test was used to ascertain the significance of the difference in response between the DHOs' and the pharmacy technicians' groups. A Fisher exact test was used when the value in any cell of 2x2 table was less than 5. A p value that is equal to or less than 0.05 was considered statistically significant.

The budget and expenditure data obtained from NLGFC was for all item lines. The item line for pharmaceuticals was "medical supplies". The researcher captured the data for "medical supplies" for the 27 districts selected. The data on the perceived budget from the respondents was captured from the questionnaire. Both were saved in a Microsoft Excel spreadsheet. The data collected from the respondents and NLGFC was not paired with corresponding districts because of the anonymity of the questionnaires. An observational description was used to compare the difference between the drug budgets and expenditures indicated by the respondents and the data obtained from NLGFC.

CHAPTER 3 RESULTS

3.1 Introduction

This chapter presents the results concerning the knowledge and practice of the DHOs and pharmacy technicians in the areas of drug supply and budget management, and their understanding of the benefits of, and willingness to conduct forecasts of the drug and budget requirements for their districts.

Fifty-four (54) questionnaires were sent to 27 District Health Officers (DHOs) and 27 pharmacy technicians-in-charge. Fifty (50) questionnaires were received from 23 DHOs and 27 pharmacy technicians (PTs). This represents a 100% response rate for the pharmacy technicians and 85.2% for the DHOs, and 92.6% (50/54) overall. The data collection period coincided with some DHOs being transferred to other districts. Some of the out-going DHOs were on leave, and the new DHOs had not reported at that time. This affected the response rate.

Regarding the respondents' length of stay in their districts, 92.3% of the pharmacy technicians had been in their district for at least one year. However, only 44.5% of the DHOs had been in their current post for at least 12 months. One respondent failed to answer this question. The results show that there is a relatively high turnover of DHOs relative to pharmacy technicians.

3.2 The Practice of Monitoring Drug Expenditure

This section presents the results of respondents' awareness of their drug budgets and monitoring practices.

3.2.1 Awareness of the drug budget for FY08/09

This study considers the length of stay of the respondents in their current posts as a factor that affects awareness of their drug budget.

Out of the 49 respondents who indicated their length of stay in their current position, two pharmacy technicians did not respond to the question on whether they were aware of the district drug budget for the FY08/09. Table 3.1 indicates that those respondents who had been in their current position for at least 12 months were more likely to know what the district drug budget was. The difference was however marginal (p=0.0540). The majority of respondents reported awareness of their drug budget irrespective of the period they had held their current posts.

Table 3.1: Awareness of the drug budget - all respondents – by length of stay in current post

	<12m	≥12m	Total
Unaware of the drug budget	6 (40.0%)	4 (12.5%)	10 (21.3%)
Aware of the drug budget	9 (60.0%)	28 (87.5%)	37 (78.7%)
Total	**15 (100%)**	**32 (100%)**	**47 (100%)**

Table 3. 2 indicates that the DHOs' length of stay does not significantly affect their awareness of the drug budget. However, there is a marginal difference for pharmacy technicians. In total, 82.6% (19/23) of the DHOs and 75% (18/24) of the PTs were aware of the budget for FY2008/09.

Table 3. 2 Awareness of drug budget – DHOs and pharmacy technicians (PT) – by length of stay in current post.

	DHO (N=23, p=0.1045)		PT (N=24, p=0.0543)	
Length of stay (months)	<12	≥12	<12	≥12
Unaware of drug budget FY08/09	4 (30.8%)	0 (0.0%)	2 (100.0%)	4 (11.2%)
Aware of drug budget FY08/09	9 (69.2%)	10 (100.0%)	0 (0.0%)	18 (81.8%)
Total	13 (100.0%)	10 (100.0%)	2 (100.0%)	22 (100.0%)

Those who knew their drug budget also indicated the amount of their budgets (rounded up to the nearest million MK). Table 3.3 shows the budget amounts indicated by the respondents as well as the approved budgets from NLGFC. The data is presented from the smallest to the largest amount for each respondent and it should be noted that it was not possible to link the DHOs with the PTs, nor with the actual district. It is observed that only the amounts indicated by three DHOs (No. 7, 9,12) and one pharmacy technician (No. 11) were closer to that of the NLGFC (No. 6, 9,13). In general, the amounts of which pharmacy technicians aware were lower

than that of the DHOs. There were five budgets that were the same with DHOs and pharmacy technicians.

Table 3.3 Drug budgets for FY08/09 provided by the respondents and NLGFC (The blank cells indicate that there was no data from the respondents and the NLGFC, respectively.) (Currency: Malawi Kwacha, MK)

	Data from DHOs	Data from PTs	Approved Budgets 08/09 from NLGFC
1	4,500,000	2,200,000	9,453,829
2	9,000,000	3,500,000	43,347,211
3	24,000,000	5,000,000	43,532,256
4	33,000,000	7,000,000	44,635,959
5	39,000,000	8,000,000	45,702,279
6	**42,000,000**[a]	9,000,000	***48,729,129***
7	***48,000,000***[b]	12,000,000	58,594,531
8	62,000,000	17,000,000	59,121,695
9	***64,000,000***	**42,000,000**	***64,413,947***
10	**76,000,000**	45,600,000	65,870,004
11	**76,000,000**	***48,000,000***	68,347,792
12	***84,000,000***	50,000,000	77,231,600
13	85,700,000	55,000,000	***84,580,609***
14	100,000,000	56,400,000	92,459,413
15	110,000,000	**76,000,000**	93,875,914
16	118,000,000	**76,000,000**	97,391,000
17	**147,000,000**	133,000,000	109,708,395
18	190,000,000	**147,000,000**	121,163,741
19	300,000,000	.	125,895,091
20	.	.	128,231,754
21	.	.	130,472,881
22	.	.	142,849,062
23	.	.	151,729,247
24	.	.	156,002,147
25	.	.	232,799,076
26	.	.	381,844,668
27			.

[a]: The data in bold means that it is the same amount as that of a pharmacy technician

[b]: The data in bold *italic* and underlined means that it is the closest to one of the data from NLGFC

3.2.2 Monitoring of the drug expenditure

Table 3.4 shows that most of the pharmacy technicians and all the DHOs indicated they monitored drug expenditure. There is only a marginal difference between the two groups (p=0.0521).

Table 3.4 Monitoring of the drug expenditure

	DHO	PT	Total
Did not monitor drug expenditure	0 (0.0%)	5 (19.2%)	5 (10.2%)
Monitor drug expenditure	23 (100.0%)	21 (80.8%)	44 (89.8%)
Total	23 (100%)	26 (100%)	49 (100%)

97.7% (22 DHOs and 21 PTs) of those who indicated they monitored their expenditures also indicated the methodologies they used. Figure 3.1 gives the ways in which they monitor expenditure. Regular expenditure review, which simply reviews how much was spent, was the methodology most commonly used by DHOs and pharmacy technicians. Only 19% of the respondents used the techniques of ABC analysis or cost analysis to monitor their expenditure.

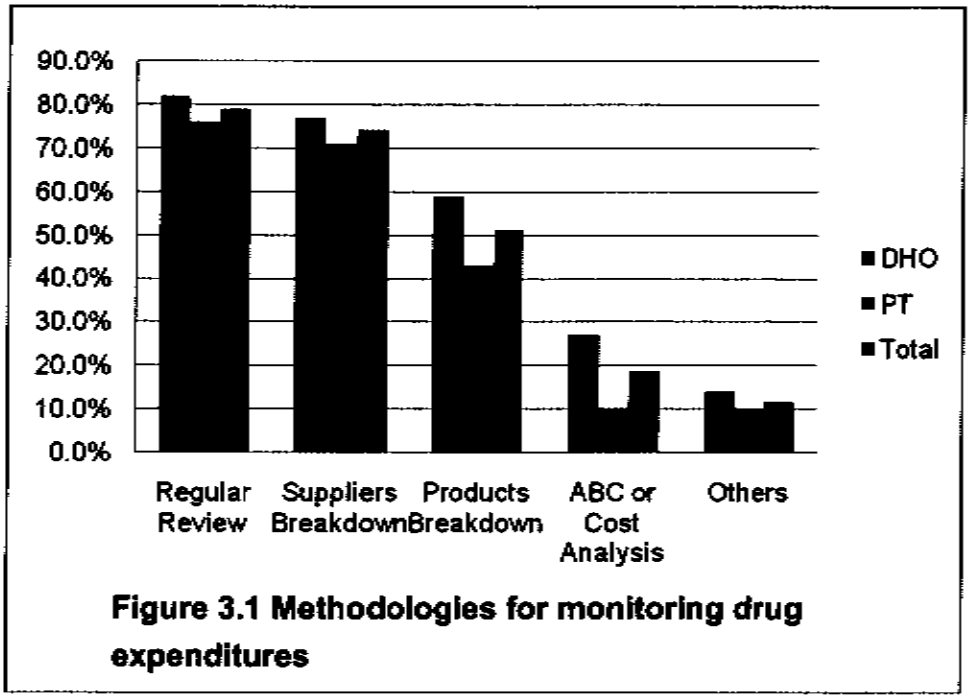


Figure 3.1 Methodologies for monitoring drug expenditures

When the respondents were asked whether they had overspent their drug budgets for FY08/09, 5 DHOs and 6 pharmacy technicians replied they did not know. All these DHOs were in their current post for less than 12 months, while 3 of these pharmacy technicians were in the current post for more than 12 months and indicated that they monitor drug expenditure. Table 3.5 shows the respondents' perceived awareness of their spending status for FY08/09. Of those who knew their spending status, 13 DHOs and 17 pharmacy technicians indicated they had overspent their budget. However, the data from NLGFC in Table 3. 6 shows that only 8 out of 25 districts had over-spent their drug budgets. This result shows higher respondents' perceived overspending than what was presented by NLGFC.

Table 3.5 Awareness of spending status of drug budget for FY08/09

	DHO	PT	Total	p
Be aware of spending status	78.3% (18/23)	77.8% (21/27)	78.0% (39/50)	0.9672
Perceived over-spending of those aware of spending status	72.2% (13/18)	80.9% (17/21)	76.9% (30/39)	0.7062

Table 3. 6 District Drug Budgets and Expenditures for FY08/09 (Currency: Malawi Kwacha, MK)

Districts	Approved budget (B)	Expenditure (E)	Spending status (B-E)
Balaka	68,347,792	68,347,792	-
Blantyre	232,799,076	.	
Chikwawa	93,875,914	93,875,914	-
Chiradzulu	65,870,004	50,973,334	14,896,670
Chitipa	43,347,211	44,973,910	***- 1,626,699***
Dedza	125,895,091	125,895,091	-
Dowa	128,231,754	121,722,891	6,508,863
Karonga	48,729,129	38,729,129	10,000,000
Kasungu	130,472,881	130,472,881	-
Lilongwe	381,844,668	382,544,560	***- 699,892***
Machinga	84,580,609	84,580,609	-
Mangochi	151,729,247	177,236,757	***- 25,507,510***
Mchinji	92,459,413	61,908,979	30,550,434
Mzimba	156,002,147	177,954,418	***- 21,952,271***
Mulanje	109,708,395	109,708,396	- 1*
Mwanza	.	36,759,347	
Neno	9,453,829	22,032,744	***- 12,578,915***
Nkhata Bay	44,635,959	35,178,821	9,457,138
Nkhotakota	58,594,531	80,049,975	***- 21,455,444***
Nsanje	59,121,695	51,890,680	7,231,015
Ntcheu	97,391,000	132,690,203	***- 35,299,203***
Ntchisi	45,702,279	52,502,279	***- 6,800,000***
Phalombe	64,413,947	44,239,413	20,174,534
Rumphi	43,532,256	29,609,826	13,922,430
Salima	77,231,600	77,231,600	-
Thyolo	121,163,741	109,605,642	11,558,099
Zomba	142,849,062	142,749,062	100,000
			8/25 (32.0%)

* This minor overspending is regarded as non-overspent

3.3 Knowledge and use of the existing information systems

In this section, the results for respondents' understanding of and experiences with using the existing health and logistics management information systems are presented.

3.3.1 Awareness of the Logistics Management Information System

To explore how much the DHOs and pharmacy technicians know about LMIS, Table 3.7 shows that half of the DHOs and pharmacy technicians were aware of all components of the contents of LMIS (p=0.3946), and 76% of them were aware of at least 3 components (p=0.3254).

Table 3.7 Awareness of LMIS - based on number of components of the contents

	DHO (N=23)	PT (N=27)	Total
0 component	1(4%)	1 (4%)	2 (4%)
1 component	6 (26%)	1 (4%)	7 (14%)
2 components	0 (0%)	3 (11%)	3 (6%)
3 components	4 (17%)	1 (4%)	5 (10%)
4 components	2 (9%)	6 (22%)	8 (16%)
5 components	10 (43%)	15 (56%)	25 (50%)

The details of their understanding of the contents of LMIS report is indicated in Figure 3.2. Most of the DHOs were aware that the LMIS provided information on the stock level (90.9%), and the 92.6% of PT were aware that LMIS provided information on the consumption of pharmaceuticals.

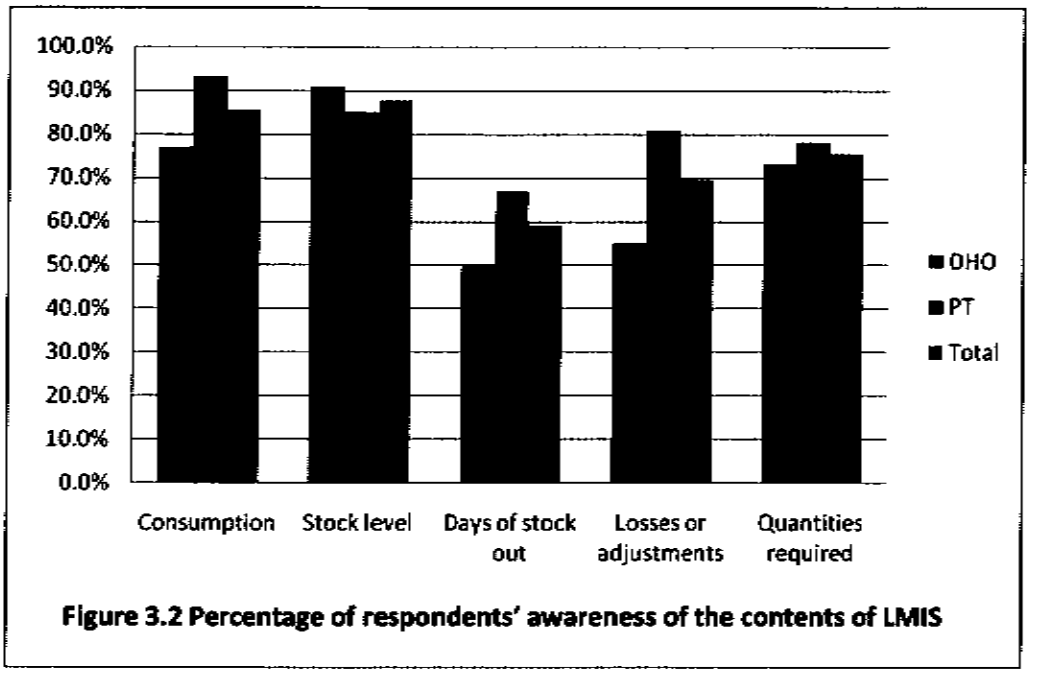


Figure 3.2 Percentage of respondents' awareness of the contents of LMIS

3.3.2 The use of Supply Chain manager

Table 3.8 shows that over 57% of DHOs and 80% of pharmacy technicians had used Supply Chain Manager (SCMger) to produce consumption reports (p=0.0782), and almost of all of them found it useful (p=1.0000).

Table 3.8 The use of SCMger to produce consumption reports

	DHO	PT	Total
Use SCMger	57.1%(12/21)	80.8%(21/26)	70.2%(33/47)
Find SCMger useful	100.0%(12/12)	94.7%(18/19)	96.8%(30/31)

3.3.3 The use of Logistics Management Information for procurement

Table 3.9 shows a very high proportion (90%) of the respondents had used logistics

management information to determine items and quantities for procurement. Pharmacy technicians were particularly noteworthy in this respect, with the majority finding the information useful.

Table 3.9 The use of LMIS to for procurement

	DHO	PT	Total	p
Use LMIS for procurement	77.3%(17/22)	100.0%(27/27)	89.8%(44/49)	0.0138
Found LMIS useful	70.6%(12/17)	85.2%(23/27)	79.5%(35/44)	0.2746

Despite the fact that 10% of the respondents did not find LMIS useful for procurement, their views might still assist improvements. Their opinions are presented in Table 3.10. The issue of most concern to the respondents was the inaccuracy of some of the LMIS reports. Most also felt the lack of cost information in the Supply Chain Manager limited its usefulness for procurement. Interestingly, more DHOs than pharmacy technicians were concerned about not all facilities submitting LMIS reports, even though pharmacy technicians are the front desk for receiving the reports.

Table 3.10 Reasons for the LMIS data not being useful

	DHO (N=5)	PT (N=4)	Total (N=9)
Not all facilities submit their LMIS reports	4 (80.0%)	2 (50.0%)	6 (66.7%)
Data incomplete in some LMIS reports	2 (40.0%)	2 (50.0%)	4 (44.4%)
Data inaccurate in some LMIS reports.	5 (100.0%)	4 (100.0%)	9 (100.0%)
The quantities required which are projected by SCMger are not all useful	2 (40.0%)	1 (25.0%)	3 (33.3%)
SCMger does not provide the cost for the pharmaceuticals required	3 (60.0%)	4 (100.0%)	7 (77.8%)
Cross checking is not always possible especially in distant facilities	1 (20.0%)	0 (0.0%)	1 (11.1%)

3.3.4 The use of health management information system for quantification

Table 3.11 indicates that less than half of the respondents have used the HMIS data to determine the quantities of needed pharmaceuticals. However, in contrast to the use of LMIS, more DHOs used HMIS than did pharmacy technicians, and all DHOs found it useful. Two pharmacy technicians who did not find it useful stated the difficulty of manually retrieving information, in addition to the incomplete nature of the diagnostic information as the reasons.

Table 3.11 The use of HMIS for quantification

	DHO	PT	Total	p
Use HMIS for procurement	47.8%(11/23)	22.2%(6/27)	34.0%(17/50)	0.0568
Found HMIS useful	100.0%(11/11)	66.7%(4/6)	88.2%(15/17)	0.1103

3.4 Perceptions, capacity and willingness to forecast annual district drug and budget requirements

In this section, the respondents shared their views on the benefits and their willingness about forecasting drug and budget requirements.

3.4.1 The perceptions of forecasting district drug and budget requirements

With regard to how the forecasting of district pharmaceutical and budget requirements would potentially benefit the districts in finance or supply managements, the respondents' views are shown in Figure 3.3. The results show quite a good consensus between DHOs and pharmacy technicians. More than 80% of both DHOs and pharmacy technicians agreed that forecasting pharmaceutical and budget requirements at the district level could motivate the districts to use their drug budget more efficiently, motivate central authorities to optimally allocate drug budget, and motivate CMS to plan procurement based on the needs of the districts. Slightly less than 80% of the respondents agreed with the other three potential benefits. However, in relation to the rational use of pharmaceuticals, the DHOs had relatively more faith than the pharmacy technicians did, in spite of having no statistical significance ($p=0.2989$).

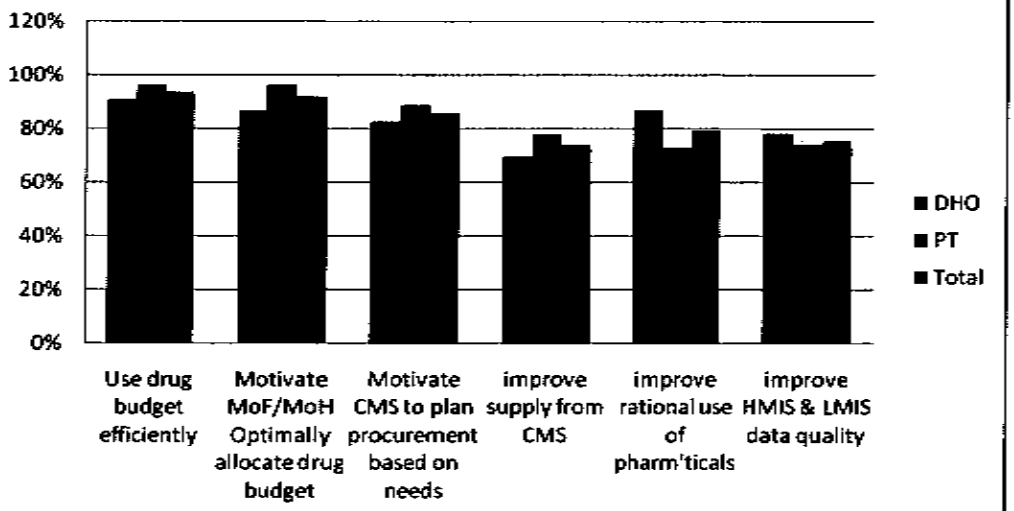


Figure 3.3 Respondents' perceived benefits of forecasting annual district drug and budget requirements

Figure 3.3 also indicates that 26% of the respondents did not agree, or were not sure whether forecasting drug and budget requirements could improve drug supply from CMS. Their concerns are presented in Table 3.12. Most felt other factors might affect CMS in their procurement. However, the respondents did not specify what such factors might be.

Table 3.12 Factors that may affect pharmaceutical supply from CMS

	DHO (N=7)	PT (N=6)	Total (N=13)
The actual requirements in the districts may significantly differ from what was forecasted	1 (14.3%)	3 (50.0%)	4 (30.8%)
There are other factors which affect CMS in their procurement	7 (100.0%)	5 (83.3%)	12 (92.3%)
CMS has internal problems	0 (0.0%)	1 (16.7%)	1 (7.7%)
Drug budget is being imposed	0 (0.0%)	1 (16.7%)	1 (7.7%)

3.4.2 The capacity of DHO's and PT to forecast district drug and budget requirements

The respondents have expressed how they use LMIS and HMIS for planning pharmaceutical procurement in the previous sections. However, given the limited budget, they may have to prioritise their needs. When asked whether they think they are able to set priorities for pharmaceutical requirements, all the pharmacy technicians and 86.4% of the DHOs responded positively. The respondents were also asked whether they think they are able to estimate the annual drug budget based on a forecasted drug requirement, with 72% confidently replying in the affirmative. Pharmacy technicians were relatively more confident than the DHOs about these two questions, but this is not statistically significant. Table 3.13 shows their perceived ability to set priorities and estimate the drug budget.

Table 3.13 The perceived ability in priority setting and estimating drug budget

	DHO	PT	Total	p
Priority setting	86.4%(19/22)	100.0%(27/27)	93.9%(46/49)	0.1861
Estimate drug budget	60.9%(14/23)	81.5%(22/27)	72.0%(36/50)	0.1057

3.4.3 The willingness to forecast district drug and budget requirements

Regarding their willingness to annually forecast the drug and budget requirements for their districts, the respondents expressed their views about whether this will

increase the time spent planning and monitoring supply and expenditure, whether they are willing to do so, and whether they would request CMS to supply pharmaceuticals accordingly. Table 3.14 shows that despite over half of the respondents feeling that forecasting drug and budget requirements would increase the time required for planning and monitoring pharmaceutical supply and expenditure, the respondents overwhelmingly expressed a willingness to forecast drug and budget requirements. CMS was accordingly requested to procure within the approved budget.

Table 3.14 The willingness of forecasting district pharmaceutical and budget requirements

	DHO	PT	Total	p
Spend more time on planning and monitoring	56.5% (13/23)	60.0% (15/25)	58.3% (28/48)	0.8071
Willing to forecast	100.0%(23/23)	96.3%(26/27)	98.0% (49/50)	1.0000
Willing to request CMS to procure accordingly	95.7%(22/23)	96.2%(25/26)	95.9%(47/49)	1.0000

CHAPTER 4 DISCUSSION

This study sought to investigate how the DHOs and pharmacy technicians monitor their pharmaceutical budget and expenditures, how they utilize the existing health information systems for quantification and procurement, and to determine their perceptions, capacity, and willingness to annually forecast drug budgets based on the needs of the districts. The results will provide the Ministry of Health with information on how to improve drug supply and services. This chapter discusses the merits and deficits of having DHOs and pharmacy technicians forecast drug and budget requirements and what is required for them to do so.

In considering the findings of this study it is important to bear in mind the following limitations:

a. Epidemiological limitation: The DHOs' response rate was lower than the pharmacy technicians' due to the turnover of the DHOs at the time of data collection.
b. Technical limitations: The drug budget and expenditure data provided by NLGFC included an estimate for the last quarter of the year which may have about 3% bias, according to the NLGFC officers.
c. Statistical limitation: The sample size is small because of the small size of the study population.

4.1 The awareness and capacity to monitor drug expenditure, estimate the drug budget and set priorities

With regard to the drug budget and spending status, the discrepancies between the awareness of the respondents, in particular, pharmacy technicians, and the data from NLGFC, imply that the respondents were not fully aware of their drug budgets and expenditure, which may be due to communication gaps in various levels such as NLGFC vs. DAs, DAs vs. DHOs, and DHOs vs. pharmacy technicians. Another reason for not knowing their drug budget accurately could be that the districts play no role in developing their drug budget.

The study does however show that most of the DHOs and pharmacy technicians regularly review drug expenditure by simply reviewing how much was spent. Furthermore, they were confident with their perceived capacity to set priorities and estimate a needs-based drug budget. This demonstrates a sense of responsibility and commitment. In addition, their confidence indicates that it is possible to estimate drug budget according to the priorities of their district implementation plans. However, their capacity may be inadequate, based on the methodology they used to monitor expenditure. This result partly concurs with another study in which general practitioners (GPs) were conscious of their public responsibility with respect to drug

expenditure, although some admitted their capacity was limited (Prados-Torres, Calderon-Larranga, Sicras-Mainar, March-Llull & Olivan-Blazquez, 2009). With regard to the capacity issue, the performance of the health care workers in managing a given drug budget with proper training in how to estimate the drug requirements of the health centres has proved successful (Garraoui et al., 1999). However, the training of pharmacy technicians, to monitor expenditure has been rare in Malawi, with the exception of DHOs. The DHOs normally receive administrative management training, including financial management, before their first appointment. They may, therefore, have more knowledge of monitoring expenditure, but not necessarily in specific techniques for drug budget. Pharmacy technicians only receive training in logistical management in which there is no financial management element (USAID|DELIVER_Project, 2003, USAID|DELIVER_Project, 2009). Therefore, the pharmacy technicians must be trained to monitor expenditure and cost control, as suggested for pharmacists in South Africa (Summers et al., 1998).

Product analysis using VEN (vital, essential, non-essential) classification and cost analysis using ABC analysis are the most recommended methodologies for priority setting and expenditure monitoring (MSH, 1997). VEN analysis is based on the health impact of the drugs. Vital items are life saving or those for whom regular

supply is mandatory; essential items are effective for significant illnesses; non-essential items are for minor illnesses. The items in the CMS catalogue are mostly assigned a VEN classification, which is correlated with Essential Health Package. This system is useful for identifying the most needed items when setting priorities. ABC analysis is used to analyse the distribution of product costs. It is derived from a "pareto" principle used to distinguish the "vital few" and "trivial many" items for attaining efficiency (Ahmed, 1995). Products are categorized into three classes, namely A, B, and C, according to annual usage (unit cost times and annual consumption). Class A products have the highest annual usage, with 10-20% of the items accounting for 70-80% of the funds spent. Class B products have lower (10-20% of items and 15-20% of expenditure), while C products have the least (60-80% of items and 5-10% expenditure) annual usages (Moore, Bykov, Savelli & Zagorski, 1997). Monitoring drug expenditures using ABC analysis enables managers to identify the levels of impact and the volume of pharmaceutical consumption. It is very useful for monitoring consumption patterns and setting priorities. VEN classification and ABC analysis can be combined as qualitative (item selection) and quantitative (pharmaceutical and budget estimation) tools for priority setting for forecasting and procurement planning. In this study, despite high confidence in priority setting and estimating drug budget based on needs, a low proportion of the DHOs and

pharmacy technicians applied product analysis (VEN) and ABC analysis to the monitoring of drug expenditure. Therefore, all DHOs and pharmacy technicians may require training or strategic guidance to use these techniques.

4.2 The Knowledge and Use of the Existing Information Systems

The health information systems are established to facilitate decision-making at different levels. More importantly, they support district health authorities by responding to their local needs (Mutemwa, 2005). In various developing countries, health information systems, such as the Health Management Information System (HMIS) and the Logistics Management Information System (LMIS), were introduced to assist the planning and prioritisation of health and pharmaceutical needs (Chaulagai, Moyo & Pendame, 2003; Fraser, Biondich, Moodley, Choi, Mamlin & Szolovits, 2005; Mutemwa, 2005; Bossert et al., 2007). However, certain studies demonstrated the challenges in terms of data quality and completeness of health information systems, along with the insufficient utilization of the information in developing countries (Rubona, 2001; Hotchkiss et al., 2006; Gething, Noor, Goodman, Gikandi, Hay, Sharif, Atkinson & Snow, 2007; HMN, 2009). A survey of the public drug supply system in Malawi has recommended a strengthening of data collection mechanisms to better foresee customers' drug requirements. Improved

information and financial management (including procurement) were also recommended (Conticini, 2004). Therefore, the data collection and analysis, as well as an understanding of the elements of the systems, are crucial to ensure quality reports, and in turn, influence the decisions.

In this study, the knowledge and use of LMIS in procurement by DHOs and pharmacy technicians is adequate, with a good level of confidence in the system. However, poor data quality, late and incomplete reporting, and a lack of price information in the SCMger, are a source of concern for some respondents. These results appear contradictory. This may be due to the bias of social desirability of the respondents.

The use of HMIS for the quantification of certain medicines is low, which may be because that HMIS was not set up for procurement. Only a few vertical programmes use morbidity or epidemiology data to estimate their needed supplies. Only a few of the DHOs and pharmacy technicians who were involved in vertical programs had used national quantification and have the knowledge and experience of using HMIS data for quantification. Therefore, their satisfaction with usefulness was high. However, few respondents concerned about the incompleteness of the data. This

study partly echoes the findings in an assessment in 2009, which found a low utilization of the information at the district level, and a lack of regular feedback to the facilities. These negatively affected the understanding of the information systems and data quality. The assessment also suggested the capacity and practice of health workers to correctly record the required information requires improvement (HMN, 2009).

More than half of the DHOs and the PTs are concerned that more time will be spent planning and monitoring if the districts forecast the pharmaceutical and budget requirements. One factor is that SCMger does not provide costs of the products as indicated by some of the respondents. The pharmacy technicians need to export the data from SCMger to Excel spread sheet and type in unit price for each item to come up with the total cost, or calculate the cost manually if they do not have the knowledge of using Excel. Another factor is that the manual health management information data is difficult to retrieve. These factors create extra work to reconcile and analyse the information. The system as it is now, with peripheral data collection and central data capturing has been characterized as difficult and time-consuming (Fraser et al., 2005), which highlights the issue of the design of health information systems. Poor timeliness and the periodicity of health expenditure data and the

inconsistent use of health information in planning frameworks and the resource allocation process (HMN, 2009) may be not merely due to a lack of human capacity, the user-friendliness of the system also counts. Some examples of an automated multi-function system to perform cost calculations in inventory management have proven successful and time-saving in pharmaceutical cost-containment programmes (Yao and Carlson, 1999; Awaya et al., 2005).

4.4 Perceptions and willingness to forecast annual drug and budget requirements at the district level

The optimistic view of the potential benefits of the respondents regarding the annual forecast of pharmaceutical and budget requirements is advantageous, and has provided a foundation for its future implementation. However, the respondents, in particular the DHOs, had less confidence that forecasting drug requirement will improve the supply from CMS. Most of these respondents were concerned that the districts' effort alone could not improve the supply from CMS because there are other factors that affect CMS's performance during pharmaceutical supply. Some of these factors are corruptions and pilferage (Nyasa_Times, 2010) and an inefficient procurement system. The SWAp review has suggested that if drugs and the health supply procurement system are not adequately addressed, it will threaten the long-term sustainability of POW (Pearson, 2010).

Most respondents also expressed a positive willingness to forecast the pharmaceutical and budget requirements for their districts. They further showed their willingness to request CMS to supply them based on their forecasted requirements within the approved budget, in spite of their concerns about the factors that may affect CMS's performance. This positive attitude may be guided by their professional conscience and recognition of their ownership in the process of decentralisation (Franco, Bennett & Kanfer, 2002; Mathauer and Imhoff, 2006). This motivation could be an integral factor for the sustainability of the pharmaceutical supply system.

CHAPTER 5 CONCLUSION AND RECOMMENDATIONS

This chapter outlines the merits and deficits identified in this study with recommendations in response to the questions of, "What exists? What is needed?" with respect to forecasting annual drug and budget requirements at the district level.

What Exists?

A. Motivation of the District Health officers and pharmacy technicians, and basic systems are available and outlined below, which could be a foundation for the further development of forecasting drug and budget requirements at the district level. Motivation to improve pharmaceutical supply is adequate: the respondents understand the benefits of forecasting drug and budget requirements for their districts and have confidence in their capacity to do so and commitment.

B. Fundamental systems and practices are present: LMIS and HMIS are available and in use, and basic drug expenditure monitoring is in place.

What is needed?

Deficits are identified on both demand and supply sides. On the demand side, advanced knowledge about and tools for analysing consumptions and expenditures are lacking for facilitating forecasting drug and budget requirements at the district

level in an efficient and effective manner. On the supply side, the capacity of CMS to manage nation-wide pharmaceutical supply is limited. Therefore, recommendations are made as follows:

A. The DHOs and pharmacy technicians require knowledge and practice of the techniques for analysing, planning, and monitoring drug supply and expenditure, such as VEN/ABC analysis or other suitable techniques.

B. The LMIS and HMIS ought to be revised in more user- friendly ways to facilitate data collection, analysis and use. The integration of multi-functions, such as patient registration, clinical management (diagnosis and prescription), pharmaceutical management (dispensing, inventory, quantification and procurement), and monitoring and research (reporting, analysis) in real time and a web-based manner can be considered for future development.

C. The reform of CMS should continue and expedite to strengthen its capacity to satisfy their customers.

In conclusion, the motivation of DHOs and PTs at the district level is one of the most important factors for the improvement of pharmaceutical management and supply. The Ministry of Health should provide necessary technical support to strengthen the systems and tools, and build their capacities in planning, management, and

monitoring related to pharmaceutical supply and its financial management.

Regarding the supplier, CMS, since its reform is on the way, the Ministry of Health should ensure that its technical capacities are built along with the reform of the system.

REFERENCES

AHMED, N. 1995. A design and implementation model for life cycle cost management system. *Information & Management,* 28, 261-269.

ANOKBONGGO, W., OGWAL-OKENG, J. & OBUA, C. 2004a. Impact of Decentralisation on health services in Uganda: A look at facility utilization, prescribing and availability of essential drugs. *East African Medical Journal,* 81, s2-s7.

ANOKBONGGO, W., OGWAL-OKENG, J. & ROSS-DEGNAN, D. 2004b. Attitudes and perceptions of stakeholders on the decentralization of health services in Uganda: The case of Lira and Apac districts. *East African Medical Journal,* 81, s8-s11.

ARREDONDO, A. & OROZCO, E. 2006. Effects of health decentralization, financing and governance in Mexico. *Rev Saude Publica,* 40, 152-60.

AWAYA, T., OHTAKI, K., YAMADA, T., YAMAMOTO, K., MIYOSHI, T., ITAGAKI, Y., TASAKI, Y., HAYASE, N. & MATSUBARA, K. 2005. Automation in drug inventory management saves personnel time and budget. *Yakugaku Zasshi,* 125, 427-32.

BOSSERT, T. J., BOWSER, D. M. & AMENYAH, J. K. 2007. Is decentralization good for logistics systems? Evidence on essential medicine logistics in Ghana and Guatemala. *Health policy and planning,* 22, 73-82.

CARSON, C., BOIVIN, M., CHIRWA, A., CHIRWA, S. & CHITALU, F. 2008. Malawi Health SWAP Mid-Term Review Summary Report.

CHAULAGAI, C., MOYO, C. & PENDAME, R. 2003. Health Management Information System in Malawi: issues and innovations. *Accessed on,* 30.

CONTICINI, A. 2004. Macroeconomics and Health in malawi: What way forward.

FRANCO, L., BENNETT, S. & KANFER, R. 2002. Health sector reform and public sector health worker motivation: a conceptual framework. *Social Science & Medicine,* 54, 1255-1266.

FRASER, H., BIONDICH, P., MOODLEY, D., CHOI, S., MAMLIN, B. & SZOLOVITS, P. 2005. Implementing electronic medical record systems in developing countries. *Informatics in Primary Care,* 13, 83-96.

GARRAOUI, A., FEUVRE, P. L. & LEDOUX, M. 1999. Introducing management principles into the supply and distribution of medicines in Tunisia. *Bulletin of the World Health Organization,* 77, 525-529.

GETHING, P., NOOR, A., GOODMAN, C., GIKANDI, P., HAY, S., SHARIF, S., ATKINSON, P. & SNOW, R. 2007. Information for decision making from imperfect national data: tracking major changes in health care use in Kenya using geostatistics. *BMC medicine,* 5, 37.

GLOCOMS Appendix A - Description of Services.

GREEN, A., ALI, B., NAEEM, A. & VASSALL, A. 2001. Using costing as a district

planning and management tool in Balochistan, Pakistan. *Health policy and planning,* 16, 180-186.

HEALTH METRICS NETWORKS 2009. Health Information Systems Assessment Report. *Ministry of Health Malawi.*

HOTCHKISS, D. R., EISELE, T. P., DJIBUTI, M., SILVESTRE, E. A. & RUKHADZE, N. 2006. Health system barriers to strengthening vaccine-preventable disease surveillance and response in the context of decentralization: evidence from Georgia. *BMC Public Health,* 6, 175.

KEMP, J., AITKEN, J., LEGRAND, S. & MWALE, B. 2003. Equity in health sector responses to HIV/AIDS in Malawi. *Regional Network for Equity in Health in Southern Africa. Harare: Equinet.*

KORTE, R., RICHTER, H., MERKLE, F. & GORGEN, H. 1992. Financing health services in sub-Saharan Africa: options for decision makers during adjustment. *Social Science & Medicine,* 34, 1-9.

LUFESI NN, A. M., AURSNES I 2007. Deficient supplies of drugs for life threatening diseases in an African community. *BMC Health Services Research,* 7.

MATHAUER, I. & IMHOFF, I. 2006. Health worker motivation in Africa: the role of non-financial incentives and human resource management tools. *Human Resources for Health,* 4, 24.

MINISTRY OF LOCAL GOVERNMENT AND RURAL DEVELOPMENT 2005. A strategy for capacity building for decentralisation in Malawi. Stage 1 - Capacity Assessment. *Government of Malawi.*

MOORE, T., BYKOV, A., SAVELLI, T. & ZAGORSKI, A. 1997. Guidelines for implementing drug utilization review programs in hospitals. *Arlington USA: Management science for health.*

MANAGEMENT SCIENCES FOR HEALTH 1997. Managing Drug Supply: The Selection, Procurement,Distribution, and Use of Pharmaceuticals, second edition.

MUTEMWA, R. I. 2005. HMIS and decision-making in Zambia: re-thinking information solutions for district health management in decentralized health systems.

NATIONAL LOCAL GOVERNMENT FINANCE COMMITTEE 2010. Consolidated Local Authorities 2009/2010 Budget Estimates. *Ministry of Local Government and Rural Development, Government of Malawi,* Local Authority Budget Document No.1.

NSO_MALAWI 2008. Population and Housing Census Preliminary Report. *National Statistical Office, Malawi.*

NYASA_TIMES 2010. Progress made to turn Medical Store into a Trust - Official. *News by Nyasa Times on 20 February 2010. http://www.nyasatimes.com/health/progress-made-to-turn-medical-store-into-a-trust-official.html. Accessed on 12 November 2010.*

PEARSON, M. 2010. Impact Evaluation of the Sector Wide Approach (SWAp), Malawi.

PRADOS-TORRES, A., CALDERON-LARRANAGA, A., SICRAS-MAINAR, A., MARCH-LLULL, S. & OLIVAN-BLAZQUEZ, B. 2009. Pharmaceutical cost control in primary care: opinion and contributions by healthcare professionals. *BMC Health Serv Res,* 9, 209.

RUBONA, J. Year. Routine health information systems that operate in Tanzania. *In,* 2001. Ministry of Health Tanzania, 183¡V193.

SUMMERS, R., CONRY, I., JOUBERT, A. & SINGH, N. 1998. The impact of rationalised pharmaceutical procurement and distribution and of essential drugs programme implementation. Northern Province. Report: Evaluation 2.

TETTEH, E. 2009. Creating reliable pharmaceutical distribution networks and supply chains in African countries: Implications for access to medicines. *Res Social Adm Pharm,* 5, 286-97.

USAID|DELIVER_PROJECT 2003. Malawi Health Commodities Logistics Management System Procedures Manual. *http://deliver.jsi.com/dlvr_content/resources/allpubs/guidelines/MW_HealCommProcManu.pdf.*

USAID|DELIVER_PROJECT 2009. Malawi Health Commodities Logistics Management System Standard Operating Procedures Manual (Draft).

WHO 2010. Monitoring the building blocks of health systems: A handbook of indicators and their measurement strategies.

YAO, A. & CARLSON, J. 1999. The impact of real-time data communication on inventory management. *International Journal of Production Economics,* 59, 213-219.

APPENDICES

Appendix 1: Information and Informed Consent Sheet

Dear Sir/Madam,

INFORMED CONSENT FOR PARTICIPATING A RESEARCH

I am Shiouchu Wang (Judy Wang). I am undertaking a research titled "Forecasting annual district pharmaceutical and budget requirements. What exists, what is needed?"

The objective of the research is to explore the opinions and knowledge of the District Health Officers and Pharmacy Technicians about forecasting the requirement of pharmaceuticals and estimating the annual drug budget for the districts.

You are invited to participate in responding the questionnaire for the research because of your crucial position in your district regarding drug supply and the implementation of Essential Health Package. You will remain anonymous and the confidentiality will be maintained throughout the research and the report. There is no risk for participating in this study. However, you are free to withdraw from the study. If you consent, please complete the attached questionnaire and post it back to me using the enclosed return envelop and stamps by end of March 2010. I will share the report with you by post or, if possible, to present it in zonal meetings.

If you have any question on the questionnaire, please contact me by phone: 0888380728, or by e-mail: jwang@msh.org, or judyscw@yahoo.com.tw. I will call you to follow up the receipt of the questionnaire and answer your questions.

Please accept my deep appreciation for assisting this task.

Yours Sincerely,

Judy Shiouchu Wang

Appendix 2: The questionnaire

QUESTIONNAIRE FOR THE RESEARCH OF

FORECASTING ANNUAL DISTRICT PHARMACEUTICAL AND BUDGET REQUIREMENTS: WHAT EXISTS, WHAT IS NEEDED?

Please tick your answers in the boxes

Questions	Answers
A. Background of the respondent	
1. What is your position?	1. □ DHO □ Pharmacy technician
2. How long have you been in your district?	2. □ Less than 12 months □ 12 months or above
B. Monitoring of pharmaceutical expenditure	
3. Do you know how much the drug budget for your district was in 2008/09?	3. □ Yes □ No
3a. If Yes, how much it was? (round it in million)	3a._____
4. Do you monitor your pharmaceutical expenditures? *(If Yes, proceed to 4a)* *(If No or I don't know, proceed to question 5)*	4. □ Yes □ No □ I don't know how to do
4a. if yes, please tick the following on how you monitor the expenditure (multiple choices)	
4a1. □ Review the report of pharmaceutical expenditure regularly	
4a2. □ Have a breakdown of the expenditures for the procurement from CMS and private suppliers	
4a3. □ Have a breakdown of the expenditures for medicines and medical supplies	
4a4. □ Apply ABC analysis or analyse the most and least cost of the pharmaceuticals procured	
4a5. □ Others- Please specify: _____	
5. Did you over spend your drug budget for the financial year of 2008/09?	5. □ Yes □ No □ I don't know

C. Knowledge about and use of the current information systems

6. Are you aware of Logistics Management Information System (LMIS)? 6. □ Yes □ No

(If Yes, proceed to 6a; if No, proceed to question 7)

6a. If yes, please tick the information below which LMIS provides based on your understanding: (multiple choices)

6a1. □ Consumption of the pharmaceuticals

6a2. □ Stock level of the pharmaceuticals

6a3. □ How long the pharmaceuticals have been out of stock

6a4. □ Losses or adjustments of the pharmaceuticals

6a5. □ Quantities required to be resupplied

6a6. □ Others- please specify: _____

7. Have you ever used Supply Chain Manager to produce periodical summarized consumption reports for essential drugs? 7. □ Yes □ No □ I don't know how to do

7a. If Yes, did you find the information useful? 7a. □ Yes □ No

8. Have you ever used **LMIS** data (computer or manually processed) to determine the items and quantities for the procurement of essential pharmaceuticals? 8. □ Yes □ No □ I don't know how to do

(If Yes, proceed to 8a)

(If No or I don't know how, proceed to question 9)

8a. If Yes, did you find it useful? 8a. □ Yes □ No

(If Yes, proceed to question 9)

(If No, proceed to 8b)

8b. If you found it not useful, please tick the reasons below (multiple choices):

8b1. □ Not all facilities submit their LMIS reports

8b2. □ Some of the LMIS reports whose data is incomplete.

8b3. □ Some of the LMIS reports whose data is inaccurate.

8b4. □ The quantities required which are projected by Supply Chain Manager are not all useful.

8b5. □ Supply Chain Manager does not provide the information of the cost for the quantities of the pharmaceuticals required.

8b6. □ Others- Please specify: _____

9. Have you ever used **HMIS** data (morbidity data) to determine the quantities required for certain medicines? 9. □ Yes □ No □ I don't know how to do

(If Yes, proceed to 9a)

(If No or I don't know how, proceed to question 10)

9a. If Yes, did you find it useful? 9a. □ Yes □ No

(If Yes, proceed to question 10; if No, proceed to 9b)

9b. If you found it not useful, please tick the reasons below (multiple choices):

9b1. □ The information of diagnosis is incomplete

9b2. □ The information of treatment is incomplete

9b3. □ The manual information is difficult to retrieve

9b4. □ Not all facilities submit their HMIS reports

9b5. □ Others- Please specify: _____

D. Perceptions, capacity and willingness about forecasting annual pharmaceutical and budget requirements at the district level

Statements	Answers
10. Do you agree that you would be able to use drug budget more efficiently if you are given an opportunity to forecast annual pharmaceutical and budget requirements?	10. □ Yes □ No □ I am not sure
11. Do you agree that forecasting annual pharmaceutical and budget requirements at the District level would motivate MOH and the Ministry of Finance to optimally allocate the drug budget?	11. □ Yes □ No □ I am not sure
12. Do you agree that forecasting annual pharmaceutical and budget requirements at the District level would motivate CMS to plan procurement and distribution based on the needs of the districts?	12. □ Yes □ No □ I am not sure
13. Do you agree that forecasting annual pharmaceutical and budget requirements at the District level would improve the pharmaceutical supply from CMS?	13. □ Yes □ No □ I am not sure

(If Yes, proceed to question 14)

(If No or I am not sure, proceed to 13a)

13a. If no or not sure, please tick the reasons below (multiple choices):

13a1: □ The actual requirements in the districts may significantly differ from what was forecasted.

13a2: □ There are other factors which affect CMS in their procurement.

13a3: □ Others- Please specify: _____

14. Do you agree that forecasting annual pharmaceutical and budget requirements at the District level would potentially improve the rational use of pharmaceuticals?	14. □ Yes □ No □ I am not sure

15. Do you agree that using LMIS and HMIS data to forecast annual pharmaceutical and budget requirements at the District level would potentially improve their data quality?	15. □ Yes □ No □ I am not sure
16. Do you think you are able to set priorities for pharmaceutical requirement?	16. □ Yes □ No □ I am not sure
17. Do you think you are able to estimate annual drug budget based on your forecasted pharmaceutical requirement?	17. □ Yes □ No □ I am not sure
18. Do you agree that forecasting drug and budget requirements would increase the time you spend on planning and monitoring pharmaceutical supply and expenditure?	18. □ Yes □ No □ I am not sure
19. In conclusion, are you willing to forecast annual pharmaceutical and budget requirements for your district? *(If Yes, proceed to question 20)*	19. □ Yes □ No □ I am not sure
20. If yes, would you request CMS to supply your district based on your forecasted requirements within the amount of the approved drug budget?	20. □ Yes □ No □ I am not sure

Appendix 3: Ethical Clearance from Ethics Committee

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Miss Shiouchu Wang

CLEARANCE CERTIFICATE	**M090347**
PROJECT	Forecasting Annual District Drugs and Budget Requirements: What Exist? What is Needed?
INVESTIGATORS	Miss Shiouchu Wang.
DEPARTMENT	School of Public Health
DATE CONSIDERED	09.03.27
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 09.05.29 **CHAIRPERSON** .....
(Professor P E Cleaton Jones)

*Guidelines for written 'informed consent' attached where applicable

cc: Supervisor : Dr J Mourman

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

.....

Appendix 4: Approval certificate from National Health Sciences Research Committee of Malawi

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

6 January 2010

Judy Wang
University of Witwatersrand

Dear Sir/Madam,
RE: Protocol # 661: Forecasting annual district pharmaceutical and budget requirements

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

- **APPROVAL NUMBER** : NHSRC # 661
  The above details should be used on all correspondence, consent forms and documents as appropriate.
- **APPROVAL DATE** : 06/01/2010
- **EXPIRATION DATE** : This approval expires on 05/01/2011
  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.
- **SERIOUS ADVERSE EVENT REPORTING** :All serious problems having to do with subject safety must be reported to the National Health Sciences Research Committee within 10 working days using standard forms obtainable from the NHSRC Secretariat.
- **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 Mwansambo (Chairman), Prof. Mfutso Bengo (Vice Chairperson)*
Registered with the USA Office for Human Research Protections (OHRP) as an International IRB
(IRB Number IRB00003965 FWA00005976)

Appendix 5: Permission from Ministry of Health of Malawi to access the respondents

In reply please quote No. .....

Telephone No.: Lilongwe – 789 400
Fax No.: 789 431
Communications should be address to
Secretary for Health

Ministry of Health
P.O. Box 30377
Capital City
Lilongwe 3

File Ref:

2nd February 20120

TO: All District Health Officers/Representatives

Dear Sir/Madam:

RE: PERMISSION FOR MS JUDY SHIOUCHU WANG TO UNDERTAKE RESEARCH IN DISTRICT HEALTH OFFICES

The Ministry of Health through the National Health Services Research Committee has granted permission for Miss Judy S Wang to undertake research titled **"Forecasting Annual District Pharmaceutical and Budget Requirements, what exist, what is needed?"**

The Ministry views this study as of much relevance to its efforts to improve the Supply Chain Management through lessons mostly likely to be learnt from it.

Miss Wang has worked with the Ministry for many years and is currently with MSH Malawi Office under the Programme of Strengthening Pharmaceutical Systems (SPS). In this regard you are asked to allow and support Miss Wang to collect the data needed for the study in question from your facilities at the point she presents this letter.

Your cooperation and assistance with this request will be highly appreciated.

Mr. Godfrey Kadewele

for: The Secretary for Health