CHALLENGES IN THE MANAGEMENT OF DRUG SUPPLY IN PUBLIC HEALTH CARE CENTRES IN THE SEDIBENG DISTRICT, GAUTENG PROVINCE

Masters in Science (Medical) in Pharmacy

With Dissertation

SHAMIMA TAYOB

200818356

Supervisor: Ms EA Helberg

Co-supervisor: Dr S Bezuidenhout

University of Limpopo, Medunsa Campus

School of Health Sciences

Department of Pharmacy

2012

ACKNOWLEDGEMENTS

I gratefully acknowledge and thank:

- My supervisor Ms. EA Helberg and my co-supervisor Dr S. Bezuidenhout for their ongoing support, motivation and supervision.

- The statistician Professor Schoeman who assisted with the analysis of the data.

- The Gauteng Department of Health, Sedibeng district for authorising this study.

- The clinic staff for their co-operation and willingness in completing the questionnaire.

- The drivers from the transport department in the completion of the questionnaire.

- Ms. Priya Bawa for capturing of the data and assisting in editing the document.

- Mr. Johan van Niekerk and Ms. Meliza Coetzee for their assistance in the data collection.

DECLARATION

I, Shamima Tayob hereby declare that the work on which this research is based is original (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is submitted for another degree at this or any other university.

Shamima Tayob

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ARV	Anti-retroviral
CHC	Community Health Centre
DOH	Department of Health
DSM	Drug Supply Management
EDL	Essential Drug List
FEFO	First expired - First out
FIFO	First-in/first-out
FM	Facility Manager
GDOH	Gauteng Department of Health
GPP	Good Pharmacy Practice
HIV	Human Immune-deficiency Virus
HST	Health Systems Trust
MEC	Member of the Executive Council
MSD	Medical Supplies Depot

NCS	National Core Standards
NDOH	National Department of Health
NDP	National Drug Policy
PA	Pharmacist Assistant
PHC	Primary Health Care
ROL	Re-order Level
SAAHIP	South African Association of Hospital and Institutional Pharmacists
SAPC	South African Pharmacy Council
SOP	Standard Operating Procedures
STG	Standard Treatment Guidelines
STI	Sexually Transmitted Infection
TB	Tuberculosis
WHO	World Health Organisation
XDR-TB	Extensively drug resistant Tuberculosis

ABSTRACT

In South Africa, 80% of the population is dependent on the government to provide for their health care needs, mainly through primary health care facilities. In the health objectives of the National Drug Policy, the government of South Africa outlines its commitment to ensuring availability and accessibility of medicines which are effective, affordable, safe and of good quality in all sectors of the health care system (National Department of Health, 1996).

In order to assess the availability of drugs and identify challenges which exist in the Emfuleni sub-district within the Sedibeng district, a questionnaire was administered to 21 primary health care facility managers/store managers, four Community Health Centre managers and five transport officers in the district.

In addition, a document review process was conducted to verify aspects of the facility managers' and store managers' responses. Bin cards and primary health care order files were also examined in conjunction with a checklist to establish whether stock control systems were in place.

There was a 100% response with all primary health care centres and community health care centres completing the questionnaires. It was established that drugs at primary and community health care clinics were procured from the Sedibeng district pharmacy.

In each of these clinics there were specific individuals responsible for medicine supply management. Only four primary health care clinics had full-time pharmacist assistants employed, and 14 clinics were visited by the assistants on a weekly/bi-weekly basis. There were no employees that have received training in drug supply management in the last 12 months in 88% of the clinics interviewed.

Nineteen clinics claimed that the storage area was not large enough to store all the stock for a month's supply and only one clinic had a secure delivery area for their medication.

It was established that 24 facilities received stock by two specific procedures namely; that the number of boxes were checked and the driver's note was then signed, and stock received was checked against the invoice. Of the interviewed

clinics, 20% admitted that the re-order level had not been calculated for all tracer items in the store.

Standard Operating Procedures, Standard Treatment Guidelines and the Essential Drugs List were also not available at all facilities. The results indicate inadequacies and weaknesses in procurement, quantification, stock control, storage and record keeping.

It clearly demonstrates that inadequately-trained staff was a major contributing factor to drug shortages. There was a lack of monitoring and evaluation by the district pharmacy as pharmacists did not manage to visit all the clinics each month. Most of the inadequacies and weaknesses can be addressed at facility level with proper supervision, in-service training, mentoring and support of staff and the reinforcement of drug supply management training.

Regular supervisory visits together with updating the monitoring tool in terms of the problems identified will improve the management of drugs and ultimately decrease the number of out of stocks where problems have been identified at primary health care level.

CHAPTER 1

1.1 INTRODUCTION

According to the World Health Organisation (WHO) standards, essential drugs are those drugs which the nation must have in sufficient quantities at all times for the management of the most common ailments that afflict the greater number of its population (WHO, 1998). The Essential Drugs List (EDL) program is derived from this concept. It is understandable that the essential drug classification is unique to each country as what may be regarded as non-essential in one country may be essential in another country due to each country's disease patterns and level of development (Jha & Roy, 2005).

Although medicines are one of the vital tools needed to improve and maintain health, for too many people throughout the world medicines are still unaffordable, unavailable, unsafe and improperly used. An estimated one third of the world's population lacks regular access to essential drugs, with this figure rising to over half in the poorest parts of Africa and Asia (Chetley, Hardon, Hodgkin, Healand & Fresle, 2007).

According to Dukes and colleagues, the following factors may impede drug supply management (DSM), (Dukes, Garnett, Hogerzeil, Laing, O'Connor, Quick & Rankin, 1997):

- The lack of infrastructure for storage and distribution of drugs
- The lack of dedicated transport to ensure constant drug supply
- Losses from expiration, theft, fraud and inappropriate storage
- Inaccurate forecasting of drug requirements due to non-adherence to drug re-order levels (ROL).

At the Primary Health Care (PHC) level, factors affecting usage would be determined by prescription patterns, patient adherence, drug availability and patient load. Other factors which impact on the usage are inventory control and the availability of human resources (Dukes *et al*., 1997).

Many of the factors indicated above are common to the current public sector in terms of DSM. Medicine expenditure in most developing countries represents one to two thirds of the total public and private health expenditure. It is therefore important to identify challenges which exist in terms of DSM (WHO, 1998).

1.2 BACKGROUND

In South Africa, many districts have reported that district health facilities (mostly PHC facilities) do not have essential drugs in stock (Matse, 2005[a]). Within a decade after the first modern pharmaceuticals became available, efforts began to ensure their widespread availability. From the mid 1950's to the mid 1970's, basic management concepts began to evolve in countries such as Norway, Papua Guinea, Sri Lanka, Cuba and Peru (Matse, 2005[a]).

Availability of medicines has been shown to enhance the utilisation of health facilities and the reputation of health professionals and the entire health care system in general. Gray and co-workers reported that many patients view access to drugs as an indication of good health care management (Gray, McCoy & Suleman, 1988). The country's socioeconomic contrast poses a unique challenge to the National Department of Health (NDOH) to make cost-effective healthcare accessible to all the inhabitants of the country.

1.3 RATIONALE FOR THE STUDY

According to the Management Sciences for Health, "most leading causes of discomfort, disability, and premature death

can be prevented, treated or at least alleviated with cost effective drugs" (Matse, 2005[a]). According to the National Drug Policy (NDP) of 1996, drugs have bestowed enormous health benefits on people all over the world (NDOH, 1996). They have transformed the treatment and prevention of many diseases, thus resulting in many lives being saved from death and a greater improvement of the quality of life of others (NDOH, 2003).

Research has proven that essential drugs have a major impact on common causes of morbidity and mortality. The huge burden of illness due to acute respiratory infections, diarrhoeal diseases, measles, malaria, sexually transmitted infection's (STI), tuberculosis (TB), chronic diseases and other illnesses can be substantially reduced if essential drugs are available and properly utilised (Ohuabunwa, 2008).

There is no doubt therefore that whilst it is important to invest in prevention through health education and other programs to improve nutrition, sanitation, water supply, housing, environment and personal hygiene, the availability of essential drugs in response to many diseases is also of importance (Gray & Suleman, 2009).

Despite all these benefits, drugs have not been available to all South Africans. This has been the case even after the NDP and the essential drugs program were adopted to ensure that essential drugs are available at all times, in adequate quantities and in the appropriate dosage forms. It has already been mentioned earlier that many district health facilities do not have drugs in stock (Davids, Mbelle, Mohlala, Peltzer, Phaswana-Mafuya, Ramlagan & Zuma, 2006).

A study by the Health Systems Trust (HST) found that the Kgalagadi district of the Northern Cape had a problem of drug shortages. Reasons for these shortages were not identified (HST, 2003). Also participants of a drug management workshop held in Tzaneen (Mopani district) admitted that their respective health facilities faced serious shortages of essential drugs. The workshop was held in August 2002 and all participants were drug managers at their respective health facilities. However, the reasons behind these shortages were not determined (Davids *et al.*, 2006).

Since the determinant factors associated with essential drug shortages in PHC facilities are based on the political, cultural, and economics of a specific district, reasons for drug shortages

may vary from district to district. Therefore, this study aims to outline the factors associated with essential drug shortages in PHC facilities specifically in the Sedibeng district.

1.4 RESEARCH QUESTION

What are the challenges experienced in the management of drug supply in PHC centres in the Sedibeng district in Gauteng?

1.5 PURPOSE OF THE STUDY

In the Gauteng Province, drugs which are out of stock at the district pharmacies are reported to pharmaceutical services on a weekly basis (an out of stock item results, when the demand for an item cannot be fulfilled from the current inventory). According to circular 39 of 2005 issued by the Gauteng Department of Health (GDOH) a norm of not more than two percent of drug “stock outs” is acceptable (GDOH, 2005).

Effective pharmaceutical procurement and distribution processes are essential to ensure the availability of drug supplies. Pharmaceutical services in the Gauteng Province have developed a procedure manual and a set of standard operating procedures (SOP’s) for DSM to ensure an effective system of monitoring and evaluation. Over the last 20 years different

countries have acquired considerable experience in managing drug supply. Broad lessons which emerge from this experience include that:

- The NDP provides a sound foundation for managing drug supply,
- Wise drug selection underlies all other improvements,
- Effective management saves money and improves performance and,
- Systemic assessment and monitoring are essential.

What works best in DSM has no simple answer. Each country brings unique political, economic and geographical factors to the equation. In addition, to weigh one drug supply system against another cannot be properly done from a global perspective without a detailed study (WHO, 1998). However, what the experience of countless countries does demonstrate is that substantive and sustainable improvements in the supply and use of drugs is possible, but an equal or greater number of negative experiences show that success is by no means assured. Clear goals, sound plans, effective implementation and monitoring are essential ingredients in the pharmaceutical sector development (WHO, 1998).

Unless changes in drug supply systems are based on careful analysis of the underlying causes for the weaknesses of the existing system, a change in the system is unlikely to produce the desired outcome. Systems that are chosen because they function in a “successful” market economy may not prove to be the solution to the drug supply problems faced in the context of a developing country (WHO, 1998).

However, in recent months, complaints were made directly to the Member of the Executive Council (MEC) for Gauteng health by patients in the Sedibeng district, with regards to the non-availability of drugs at PHC level, which has increased in the Gauteng Province. Under the directive of the MEC for GDOH, monitoring and evaluation teams have been established to ensure drug availability of 99.5% stock levels at all times in accordance with circular minute 118 of 2009 (GDOH, 2009).

In line with these patient complaints the Sedibeng district has a challenge to determine reasons for drug “stock-outs” at their PHC facilities. There is thus an urgent need to carefully review DSM in order to determine the problems associated with it. Furthermore, a study in terms of factors affecting DSM or any

related study has never been previously conducted in the Sedibeng district.

1.5.1 Aim of the Study

The aim of this study was to determine problems or challenges affecting DSM at PHC level in the Sedibeng district.

1.5.2 Objectives of the Study

The specific objectives of this study were as follows:

1. To establish the availability of trained personnel to manage drug supply,
2. To explore the availability of infrastructure to store drugs at PHC level according to Good Pharmacy Practice (GPP) requirements,
3. To study the distribution process in terms of availability and accessibility of drugs at PHC level,
4. To identify if stock control systems were in place to ensure affordable and acceptable drugs at PHC level,
5. To update the current tool to effectively monitor drug supply in the Sedibeng district. A monitoring and evaluation tool is currently used from the clinic supervisors manual (DOH, 2003), to monitor DSM in the Gauteng Province.

1.6 THE SIGNIFICANCE OF THE STUDY

The significance of the study is to establish a detailed appraisal of the drug procurement process and inventory control system within the Sedibeng district. The results from the study will also assist in:

- Identifying challenges which exist within the Sedibeng district which will assist in addressing shortcomings in terms of the DSM cycle,
- Providing a baseline of performance against which subsequent quality improvements can be measured,
- Updating the current monitoring tool in order to improve future monitoring and evaluation processes,
- Enhancing the capacity and skills of participants at PHC level in DSM,
- Ensuring compliance with the National Core Standards (NCS) in terms of patient care and the availability of medicines (DOH, 2011),
- Providing recommendations for improving the functioning of DSM not only at a local level but which are generic to the improvement of DSM around the Gauteng Province.

This chapter summarised the importance of the availability of essential drugs at PHC level. It also outlines the aim and objectives of the study and highlights the significance of the study. The subsequent chapter introduces a broad overview of the DSM cycle and highlights the different aspects linked to procurement processes.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Drugs have a special importance and need to be available for the following reasons:

- Drugs save lives and improve health outcomes,
- Drugs promote trust and participation in health services,
- Essential drugs provide a direct low cost response for many diseases (Dukes *et al*., 1997).

Considering these brief reasons for the importance of the availability of drugs, it is imperative that the management of drug supply follows a stringent process. Therefore, the general management function requires an examination of the management process as a whole, in particular the planning and organisation that is required by management. This must include leadership and control, which managers have to exercise over processes, in order to effectively implement plans (Booyens, 1997).

General management embraces the overall function, through which top management develops strategies and formulates

policies for the entire organisation (Booyens, 1997). One such policy which is currently under review is the NDP which provides a sound foundation for managing drug supply. The NDP (1996) within the framework of the National Health Policy aims to improve access to health service, through ensuring the availability of appropriate drugs whenever they are needed (Dukes *et al*., 1997).

The management of drug supply is organised around the four basic functions of the DSM cycle namely: selection, procurement, distribution and use. At the centre of the DSM cycle is a core of management support systems, which include organization, financing and sustainability, information management and human resource management (Dukes *et al*., 1997).

The success of the DSM cycle will depend upon the ability to reliably and consistently supply the drugs to health facilities at all levels of the health system (Mohammad & Raja, 2004). The consequence of supply interruption can be dire, including antibiotic and anti-retroviral (ARV) drug resistance, which could have a wider global impact on the availability of drugs for treatment.

Medical health drug supply chains are different because they usually have large, extended global pipelines, require high levels of product availability and have a high uncertainty in supply and demand.

It is therefore paramount that supply chain or logistics systems are treated as an important and critical function in getting the drugs to their destination. In fact, in order to sustain and expand the successful interventions experienced to date, the supply chains will need to be made more robust, agile and flexible through better management and increased investment of resources to achieve supply chain optimization (Mohammad & Raja, 2004).

The term *supply chain* describes the links and the interrelationships among the many organisations, people, resources, and procedures involved in getting drugs to patients. A typical supply chain would include partners from manufacturing, transportation, warehousing and, service delivery.

Delivery and distribution of drugs at various levels are not possible without effective drug procurement and inventory

control. DSM tools help managers with the process of distributing drugs and supplies to clinic facilities and ultimately to patients, through following a series of steps viz. forecasting needs, the tender process, ordering, receiving, storing/warehousing, and distribution (Mohammad & Raja, 2004).

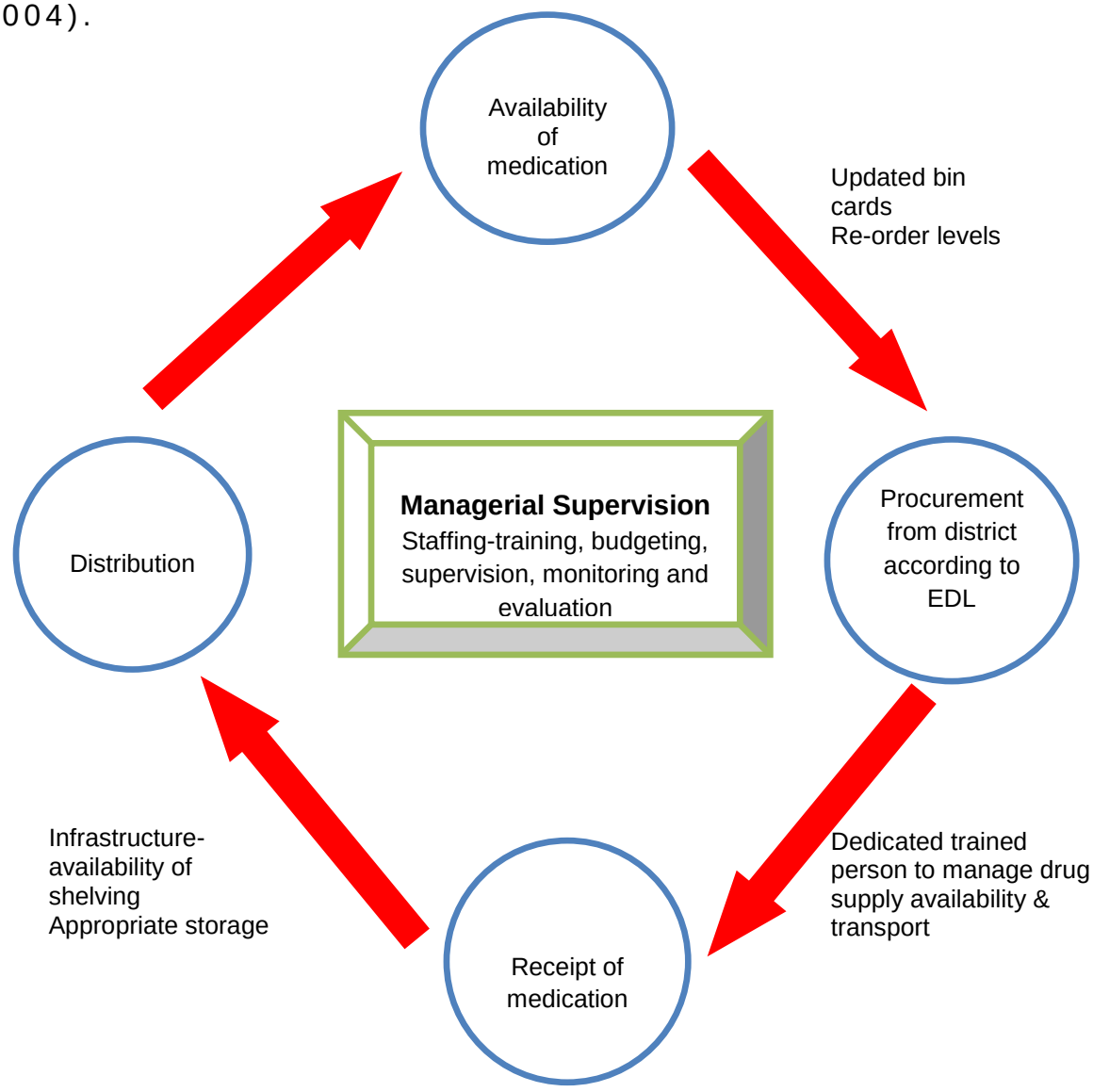


Figure 2.1: Typical logistic cycle of DSM performed in the Sedibeng district.

The procurement of drugs involves various steps including quantification, sourcing, pricing and ensuring timely delivery to the central store. The management of inventory depends on information systems that provide feedback for:

- Tracking the storage and movement of goods at every level within the supply system and storage of medication ready for use in health facilities,
- Ensuring proper stock rotation and medicine with dates so that items of earliest expiry dates are used first, as well as

Enabling managers to know the total amounts of drugs that are within the supply and where they are located thus allowing the possibility of redistribution (Mohammed & Raja, 2004).

Inventory records should be regularly updated to confirm that items are being used correctly and not diverted and misused. Thus inventory control is essential as a source of data for review and decision regarding future procurement (Mohammed & Raja, 2004).

However, despite availability of numerous tools for the management of drugs, none of these specifically targets the health worker who has had no formal training in drug logistics and supply management systems (Jha & Roy, 2005).

In health care, ensuring that there are adequate drugs and supplies for every patient is paramount, as partial or intermittent treatment can lead to less that optimal results and in some cases, this can even be disastrous, both for the individual patient and the public at large (Jha & Roy, 2005).

This concept of full supply is not always applied and many countries manage drugs supplies by rationing systems. However, in the case of Human Immune-deficiency Virus (HIV) treatment, rationing strategies cannot be used and once a patient is placed on treatment, there must be uninterrupted supply of drugs. Rationing could easily lead to treatment interruption and this could lead to treatment failure, drug resistance and a host of other problems, which would ultimately have a huge negative global impact. Ensuring full supply of drugs can be costly and requires additional strategies to optimise the use of resources (Mohammed & Raja, 2004).

Strategies for improving full-supply are as follows:

- Maximise all sources of funding through better co-ordination.
- Provide full and continuous treatment to fewer patients.

- Partner with manufacturers in providing timely forecasts and reducing uncertainty in planning and unplanned costs.
- Purchase in bulk to obtain better prices where possible.
- Make the supply chain efficient resulting in fewer inventories tied in safety stock. This may require shortening the pipeline and delivering directly to the service delivery site and not through intermediary warehouses.
- Reduce loss and pilferage by implementing a security system across the supply chain.
- Standardise and limit the number of drugs and supplies in the system.
- Reduce duplicative drugs and supplies.
- Implement an automated logistics information management system that tracks stock levels and consumption patterns, making inventory transparent through the system.
- Monitor the use of drugs and supplies (Mohammed & Raja, 2004).

Effective distribution management includes the availability of an efficient network of storage facilities, keeping reliable records of drugs stock balance and consumption, maintaining accountability procedures, ensuring adequate and secured

storage, reliable transport systems and reinforcing reporting and supervisory practices. Matse stated that a third of procurement and distribution processes are compromised due to a lack of adequately trained staff. He also stated that "the professionals who are expected to ensure proper purchase, utilisation and appropriate use of those drugs often lack basic knowledge on the management of drug supplies" (Matse, 2005[b]).

The HST's initiative for sub-district support claims that by ensuring an adequate supply of medicine to clinics is only addressing half the problem. They further argue that it is also necessary to address drug use patterns and ensure that drug use is rational (HST, 2003). Rational prescribing refers to "the process of making sure that the diagnosis, advice and treatment for any given patient is correct, and if a medicine is used, that it is the correct choice and correct dose" (Mohammed & Raja, 2004). Quite often poorly trained prescribers, prescribe irrationally resulting in drug shortages (HST, 2003).

For example, in Kenya, Matse determined that inadequately trained staff members are an important contributing factor to drug shortages as a result of their irrational prescribing (Matse, 2005[b]). Other studies attributed drug shortages to drug misuse

and abuse by patients who collect treatment even if they are not sick, or those who accumulate more drugs than they require. Bakarich and co-workers, for example stated that in the United States, “hoarding drugs is not an uncommon practice [especially] among elderly women” (Bakarich, Finucane, Harris & Healy, 2006).

A study conducted in the Mopani established that none of the workers understood the method they claimed to use to determine quantities to be ordered. Whether it was Maximum and Minimum Stock Order Levels, Consumption-Based ROL or the Average Monthly Consumption, the workers had no clue how these formulas were used (Matse, 2005[b]).As a result the study concluded that staff relied on their working experience to determine the quantities to be ordered. It was found that almost thirty percent of the facilities indicated that they had no formal method of quantifying their orders. The stock outs and overstocking found in Mopani could mainly be attributed to the lack of knowledge with regard to quantification method (Matse, 2005[b]).

Unreliable transport for drug supplies has also been cited as a major problem in many health care programs in developing

countries. Transport is either difficult to plan and manage, or is inadequate to health care delivery. Unavailability of reliable transport systems is a major contributing factor to drug shortages (Matse, 2005[a]).

According to WHO, medicines are the second highest expense after staff costs in a country's health care system (Matse, 2005[a]). The World Bank indicates that in many developing countries, a high percentage of medicine losses occur in the state procurement, storage, distribution, and utilisation system.

The World Bank also estimates that in Africa, the patient receives only 12 cents out of every dollar spent by the government on medicines. Inefficiency is the major contributor to these losses (Matse, 2005[a]). Out of the 100% budget allocated for medicines, 10% is lost through inadequate buying practices, 14% through quantification problems, 27% through procurement, 19% through inefficient distribution, 15% through irrational prescribing, and another 3% through patient non-compliance. All these losses that occur in the supply chain add up to 88% of the original budget (Matse, 2005[a]).

It has also been established that in certain areas a significant proportion of essential medicines and supplies meant for PHC are misappropriated or diverted. This diversion is at two levels, firstly at the district pharmacy drug store level and secondly, at the PHC level (Matse, 2005[b]).

Health workers, especially the store managers and those at the dispensaries, divert some of these items either for personal use or by outright theft as some of the items delivered to the health centres have been found in the open drug markets. This matter is worsened by poor supervision because in many cases there are no pharmacists to provide supervision and even the other health care staff to which such duties are assigned are sometimes negligent or even collude to divert the medicines and supplies. Similar situations exist in some state medical stores and general hospitals (Matse, 2005[b]).

In terms of the drug supply and management system of the public health sector, the NDOH monitors the ability of suppliers to supply medicines. During 2009/10, there was a 12% stock out of the 45 ARV's on tender. This was measured in 9 provinces (405 items). There was also a 21.8% stock out of the 35 TB drugs on tender in the 9 provinces (315 items) (NDOH, 2009).

Factors influencing these drug stock outs included: financial constraints and insufficient budget allocation for pharmaceuticals at provincial level, suspension of accounts, and suppliers not adhering to lead times (NDOH, 2009).

During 2009/10, the NDOH secured an additional R900 million from the national treasury to support provinces with the acquisition of ARV's, to ensure that patient care was not compromised. The NDOH continues to support provinces with accurate cost estimates for both ARV's and TB medicines. However, despite the additional allocation of budget, medicines continue to be out of stock at PHC levels (NDOH, 2009).

In 2011 the South African Association of Hospital Pharmacists (SAAHIP) conference focused on the improvement of the quality of pharmaceutical services in the public sector at PHC's and CHC's with particular emphasis on the management and policy-making settings. Improving the quality of health care is central to the NDOH Strategic plan for 2009/2011 and the 10-point plan of 2009-2014, which highlights the improvement of the quality of health services provided (Bradley, Johnson, Putter & Von Zeil, 2011).

The conference also introduced the NCS and explored the implications for pharmaceutical services. In terms of the availability of medicine supplies, the following aspects were discussed:

- Management of budget and inventory control,
- Development of alternative delivery systems for medicines,
- The need to improve patient education with regard to medicines which will in turn lead to improved availability and responsibility for medicine supplies,
- Lack of human resources and the failure to utilise available human resources optimally (Bradley *et al.*, 2011).

The objectives of the core standards are (Bradley *et al.*, 2011):

- To establish a benchmark against which health establishments can be assessed, gaps identified, and strengths appraised,
- To highlight the practical implications of quality improvement in pharmaceutical services,
- To identify interventions to improve the quality of pharmaceutical services using the NCS.

The following were suggested to improve standards:

- Identify sites of “best practice”,

- Self-assessments (audits) in pharmacies,
- Monitor changes over time,
- Assist in motivations for more resources, including equipment and staff (Bradley *et al*., 2011).

The importance of the availability of qualified staff and appropriate infrastructure is often taken for granted within government institutions and policy implementation is expected without appropriate resources.

According to an article published by the World Council of Churches, the implementation of PHC services requires a minimum of the following pre-conditions (Ndilta, 2009):

1. Availability and accessibility of affordable quality essential medicines,
2. Availability of a sufficient number of qualified human resources for health,
3. Availability of adequate infrastructure according to guidelines and norms.

2.2 AVAILABILITY AND ACCESSIBILITY OF AFFORDABLE QUALITY ESSENTIAL MEDICINES

The main objective of the Essential Drug Program is to achieve success and equity through effective DSM (Dukes *et al*., 1997). An EDL is available in pharmacies in South Africa. District pharmacies within the Gauteng Province supply drugs to PHC facilities within their districts according to the EDL. Thus selection, procurement and distribution of drug supply occur at the district level. Pharmaceutical services in the Gauteng Province have developed a procedure manual and a set of SOP's, for DSM to ensure an effective system of monitoring and evaluation. However, drug stocks outs continue to be high despite the implementation of the above mentioned guidelines.

2.3 AVAILABILITY OF A SUFFICIENT NUMBER OF QUALIFIED HUMAN RESOURCES

The quality of health services, their efficacy, efficiency, accessibility and viability depend primarily on the performance of those who deliver them. However, research in this area has been neglected in many countries (Jokhio, Lancashire & Pappas, 2008). Not unlike other developing countries, South Africa's public health system is characterised by human resource shortfalls (Hall, 2003). Due to the shortage of staff, a

process of task-shifting has taken place. In African countries such forms of “task shifting” have been described as the indirect substitution or delegation of tasks to an existing but different profession e.g. from doctors to nurses or pharmacists (Loffstadt, Schneider, Steyn & Van Rensburg, 2007).

Thus, progress towards the legislation permitting nurses to prescribe medicines stemmed from the recognition that there were insufficient prescribers to deal with community health needs (McGilvray, Miles & Seitio, 2006). The original right of nurses to prescribe was dealt with in Section 38A of the old Nursing Act 1978 which has now been amended to section 56A of the new Nursing Act of 2005 (NDOH, 2006; Kruger, 2009).

Due to registered pharmacists and pharmacist assistants (PA’s) being a scarce skill, nurses also currently manage drug supplies at PHC level, with the exception of a few institutions, where pharmacists and PA’s are available (Loffstadt *et al.*, 2007).

- PA’s at different levels of training has been placed at PHC clinics within the Sedibeng district as from June 2011.

- The scope of practice of the two categories of PA's is explained in the *Regulations relating to the practice of pharmacy* published in terms of the Pharmacy Act, 1974, as amended (SAPC, 2011).

Scope of practice of PA's:

PA's perform a wide variety of functions within the various sectors of pharmacy. Two categories of PA's can be identified; *viz.*

- Basic PA's; and
- Post-basic PA's.

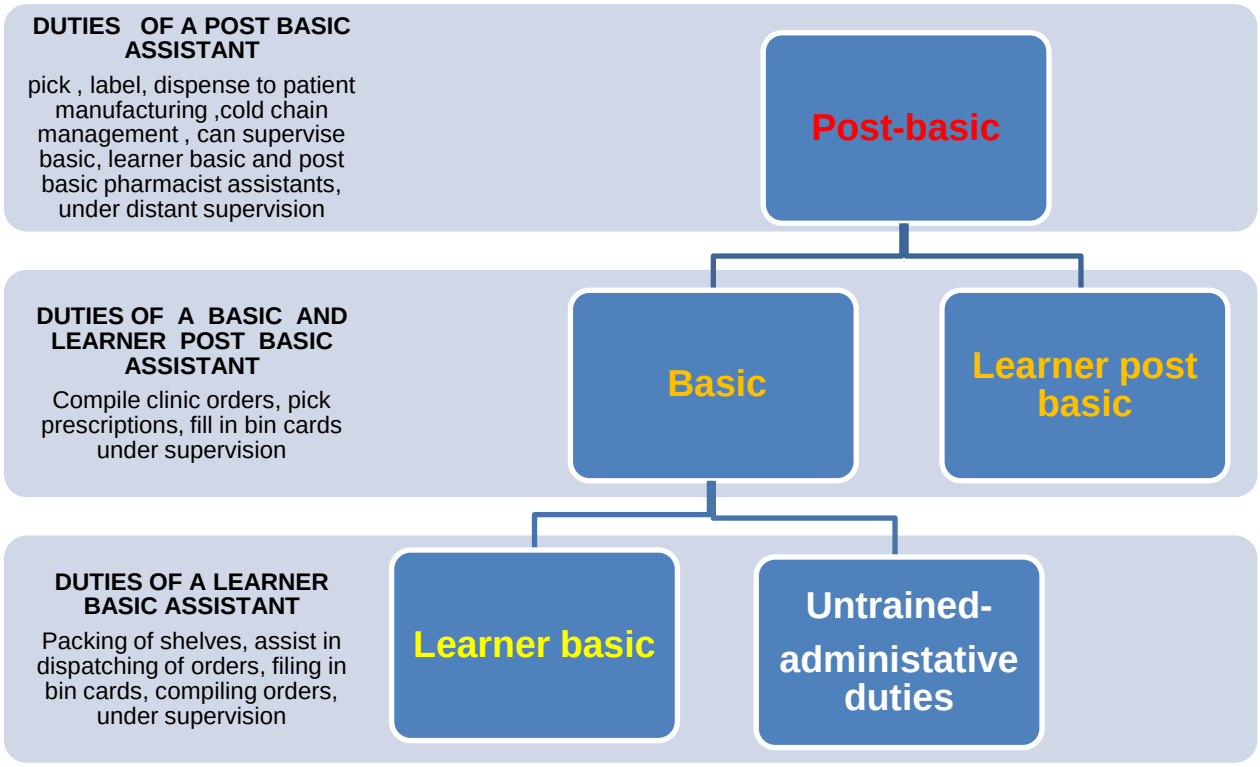


Figure 2.2: Scope of practice of different categories of PA's as performed in the Sedibeng district.

The scope of practice determines the activities, responsibilities and accountability of PA's in the practice setting. However, PA's need to have in service training in terms on site in terms of establishing ROL's, consumption data, monitoring and evaluation of drug usage.

In terms of Human and Institutional Resources the strength of a health commodity supply chain is dependent upon (Mohammad & Raja, 2004):

- Having assigned staff for logistical functions,
- Ensuring that staff have the capacity to conduct the logistical functions,
- Having clear logistics job descriptions,
- Providing the tools to the staff to be able to do their jobs,
- Providing clear job aids,
- Providing clear procedure manuals,
- Encouraging and empowering staff to take initiative to continually improve processes for each of the functions,
- Creating performance measures for the logistics functions,
- Including timeliness of deliveries, product availability at health facilities, reduction of loss due to expiry,
- Building and strengthening monitoring and supervision.

2.4 AVAILABILITY OF ADEQUATE INFRASTRUCTURE ACCORDING TO GUIDELINES AND NORMS

Well-located, well-built, organised and secure storage facilities are an essential component of a drug supply system. A minimum set of guidelines are set out in GPP as required by the South African Pharmacy Council (SAPC) in terms of standards at PHC facilities (SAPC, 2010).

Poor quality of care with inadequate training, inconsistent drug supplies and limited resources results in poor health outcomes especially in TB and HIV (The Global Fund, 2010).

South African extreme drug resistant-TB (XDR-TB) patients moreover, are also showing increased drug-resistance because these patients are only given two active agents due to 'poor medication access'. “This (lack of medication access) will undoubtedly amplify drug resistance" (Stuijt, 2007). It is also commented that this (growing drug resistance) "may be averted by accelerating access to second-line agents (drugs) for use in bolstered regimens"(Stuijt, 2007).

In Nigeria a study was conducted in 2003 on the availability of ARV’s (WHO, 2003). The objective of this study was to conduct

a rapid assessment of the use and management of ARV's in treatment centres. The assessment was aimed at identifying pressing issues in program management that could hinder the achievement of ensuring the uninterrupted supply of good quality ARV's. In essence, the result of the study was to form the basis for management decision-making and re-engineering of the ARV drug programme.

Eighty percent (80%) of the facilities had the three first-line ARV's namely, Nevirapine, Stavudine and Lamivudine, in stock. Forty four percent (44%) of the facilities did not have adequate stock balance of these three ARV's and eight (8) facilities had experienced stock out for periods ranging from one to three months (WHO, 2003).

Expired ARV's were found in 64% of the facilities with the loss due to expiry estimated at $146,717. One of the five consignments of ARV's received at the Central Medical Store had a shelf life of five months (WHO, 2003). Storage of ARV's was generally satisfactory in all the centres as 84% and 92% scored above the 50% required for adequacy of storage in the dispensary and the facility store, respectively (WHO, 2003).

The goal of an ARV program, which is to provide uninterrupted drug supply to treatment centres and to patients in a timely manner, while minimising drug expiry, was not achieved. In fact, the study revealed poor management of drug supply. There is thus the need to evolve effective drug procurement, distribution, financing and ARV information management systems to improve access and affordability of ARV's (WHO, 2003).

Therefore,

- Drug procurement for PHC centres need to be adequately budgeted for,
- Pharmacists and other appropriate healthcare workers must be involved in the development of the list of drugs, purchase, storage, distribution and dispensing of the drugs and necessary supplies,
- Proper record keeping must be established with adequate supervision,
- Regular financial audits must be undertaken to ensure cost effective utilisation of the drugs and supplies and additional outcome audits must also be undertaken to assess impact on the health of the community,
- The health care workers that manage drug supply must be trained and equipped to carry out the very basic but very

essential service of managing drugs and monitoring supply to ensure continuous availability (Ohuabunwa, 2008),

- A high level Enlightenment Campaign must be undertaken to achieve the following:
    1. Bringing of health consciousness among the people,
    2. Teaching simple ways of keeping healthy,
    3. Inviting people to visit the PHC centre, indicating the locations and assuring that health care professionals are on duty and that there are sufficient drugs,
    4. Preparing people to adopt preventive measures before the outbreak of epidemics such as meningitis.

It is medicines that make health care delivery credible. Many people who go to health institutions and see the best doctors or undertake the most rigorous tests and investigations go home unhappy if they do not have medicines prescribed or recommended for them (Ohuabunwa, 2008).

It is therefore critical that any health care system must take the issue of making quality drugs and essential hospital consumables available in the right quantities and correct pricing structure. It becomes even much more important in the PHC service set up. It is here that the disease progression must be stopped and people enabled to return to work speedily. In

addition, it is here that the expectation of the people to take drugs home after a visit is highest and it is here in many cases that the people cannot afford to pay for expensive medicines or other high hospital cost (Ohuabunwa, 2008).

In this discourse it has been identified that poor and inadequate budgetary allocation, diversion of products, poor value for money, uncoordinated governmental actions and the local unavailability of quality essential medicines constitute the major challenges affecting the sustained availability of essential medicines and supply for PHC services (Ohuabunwa, 2008).

The above information dealt with DSM and the reasons for drug stock outs found in other studies. This study will specifically deal with stock outs in the Sedibeng district in order to ensure 99.5% availability of drugs at all times as requested by the NDOH, Gauteng.

CHAPTER 3

METHODOLOGY

3.1 STUDY DESIGN

A retrospective, quantitative, descriptive cross-sectional approach was followed over a three month period. This study design was followed to essentially ensure that the data acquired for the study could be quantitatively evaluated, compared and measured so that quantitative postulations could be made. Furthermore, a descriptive approach was followed so that the data acquired could be analyzed in a systematic manner with the use of tables, figures and graphs. In consideration of the time constraints and for the standardization of the data acquisition process a cross-sectional and retrospective design was followed. Thus, data was acquired either through past/current records over a defined period of time where data may have been collected for other purposes.

3.2 SETTING

The Gauteng Province is divided into three different regions based on geographic location namely,

- Region A consists of the City of Johannesburg and West Rand (Mogale City) districts,

- Region B consists of the Ekurhuleni and Sedibeng districts,
- Region C consists of Tshwane and Metsweding districts.

Region A, B and C are provincial health districts. However, the city of Johannesburg, Ekurhuleni and Tshwane also have municipal metropolitan areas.

A central Medical Supplies Depot (MSD) provides drugs to each district. Drugs are also procured directly from various companies through MSD. Furthermore, each district has a district pharmacy which supplies drugs to PHC clinics and CHC's within the specific district. This study will be conducted in the Sedibeng district where there are three sub-districts which are Lesedi, Midvaal and Emfuleni.

3.3 STUDY SITE

The study was conducted in the Sedibeng district, in particular one of the three sub-districts namely, Emfuleni.

3.4 STUDY POPULATION

There are a total of 34 PHC clinics and 4 CHC's in the Sedibeng district. For the purposes of this study, the largest sub-district which consists of the 4 CHC's and 21 PHC clinics was selected.

3.5 SAMPLE SIZE

The study sample size therefore consisted of twenty one PHC clinics and the four CHC's. CHC's were included in this study, since they provide additional services compared to PHC clinics, and it was essential to identify challenges in the management of drug supply, according to the objectives of the study in all areas of primary health care.

More specifically the sample size consisted of:

- 21 facility managers (FM) in the PHC's (N1=21)
- 4 FM in the CHC's (N2=4)
- 21 store managers in the PHC's(N3=21)
- 4 store managers in the CHC's (N4=4)
- 5 transport officers (N5=5)

The FM and the store manager questionnaires are combined with separate sections applicable to each category. In the absence of a store manager, the FM will be requested to complete the entire questionnaire.

3.6 PILOT STUDY

The pilot study was conducted in the remaining two sub-districts namely, Lesedi and Midvaal and included two PHC clinics from each sub-district prior to data collection for the actual study.

The aim of the pilot study was to identify any problems that the respondents might have with the questions, so that modifications could be made to the questionnaires accordingly (Stead & Struwig, 2001). The data collected from the pilot study was excluded from this study.

3.7 DATA COLLECTION

Data collection commenced as soon as approval was received from the University of Limpopo, Medunsa Research Ethics Committee (Appendix 9). Data was collected by the researcher with the assistance of two pharmacists, who are currently involved in monitoring and evaluation of DSM at PHC clinics and CHC clinics. In order to ensure standardization in the administration of the questionnaire the pilot study was conducted by the principal researcher and the two research assistants. Thus any problems/challenges arising during the administration of the questionnaires were addressed prior to data collection of the actual study.

Two data collectors (research assistants) were allocated to eight clinics each, whilst one data collector was allocated to the remaining nine clinics, and in addition also administered the transport officer questionnaires. Data collection continued for a

period of two months commencing on 20 June 2011 until 20 August 2011.

To address the listed objectives, data was collected through the following means:

- A questionnaire administered to the transport officers (Appendix 3),
- A questionnaire administered to FM and/or store managers (Appendix 4),
- A researcher check list (Appendix 5),
- A document review process of bin cards and order files of the facilities,
- A drug tracer list to establish availability of tracer items at the facilities (Appendix 6).

Data collection for FM and store managers was conducted at the respective facilities, whilst data collection for transport officers was conducted at the district office.

The questionnaire was administered to transport officers, to determine the distribution process in terms of availability and accessibility of drugs at PHC level (Appendix 3). The

questionnaire which was administered to FM and store managers addressed the following objectives (Appendix 4):

- Availability of stock control processes,
- Availability of appropriate infrastructure to store the drugs according to GPP requirements at PHC level,
- Availability of trained personnel to manage drug supply.

All facilities and transport officers completed the questionnaire. The researcher checklist was used to verify aspects of the facility and store manager's responses to the questions. This verification process was conducted at the respective PHC clinics and CHC clinics (Appendix 5).

A document review process was conducted at the respective PHC clinics and CHC clinics which identified whether optimal stock control systems are in place which would ensure affordable and acceptable drugs at PHC level (presence of bin cards and order files at all facilities). This process was conducted by reviewing order files and stock cards of all tracer medicines (Appendix 6) at all the clinics, over the period of two months. The stock cards and order files were evaluated by the researcher, after the FM had completed the questionnaires. The researcher had a checklist to assist in reviewing the stock

cards and order files. The checklist also assisted in verifying the authenticity of the data collected.

The purpose of this document review process was therefore to establish:

1. If bin cards were regularly updated,
2. If stock was counted and updated on the bin card during receipt and issuing of medication,
3. If ROL's were adhered to on order files.

Three months of retrospective data from stock cards and order files, was reviewed against a researcher check list (Appendix 5) and compared to prospective data obtained from the questionnaires as indicated below.

A questionnaire which had been designed by Management Sciences for Health to assess PHC facilities was adapted for the purposes of this study. Currently, a monitoring tool from the Sedibeng District Drug Supervisory manual is used to monitor DSM in the district. The tool contains different aspects of DSM. The tool is available in the clinic supervisor's manual and is used during monitoring and evaluation visits by the assistant

director of the clinic. Questions from this current monitoring tool were also used where applicable.

The questionnaire was completed in the presence of the researcher and was administered as an interview. The lengthy questionnaire was subdivided into three sections. Section A comprised of questions related to human resource management in the facility. This section was administered to the most appropriate person i.e. the FM. Section B and Section C was administered on two separate occasions to the store manager, since these comprised of questions relating to storage of medication and medicine management processes. In the smaller PHC clinics where there was no store manager, the person who was responsible for DSM, was requested to complete the questionnaire. Drug availability was checked against a list of tracer drugs (Appendix 6) for the purposes of this study.

3.8 DATA ENTRY

All data collected during the study was captured in a Microsoft Excel spreadsheet. Data capturing was verified and validity checks were performed.

3.9 STATISTICAL ANALYSIS

Statistical analysis was of a descriptive nature with the responses to categorical variables summarised by frequency counts and percentages. Problems affecting DSM, as determined in the study were prioritized on the basis of incidence. All statistical procedures were performed on Statistical Analysis Software, Release 9.2, running under Microsoft Windows for a personal computer.

3.10 ETHICAL CONSIDERATIONS

Ethical approval was obtained from the University of Limpopo, Medunsa Research Ethics Committee. Permission was also obtained from the Director of the Sedibeng district to conduct the study at all PHC and CHC clinics. Participants signed an informed consent form after the researcher had explained the aim of the project to the participant. Questionnaires were anonymous and therefore the identities of participants were not revealed. Data was collected and placed into a sealed box which was stored at the district office. Each questionnaire was allocated a unique reference number, which was linked to the facility name. This was for the purposes of the researcher only, and was not indicated in the research report. The same process

applied to the transport officer. Anonymity and confidentiality was thus consistently maintained.

3.11 RELIABILITY AND VALIDITY OF THE STUDY

Reliability was achieved by standardising the measurement procedure, so that the procedures were always the same (Stead & Struwig, 2001). Validity was tested during the pilot study conducted prior to the actual research data collection process. This was performed to ensure that all questions asked were understood correctly, and that the researcher and research assistants were satisfied with responses to questions. Therefore, the pilot study improved the internal validity of the questionnaire. All captured data was cross-checked and proof-read by the researcher to ensure accuracy.

3.12 BIAS

The researcher and research assistants visited the different PHC and CHC clinics, and data collection was done during this time. The researcher and assistants observed the completion of the questionnaire so that participants could not refer to resources. The questionnaire was administered in the official workplace language i.e. English in order to eliminate any form of bias.

3.13 LIMITATIONS OF THE STUDY

The impact on DSM by the recent placement of PA's could not be measured due to the short period of time spent at PHC clinics. In addition, a baseline study has not been conducted prior to the placement of the PA's at PHC level to determine the impact of the PA's at PHC level on DSM.

The study also has its limitations in terms of feedback from the district pharmacy. The district pharmacy was not included in this study and the impact of drug out of stocks in the district pharmacy was not established in this study. Hence it cannot be ascertained as to whether the ordering roster issued by the district pharmacy to the PHC clinics was adhered to by the clinics.

This chapter summarises the method, study site, sample size, data collection and method of data analysis. The next chapter summarises the results acquired through questionnaires administered

CHAPTER 4

RESULTS AND DISCUSSION

This chapter summarises the results acquired based on the questionnaires administered and discusses the most distinctive of these results.

SECTION A

4.1 HUMAN RESOURCES

4.1.1 Staff member responsible for drug supply management

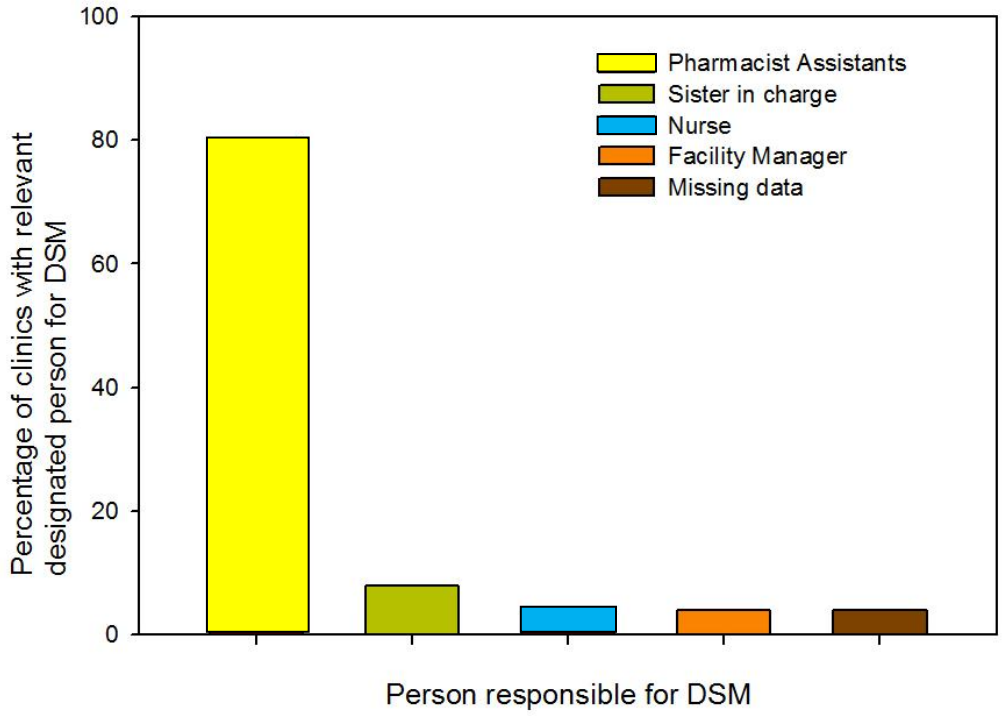


Figure 4.1: Percentage of clinics that rely on specific individuals for DSM (N=25).

- There was specific individual/s, in all 25 clinics that were responsible for DSM.
- DSM was performed by the FM or nurse in only one of the clinics.
- PA's were responsible for these duties (DSM) in 80% of the clinics interviewed.
- Furthermore, of the 80% of clinics (20), only four of them had full-time PA's employed.
- Fourteen of the 25 clinics were visited by the assistants on a weekly/bi-weekly basis. These assistants rotated from one clinic to the other on different days due the shortage of assistants.

As established from the results, the fact that fourteen clinics had part time PA's, which resulted in drugs not being checked and unpacked immediately when they were received. This could result in patients not receiving medication on time and contribute to situations where clinics are out of stock.

However, from the results of this study it became clear that there is a need for full-time PA's at PHC level, as was confirmed with the study performed by (Gray, Gengiah & Naidoo, 2005). The acute shortage of professional human

resources necessitates the need to look at mid-level workers such as PA's to deal with the shortage of personnel at PHC level.

PA's have been an ever-growing part of the health care delivery in both the public and the private sectors since the late 1980's (Gray *et al.*, 2005). According to the South African Pharmacist's Assistants Journal, volume 2 of 2002, training of PA's is helping to develop skills in pharmaceutical services (Carol, 2002). Furthermore, if key health care professionals are in short supply e.g. nurses and pharmacists and certain routine, repetitive tasks normally undertaken by such professionals can be safely and efficiently delegated to suitably-trained alternate cadres of mid-level workers (Gray *et al.*, 2005).

If these tasks become more routine requiring less cognitive skills or professional judgment, then such tasks are perhaps suited for delegation to an appropriate sub-professional group, namely PA's. Weber and colleagues found that pharmacist technician teams in patient care units improved the service and the satisfaction of the nursing personnel (Weber, Skleda, Sirianni, Frank, Yourich & Martinelli, 2004). In South Africa currently no training is offered as a pharmacy technician.

However, training of pharmacy technicians is planned for and will be implemented by 2013 according to the SAPC.

4.1.2 Nursing staff trained in dispensing

Table 4.1: Differences in the number of trained, untrained and in-training nurses in dispensing (N=208)

	Trained		In-training		Un-trained	
	No. of nurses	% of facilities	No. of nurses	% of facilities	No. of nurses	% of facilities
	0	4 (1/25)	0	64 (16/25)	0	4 (1/25)
	1	8 (2/25)	1	24 (6/25)	1	28 (7/25)
	2	36 (9/25)	2	8 (6/25)	2	28 (7/25)
	3	8 (2/25)	3	4 (1/25)	3	20 (5/25)
	4	24 (6/25)			5	4 (1/25)
	6	4 (1/25)			8	4 (1/25)
	7	4 (1/25)			9	4 (1/25)
	9	4 (1/25)			12	4 (1/25)
	10	4 (1/25)			23	4 (1/25)
	12	4 (1/25)				
TOTAL NO. OF NURSES:	**94**		**21**		**93**	

From the results obtained, only one clinic had no trained nurses in dispensing.

The set of norms and standards for PHC clinics recommends that there should be at least one dispensing trained staff

member per clinic (Blaauw, Chabikuli, Gilson & Schneider, 2005).

4.1.3 Availability of a dispensing license according to the researcher checklist (appendix 5)

According to the researcher checklist only 34 nurses out of a total of 208 had either a dispensing licence or a section 56A permit. If a registered nurse does not have a dispensing licence, a registered nurse must obtain authorisation from the medical practitioner in charge of a specific on-site clinic in order to be able to prescribe Schedule 1 to 6 medicines, dispense and manage stock, in accordance with the regulations of the South African Society of Occupational Nursing Health Practitioners. The medical practitioner must complete a specified authorisation form in respect of the specific treatment protocols for which a particular nurse is permitted to prescribe medicines. The registered nurse may only prescribe the specific medicines if the medical practitioner is not personally available at the on-site clinic to diagnose the patient and prescribe and dispense the required medicine him or herself (Kruger, 2009).

The lack of availability of section 38A or a section 56A indicated that nurses were assessing patients and dispensing

medication but were not trained in PHC and had not completed the dispensing course. Irrational prescribing is one of the factors contributing to drug shortages. The HST attributes irrational prescribing to poorly-trained staff. They argue that quite often poorly-trained prescribers prescribe irrationally, resulting in drug shortages (Matse, 2005[b]). According to this study, out of a total of 208 nurses, 93 nurses were not trained in dispensing. Even though the remaining 115 nurses were trained in dispensing, only 34 of these had physical evidence of the dispensing license/permit.

4.1.4 Learner Basic and Post Basic PA's trained in dispensing

Table 4.2: Differences in the number of trained, untrained and in-training PA's in dispensing (N=21)

	Trained		**In-training**		**Un-trained**	
	No. of PA's	**% of facilities**	**No. of PA's**	**% of facilities**	**No. of PA's**	**% of facilities**
	0	52% (13/25)	0	64% (16/25)	0	100% (25/25)
	1	48% (12/25)	1	36% (9/25)		
TOTAL NO. OF PA's: N=21	**12**		**9**		**0**	

- Fifty percent of the clinics had learner basic PA's in employment (learner-basic). According to the scope of practice, these assistants are not allowed to dispense unless under the direct supervision of a pharmacist. However, they are allowed to manage stock in a store in terms of ordering and receiving stock, balancing bin cards, establishing ROL's and monitoring usage.
- Forty eight percent of the clinics had one qualified post basic PA. (Qualified post basic PA's are allowed to dispense medication under indirect supervision of a pharmacist in conjunction with specified protocols at PHC clinics).

4.1.5 Training in Drug Supply Management

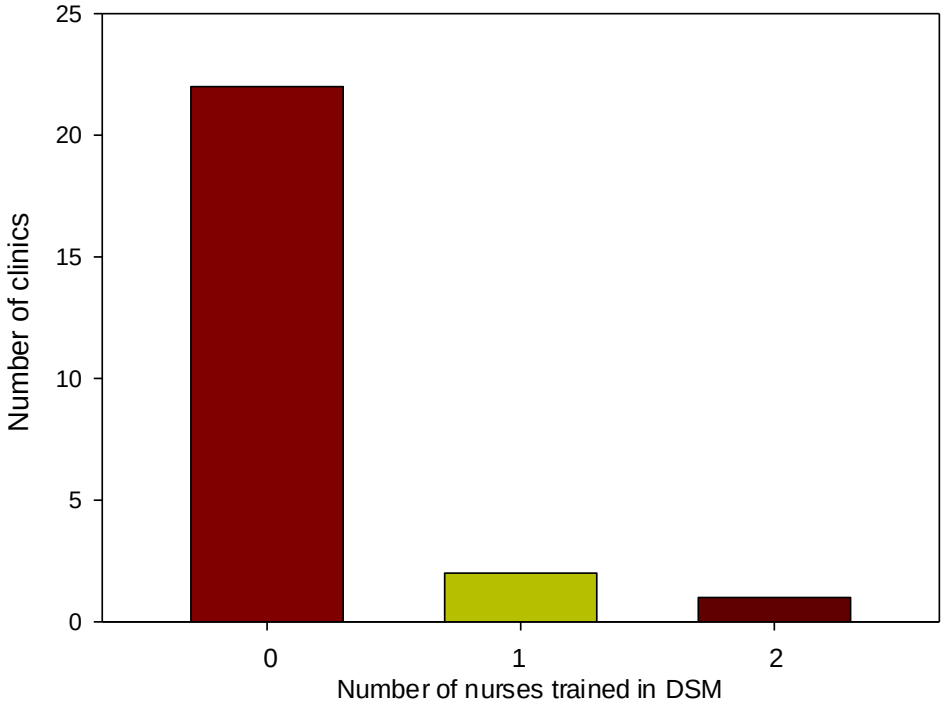


Figure 4.2: Number of clinics with nurses trained in DSM (N=25).

- In 88% of the interviewed clinics there were no nurses who had received training in DSM in the last twelve months.
- From the results obtained in this study, there is definitely a need for ongoing training in DSM. According to the PHC supervisory tool, nurses have to be trained in DSM in order to effectively manage drug supply.

Each health facility has the responsibility of identifying the individuals with the required knowledge, skills and experience in DSM, who are permitted by laws, regulations or registration

to prescribe or order medications. The health facility also identifies any additional individuals, who are permitted to prescribe or order medications in emergency situations. Policies and procedures define the documentation required for the ordering of medications or prescribed items and for verbal medication orders (Whittaker, 2011).

SECTION B

4.2 INFRASTRUCTURE AND SECURITY

Infrastructure and security forms part of section b and include the storage of medicine, the condition of a store room, availability of a secure delivery area and access control measures.

4.2.1 Storage area of medicines

The following results were found in terms of the storage of medicines:

- In all 25 clinics medicine is stored in the nurse's consulting room. (Medicine is allowed to be stored in a consulting room provided it complies with GPP practice requirements).
- In 21 of the clinics medicine was also stored in the medicine store. (Medicine is allowed to be stored in a

medicine store provided it complies with GPP practice requirements).

- Nineteen clinics claimed that the storage area is not large enough to store all the stock for a month's supply.
- Thirteen out of the 25 clinics admitted that there were drugs that were being stored in direct contact with the floor as indicated in figure 4.3 below.

Figure 4.3: Stock on the floor (Clinic A).

According to the researcher checklist:

- Twenty of the clinics stored medicines in the medicine store,
- In addition to storing medicine in the medicine store, 23 facilities also stored medicines in the nurses consulting rooms.

- In 16 clinics, it was admitted that medicines were not the only items stored in the areas described above. Other items that were stored in these areas included stationary, dry stores, pap, milk and even toilet paper.

The study found that there are discrepancies between the researchers' checklist and the FM questionnaire results in terms of medication stored in nurses consulting rooms and other items stored in the medicine store. Such a situation results in unauthorised access to the medicine store which could result in losses encountered. "Other items" in the medicine store also contributed to the lack of space.

Figure 4.4: Milk powder stored in the medicine room leading to unauthorised access to the area and contributing to a shortage of space (Clinic B).

A previous study stated that store rooms are needed in every facility to store drugs and medical supplies safely and that the size of the store room should be determined by the consumption data of the clinic (Dukes *et al.*, 1997). However, in Sedibeng some clinics consist of two rooms and drugs are stored on the floor wherever space is available as established from the results of the study.

4.2.2 Condition of store room

The following results were obtained in terms of the condition of the store rooms:

- Twenty three of the clinics (92%) had no cracks and holes in the walls of the medicine storage areas,
- Twenty four of the clinics (96%) had a ceiling that was in a good condition in the medicine storage area.

Figure 4.5: Cracks in medicine store wall at a clinic (Clinic C).

According to the study conducted by Dukes *et al.*, (1997), well-located, well-built, well-organized and secure storage facilities are an essential component of a DSM system. An appropriate building provides the correct environment for the storage of drugs and assists the efficient flow of supplies.

Figure 4.6: Broken ceiling panel (Clinic D).

A broken ceiling panel can result in pest infestation and rain water entering the store, resulting in damage to drugs.

4.2.3 Secure delivery area

The following results were obtained in terms of the availability of a secure delivery area:

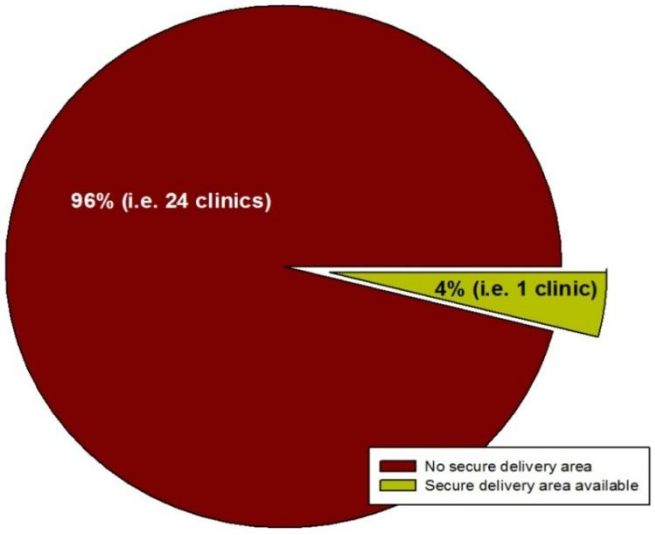


Figure 4.7: Availability of secure delivery area.

- Only one clinic (4%) claimed that there was a secure delivery area for their medication.
- The lack of a secure delivery area for 24 clinics poses numerous challenges in terms of the following:
    - Unauthorised access to medication,
    - Loss of medication through theft,
    - Damage of stock due to adverse weather conditions.

4.2.4 Protection of medicine from direct sunlight

The following results were obtained in terms of methods of protection of medication from exposure to sunlight:

Table 4.3: Percentage of clinics employing a specific method of protection from sunlight (N=25)

Method of protection from sunlight	Percentage of clinics employing the method
Blinds	32%
Paint	4%
None	20%
No store room	4%
No sun inside store room	4%
No windows	36%

Figure 4.8: Blinds protect medication from direct sunlight (Clinic B).

Figure 4.9: No protection from sunlight at other clinics (Clinic E).

Figure 4.10: No protection from sunlight, no electricity in store room (Clinic C).

The lack of electricity in the store room can result in:

- Incorrect medication being issued ,
- Inability to fill in stock cards,
- No temperature control,
- The lack of protection against sunlight contributes to deterioration of medication and does not comply with GPP requirements for storage of medication.

4.2.5 Pest infestation

The following results were obtained in terms of pest infestation at the various clinics:

Twenty two of the clinics admitted that the medicine storage area was free from any signs of pest infestation.

Figure 4.11: Dead insects in light cover (Clinic D).

The above indicates the presence of insects in the medicine store which does not comply with GPP requirements of good

housekeeping and a pest-free environment. This can result in contamination and damage of medication (SAPC, 2010).

4.2.6 Access control

The following results were obtained in terms of access control:

- Twenty three of the clinics claimed to have controlled access measures in place for the entry of unauthorised persons into the medicine store.
- In 50% of the clinics the key to the medicine store/pharmacy was kept in the possession of the sister in charge.
- In nine clinics, the key to the medicine store was in the possession of the PA. However, in the clinics where PA's rotated between the clinics, the key would then be left in the key cupboard during the interim period, which could result in uncontrolled access.

4.2.7 Security of the medicine room

Nine of the clinics had a security door and eight clinics had burglar bars as an available security measure.

Figure 4.12: Lack of security-medicines easily accessible (Clinic E).

According to the GPP, medication must be stored in a locked area, ensuring no unauthorised access to the medication (SAPC, 2010). Institutions within the Department of Health are required to comply to this requirement in medicine stores and consulting rooms where medication is allowed to be stored.

SECTION C

4.3 STORAGE AND CONTROL PROCESSES

4.3.1 Delivery and receipt of medication

Taking into account that one clinic did not fill in the data, it was established that twenty four of the clinics received stock by two specific procedures:

1. The number of boxes is checked and the driver's note is then signed.
2. Stock received is checked against the invoice.

Table 4.4: Relevant person/s responsible for receiving stock in the clinics (N=39)

Person responsible for receiving stock	**No. of clinics**
PA (basic and post basic)	21
Pharmacist	0
Nurse	8
Store manager	0
Security	0
Facility Manager	10

Note: More than one person may be responsible for receiving the drugs at these facilities. However, when a PA is not available, a nurse would receive the drugs.

- In 56% of clinics, stock is checked within the same day of receipt.
- In 40% of the clinics, stock is checked within 24 hours.
- In the remaining four percent, receipt of stock is checked within a week of delivery.

One of the key elements in DSM is to ensure that medication is checked within twenty four hours of receipt. The risk of misappropriation of drugs increases if drugs are not checked immediately. According to Dukes *et al.*, (1997), dedicated personnel need to be available to check deliveries immediately.

According to this study, stock was checked within twenty four hours of receipt in 40% of the clinics. Although the issue of theft of medication was not investigated in this study, not checking medication upon receipt creates an environment which could allow for the misappropriation of drugs.

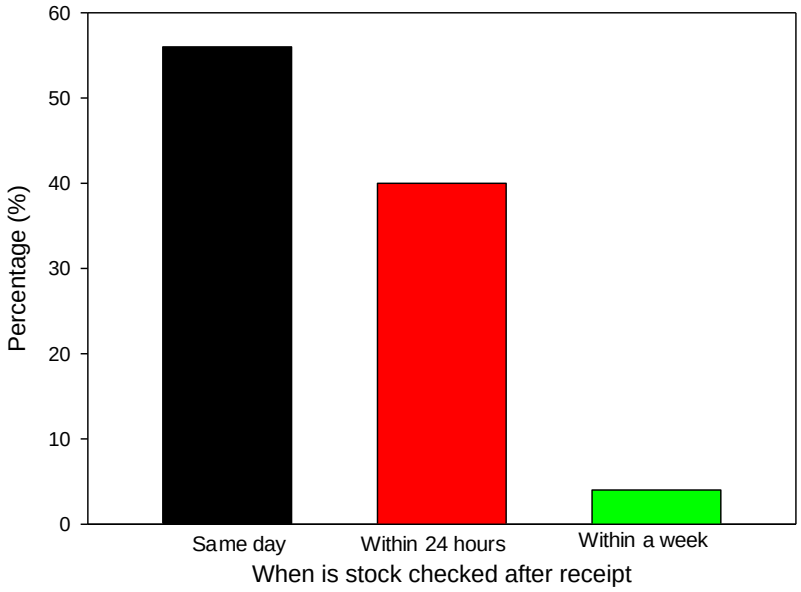


Figure4.13: Checking of stock after receipt thereof according to the questionnaire (N=25).

Furthermore, not checking stock as soon as possible after delivery can result in discrepancies such as a shortage or an excess in delivery being not being identified. This in turn results in paying for medication not received or not ordered. Ultimately this will impact on either out of stocks or excess stock which can lead to patients not receiving medication or expired stock.

4.3.2 Checking of stock according to transport officers in the presence of security officers

Procedurally, security officers are required to be at all clinics and are required to check all deliveries at clinics. After a security check, a staff member is requested to verify the number of boxes received by security personnel.

Table 4.5: Presence of security officers during the receipt of medication according to the transport officers (N=4)

Presence of security personnel during the receipt of medication	No. of transport officers
Always	1
Never	1
Sometimes	2

The results obtained from the four transport officers as indicated in Table 4.6 were contrary to results obtained from the questionnaire administered to the FM in terms of receipt of medication (Table 4.4). (Some of these questions were not asked to FM's).

Table 4.6: Persons responsible for receiving stock according to the transport officers (N=10)

Person/s responsible for receiving stock according to transport officers	**No. of transport officers**
Store manager	2
Facility manager	2
Security	3
PA	1
Nurse	1
Depends who is available	1

- Note that all four transport officers stated that there was no dedicated person to receive the order when delivered to the clinic.
- It was also indicated that there may be more than one person responsible for receiving the order at the clinic.

- Three transport officers reported that the number of boxes are only checked ‘sometimes’ when the delivery is received at the clinic.
- In cases where the boxes are not checked immediately various procedures are followed such as ‘the boxes are left outside with security and if a PA is available, the boxes are counted’, or ‘sometimes the number of boxes is counted, at other times boxes are left outside the door at the clinic without being checked’.
- There is always an accompanying delivery note with each order. In the case where the order does not correspond to the delivery note, only one transport officer admitted that he contacts the district pharmacy only if the clinic refuses to accept the order.
- Three transport officers stated that the delivery note is not signed by the person receiving the order. One transport officer stated that it was sometimes signed.
- Furthermore, two of the transport officers said that a signed copy of the delivery note is only ‘sometimes’ returned to the pharmacy.
- The remaining two said that a signed copy of the delivery note is never returned to the pharmacy. (It is the joint responsibility of the clinic, the transport department and

the district pharmacy to ensure that the signed delivery note is returned to the district pharmacy. However, this rarely happens due to all sectors not following procedure). The lack of dedicated personnel is also a contributing factor since it is difficult to pinpoint the culprit.

- Three transport officers admitted that there have been discrepancies in terms of the actual number of boxes of medication delivered.

According to Dukes *et al.*, (1997), when medication is delivered, the responsible person receiving stock must carry out a complete inspection of every delivery immediately upon delivery. The stock received must be kept separate from other stock until inspection has been completed. The responsible person should check for damaged and missing items and reconcile the drugs received with the order placed. Items requiring special handling such as cold chain items and schedule 5 or 6 items need to be stored immediately. Security breaches include theft, bribery and fraud. These can occur at all levels of the drug purchasing and distribution system.

There are three common forms of theft and leakage:

Slow, chronic, sustained, small-scale leakage may go unnoticed for a long time. Staff members with access to drug storage areas are usually responsible for such thefts. Large scale robbery may involve people both inside and outside the drug supply system. Diversion of a delivery before it reaches its destination may involve people in responsible positions with access to information on movement of drugs. These can have a substantial and sometimes disastrous economic and health impacts (Dukes *et al*., 1997). The lack of implementation of a proper system to receive medication at the clinics in Sedibeng makes it very easy for theft of stock to occur.

Some factors that promote theft are:

- Shortage of essential drugs or a high demand for drugs in the private sector,
- Poor physical security in stores,
- Inadequate and incomplete inventory records,
- Unlimited access to stores by unauthorised personnel,
- Staff whose salaries are significantly lower than necessary for self support (Dukes *et al*., 1997).

The discrepancies between the responses of PHC personnel and transport officers indicated that there are serious issues which need to be further investigated in order to establish the actual processes followed during the delivery and receipt of medication. This indicates that a problem exists in terms of dedicated personnel to manage the receipt of stock. Discrepancies in the number of boxes delivered also indicate a lack of security and a lack of dedicated personnel which can contribute to losses by means of theft. Due to the discrepancies in the reports, findings of other studies could be applicable in this study in terms of theft and diversion of stock during delivery and incomplete inventory reports.

4.3.3 Packing of stock in the medicine store and the consulting room

- Two facilities did not pack medicines according to the first-in/first-out basis (FIFO) principle in the medicine store.
- Eight facilities did not pack medicines according to the first expired-first out (FEFO) principle in the consulting room.
- Seventeen of the clinics had no damaged containers or packages on the shelves of the medicine store or consulting room.

In a previous study conducted by Dukes *et al.*, (1997), it showed that in order to avoid accumulation of expired and obsolete stock, a stock rotation system needs to be in place to determine which items need to be used first on either a FIFO or a FEFO basis. The findings in this study can be linked to Dukes *et al.*, (1997), in terms of the lack of FEFO or FIFO principles contributing to expired and obsolete stock.

The cost of expired stock in one clinic in this study was as high as R126 203.00. This figure equates to the drug expenditure of an average PHC clinic per month. The high value of expired stock is an indicator of an improper stock rotation system.

Deterioration and spoilage costs for drugs are more likely to occur with poor storekeeping practices, but there is some risk in all storage areas of medicine. In general, these costs are incremental- the higher the stock levels, the higher the costs of spoilage. Inadequate storage areas within the NDOH results in an increase risk of damaged and expired stock and this has a negative impact on an already strained budget (Dukes *et al*., 1997).

4.3.4 Ventilation and Temperature control within facilities

Table 4.7: Ventilation and temperature control systems (N=25)

Form of ventilation	No. of clinics
Fan & windows	1
Airbricks	1
Air-conditioner (functional)	11
Air-conditioner (non-functional)	6
None	4
Missing data	2

Figure 4.14: Typical type of air-conditioner present in the 17 clinics with air-conditioners (Clinic F).

According to the FM's response to the questionnaire 40% of facilities had an available temperature chart which was recorded twice daily. However, according to the researcher's

checklist, the following was noted in terms of temperature control:

- Eleven clinics had a temperature chart available in the medicine store and only ten clinics were updated regularly.
- Two clinics had both an available and regularly updated temperature chart in the consulting room.

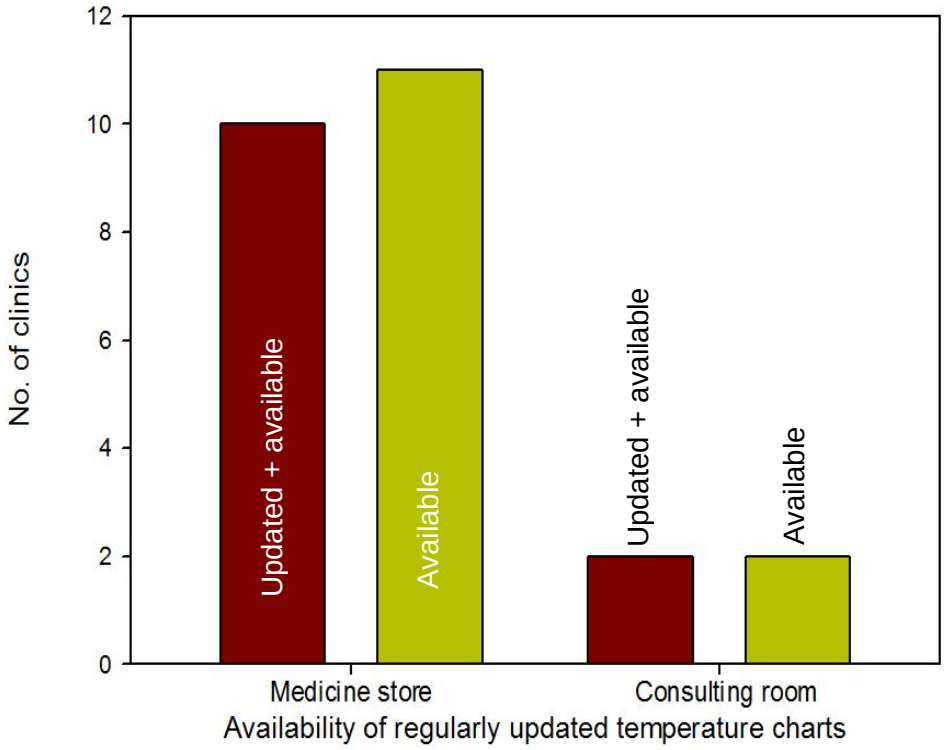


Figure 4.15: Availability of updated temperature charts in the medicine store and consulting rooms according to the researcher checklist (N=25).

From the above results, 15 clinics did not monitor temperature in the medicine store which could negatively impact on the potency of medication.

It is essential to follow the product manufacturer's storage instructions as closely as possible. If this is not possible, the product must be kept in the most suitable conditions available and used up as quickly as possible. Extreme temperature

changes can damage some items thus affecting the potency and efficacy of the items (Dukes *et al*., 1997).

4.3.5 Cold chain management

Table 4.8: Cold chain management (N=25)

	% of clinics according to facility manager	% of clinics according to researcher checklist
Only medicines stored in all medication fridges	96%	96%
Available sufficient space in the refrigerator to store medication	68%	*
Presence of a thermometer in the fridge	96%	*
Temperature of refrigerator maintained between 2-8°C	92%	96%
Temperature is recorded twice daily	92%	64%
Fridges defrosted & cleaned twice a month or when ice is more than 5mm	52%	32%
There is a backup generator in case of a power failure	20%	*
Cold chain maintained when receiving stock from the district pharmacy	96%	*

*Note: Data is not available as all the questions posed to the FM's were not present on the researcher checklist.

Figure 4.16: Ice thicker than 5mm in fridge (Clinic E).

Medications depend on suitable storage for their potency. In particular, vaccines which are exposed to high ambient temperatures and/or freezing will quickly lose their potency (Dukes *et al*., 1997).

According to transport officers:

- Only two transport officers maintained the cold chain when delivering medication. The other two admitted that it is only 'sometimes' maintained and not reported if it is not maintained.

- In the Sedibeng district, cold chain items usually consist of one cooler box and the transport officer takes it into the facility. Cold chain items are delivered weekly due to the lack of generators at the clinics.

From the results of the study, it is clear that cold chain is not always maintained by transport officers. Transport officers need to be educated on the importance of maintaining the cold chain as outlined below.

Cold chain is the system of transporting and storing vaccines within the safe temperature range of 2-8°C. For vaccines to be effective, the cold chain must be maintained from the place of manufacture to the point of administration.

Each time that vaccines are exposed to the wrong temperature, their potency is reduced. To know if vaccines are potent at the time of administration, it is important that they be monitored for exposure to heat and cold as they pass through the cold chain. While domestic refrigerators are not designed to meet the requirements of vaccine storage, safe storage is possible if healthcare facilities follow simple guidelines. Guidelines may be obtained from the health authorities or from the manufacturers

and distributors of vaccines. Foodstuff must not be stored in the medication refrigerator (Dukes *et al*., 1997).

4.4 MEDICINE MANAGEMENT AND PROCESSES

4.4.1 Inventory system used

All the facilities use a manual/paper based inventory management and stock control system. A standardised computerised system linked to the district pharmacy can assist in the monitoring and evaluation of stock.

4.4.2 Availability of bin cards

- The bin cards for tracer items are available in the medicine rooms of 19 facilities.
- In contrast only one consulting room had available bin cards for tracer items.
- From these medicine rooms and consulting rooms only thirteen of them had regularly updated bin cards.

According to Dukes *et al.*, (1997), the use of stock cards as a tool for stock control should be enforced and should be monitored by supervisors. Establishing and maintaining effective inventory records and procedures are the basis for coordinating the flow of drugs through the distribution system

and the primary protection against theft and corruption. The inventory control system is used for requisitioning and issuing drugs, for financial accounting, and for preparing the consumption and stock balance reports necessary for procurement. Record keeping must be sufficiently detailed to provide an “audit trail” that accurately traces the flow of drugs and funds though the system. An appropriate inventory management system should be adapted to suit the capacity and needs of personnel at all levels in the health program. Inventory records must be monitored regularly by supervisors to ensure accuracy and to avoid or detect losses (Dukes *et al*., 1997).

In Sedibeng, due to a lack of dedicated personnel for DSM, it is difficult to ensure consistent record keeping. This leads to a lack of updated documentation which makes it difficult at clinic level to have an audit trail. Even if losses occur through theft, these would be difficult to establish unless such incidents are physically witnessed.

4.4.3 Method of calculating ordering quantities

- In 21 clinics, the ROL was reflected on the stock card. However, the ROL’s levels are not reviewed or utilised when ordering stock.
- One facility calculated the average monthly consumption.

- The data from one clinic was missing.

The lack of review and usage of ROL's by the clinics is a major contributing factor to the shortage of drugs. This can also lead to over ordering, resulting in obsolete and expired stock.

4.4.4 Re-order levels

Seventeen clinics had ROL's for the tracer items in the medicine store and one clinic for tracer items in the consulting rooms.

4.4.5 Calculation of re-order levels

- Twenty percent of the clinics admitted that the ROL has not been calculated for all tracer items in the store.
- Only 35% of the remaining 80% that had ROL's review these regularly.
- In six of these clinics the review is conducted every three months.
- In one clinic ROL's are reviewed monthly.

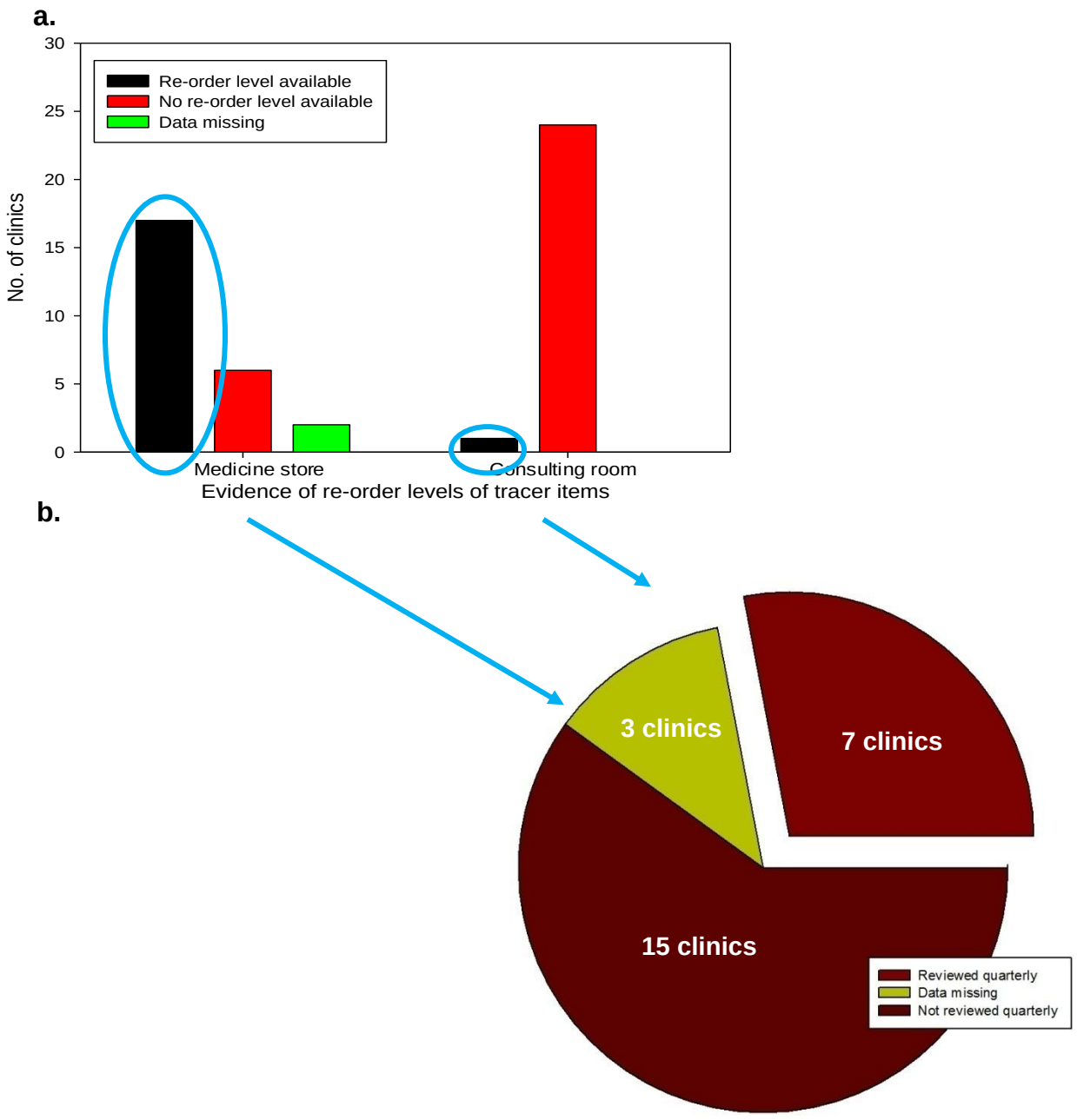


Figure 4.17: Evidence of ROL's (a) and quarterly review thereof (b) (N=25).

In a study conducted on DSM in the Mopani district, none of the workers understood the method they claimed to use to determine quantities to be ordered. Whether it was Maximum and Minimum Stock Order Levels, Consumption-Based ROL's or the Average Monthly Consumption, the workers had no clue how these formulas were used. As a result the study concluded that staff relied on their working experience to determine the quantities to be ordered. Twenty nine percent of the facilities indicated that they had no formal method of quantifying their orders. The stock outs and overstocking found in Mopani could mainly be attributed to the lack of knowledge with regard to quantification methods (Matse, 2005[b]). In the Sedibeng district, the lack of review of ROL's can be linked to the findings of the study in the Mopani district where no method was used to quantify medication orders.

Matse argued that a third of procurement and distribution processes are compromised by lack of adequately trained staff. He argued that, "the professionals who are expected to ensure proper purchase, utilisation and appropriate use of those drugs often lack basic knowledge on the management of drug supplies" (Matse, 2005[b]).

4.4.6 Quantity and period of stock out at clinics

- Eight facilities had at least one tracer item out of stock.
- Only one facility had no tracer items out of stock.
- According to the researcher checklist, the number of non-tracer items out of stock varied significantly at each clinic, with only three clinics having no out of stocks for non-tracer items and one clinic having as much as eleven non-tracer items out of stock. The discrepancies in the results clearly indicate that some clinics had a specific method of ordering whilst other clinics ordered haphazardly, resulting in a high percentage of out of stocks.
- Although non tracer items are regarded as essential but not vital, the reasons for out of stocks and the number of non tracer items out of stock is important in this study.

According to Circular Minute 118 of 2009, the MEC for Heath in Gauteng requested a 99.5% availability of drugs in Gauteng (GDOH, 2009). In order to meet this target, both tracer and non tracer items availability needs to be established. The availability of non tracer items was established through the researcher checklist.

According to the researcher checklist:

- The number of out of stock items varied considerably with four facilities having one item out of stock according to the tracer list, compared to as much as 16 items in one clinic.

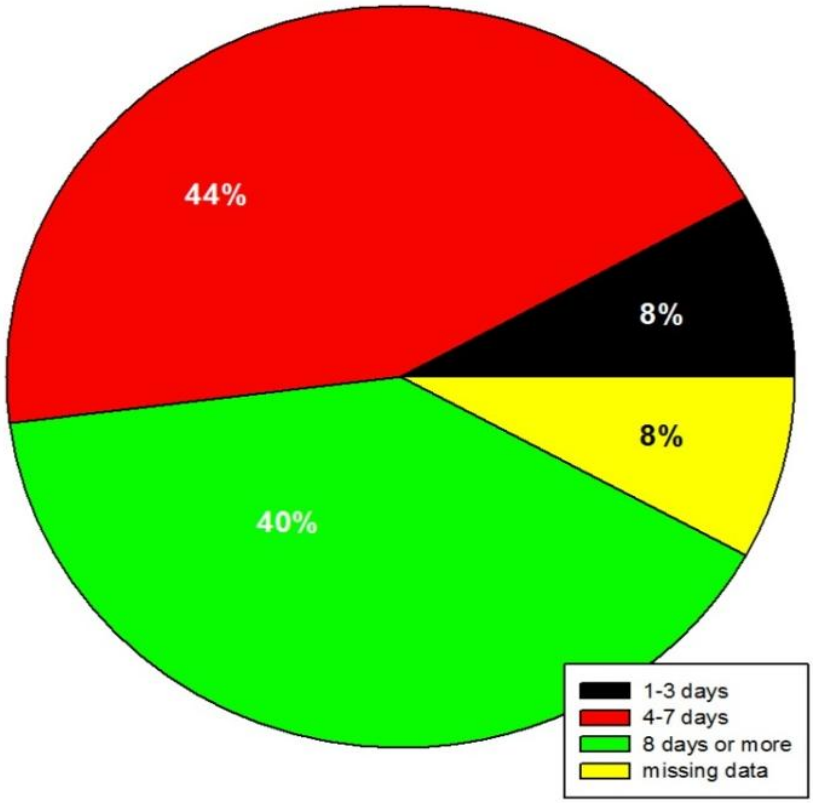


Figure 4.18: Period of tracer items out of stock at clinics (N=25).

Figure 4.19: Medication out of stock (Clinic B).

4.4.7 Responsibility for ordering of medication

- PA's are responsible for ordering of medication for twenty of the facilities ,
- In seven clinics of the above twenty clinics, the sister in charge is also responsible for ordering of medication in the absence of a PA.
- However in four clinics a nurse is in charge of this responsibility.
- In one clinic the FM is in charge of ordering medication.

4.4.8 Expired medication and tracking of expiry dates

- Sixteen clinics had drugs which expired in the last twelve months.

- The estimated monetary value of the items expired varied from R30.87 to as much as R126 203.00.
- According to the researcher checklist the value of expired stock for the last three months varied significantly from R0 (fourteen clinics) to as much as R23 000 (one clinic).
- Only four clinics had systems in place by which to track expiry dates.

According to the NCS, an expiry tracking system will soon become compulsory where each clinic will be required to have an expiry register. Sedibeng has been experiencing a high volume of expired stock at clinic level and an urgent compulsory intervention strategy is necessary.

Figure 4.20: Damaged and expired medication (Clinic E).

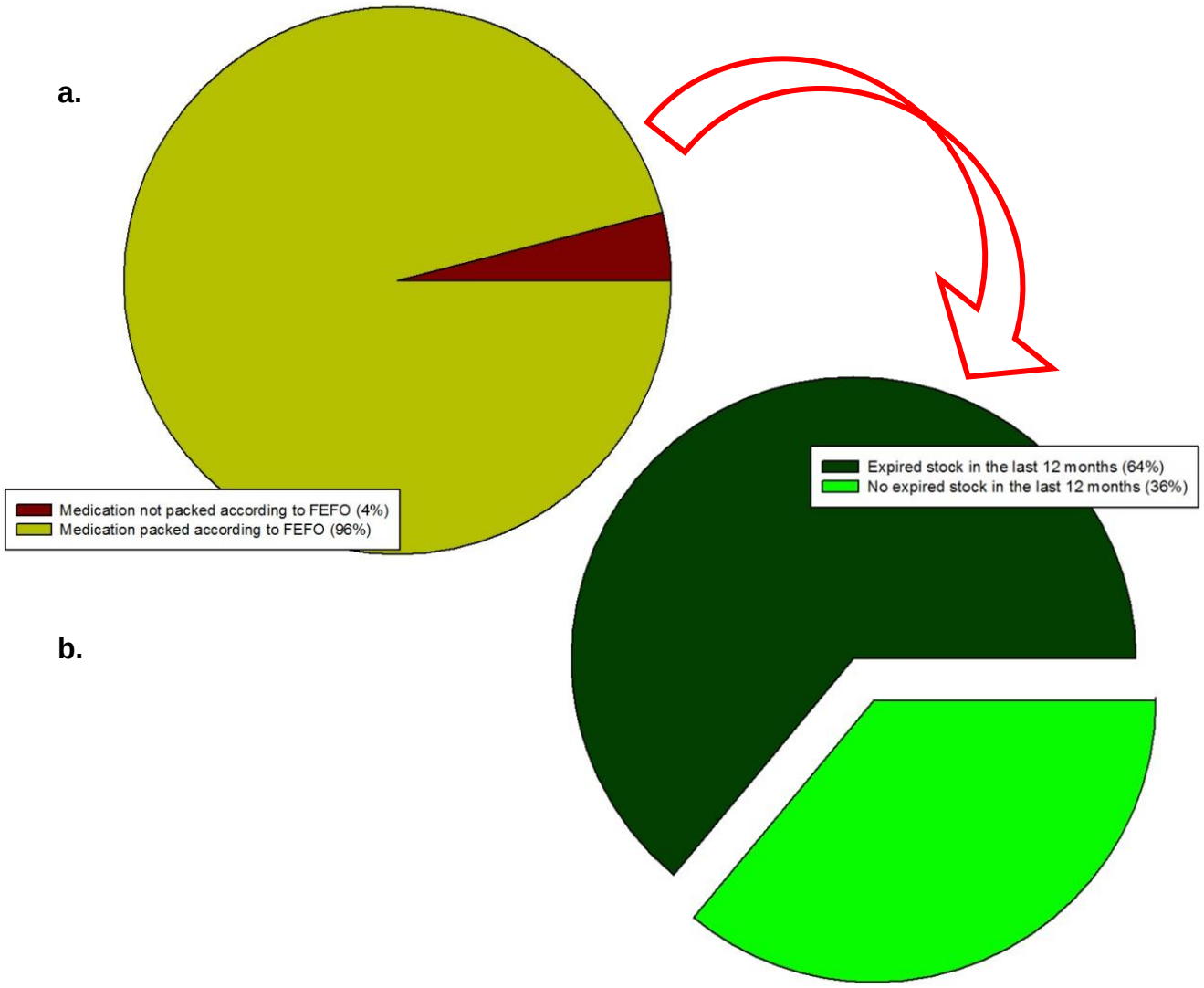


Figure 4.21: Medication packed according to FEFO (a) and incidence of expired stock in the past 12 months (b) (N=25).

4.4.9 Stock take

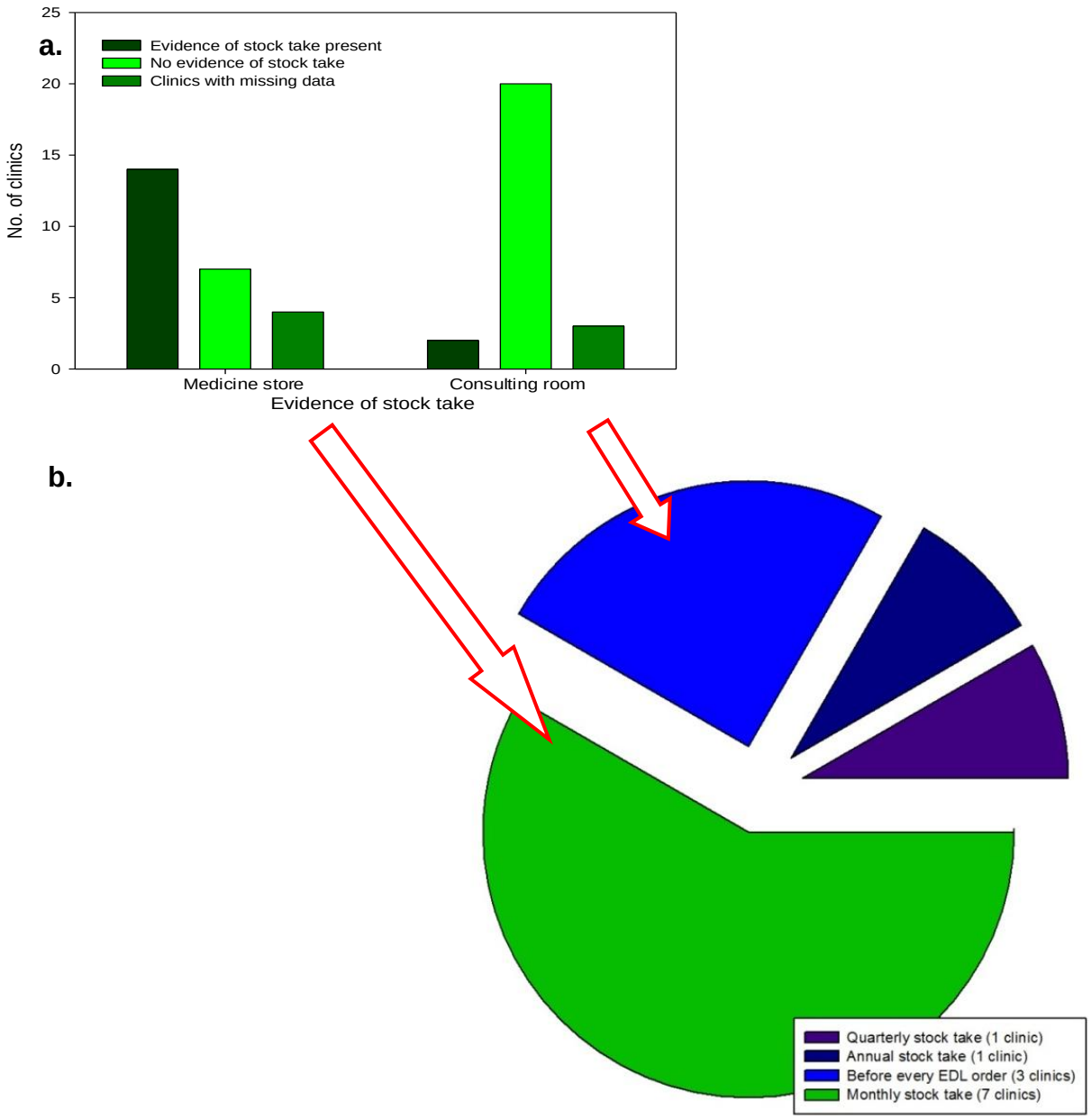


Figure 4.22: Evidence (a) and frequency (b) of stock take (N=25).

- In one clinic stock take was last conducted in 2010.
- In eleven of the clinics stock take was last conducted in 2011.
- Four clinics did not conduct any stock take at all.
- Data was missing from the remaining clinics.

According to the researcher checklist:

- Only fourteen clinics had evidence of stock take being conducted in the medicine store.
- Two clinics had evidence of stock take being conducted in the consulting room.
- The frequency of stock take in these facilities varied substantially with seven facilities performing a monthly stock take and only two facilities before every EDL order (which varies from monthly to bimonthly depending on the size of the clinic).
- Only 40% of the facilities counted stock prior to ordering and only twenty eight percent recorded the re-order level of each item on the order file.

In order to ensure efficient DSM, regular physical stock counts is necessary so that drug movement can be monitored. Bin

cards should be used to control all the stock dispensed from consultation rooms.

The study found that there were problems associated with management of stock cards. The physical stock on the shelves was not equal to the balance quantities recorded on the stock card because stock was not recorded at the time of movement. It was thus difficult for clinics who did not maintain stock cards to take stock. According to previous studies, Matse (2005[b]) argued that if stock cards are correctly maintained they could be used to calculate consumption and hence quantities to order.

The lack of stock take in the medicine store by 68% of the facilities indicated that stock is not counted prior to ordering. Hence the ordering process is conducted without determining consumption of drugs from one order period to another. This could contribute to out of stock and over stocking of certain items. This could then result in patients not receiving medication or medication expiring on the premises due to incorrect re-orders levels.

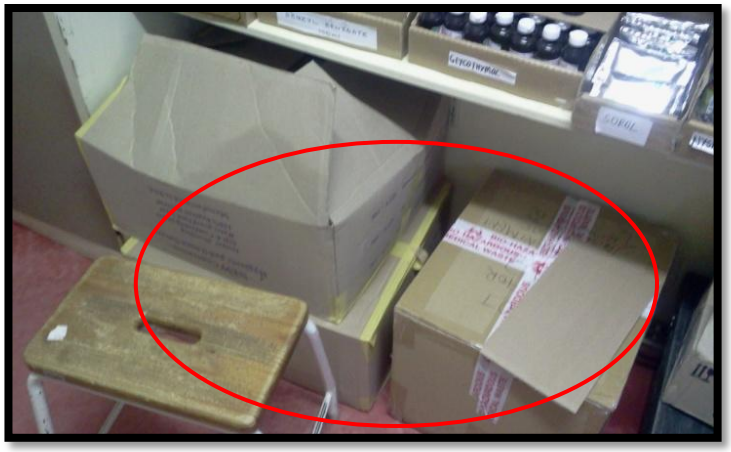


Figure 4.23: Unopened stock stored on the floor (Clinic B).

The boxes are still sealed implying that stock has not been checked (Figure 4.23). There is no evidence of bin cards. The district pharmacy often repacks stock in cardboard boxes and seals these. Thus a sealed box may contain mixed items, which in this case had not been opened and checked.

Stock records are the core records in the inventory management system. They are the primary source of information used in various reordering systems.

Several factors contribute to inaccurate records:

- High volume, repetitious entries lead to occasional entry errors just by the nature of the task. This is often found to be the case during routine visits in Sedibeng. The recording system is manual and if stock is not recorded as

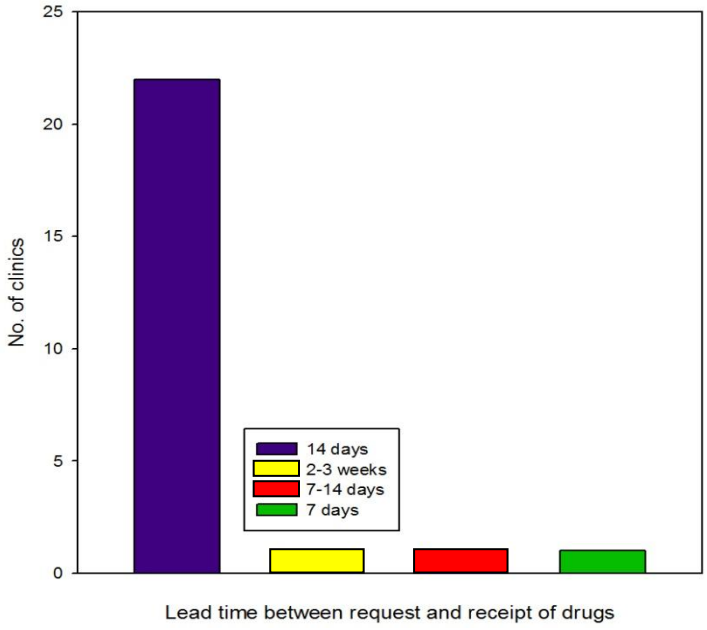
and when it is utilised (as was established in the study), then errors can easily occur (Dukes *et al*., 1997).

- Duplicate entries for receipts or issues may be caused by duplicate paperwork if more than one person is responsible for DSM. This happens frequently at some clinics especially in the absence of PA's. Nurses take medication from the store room and leave notes for the assistant to enter into bin cards. This creates room for errors.
- Spoiled or damaged stock may be destroyed but not written off the records.
- Theft produces inaccurate records, except where records are deliberately altered to conceal theft.
- Physical stock counts may be rarely or never conducted or the records may not be reconciled after stock counts as has been established in the study.
- Sloppy warehouse conditions may make it difficult to reconcile actual stock with recorded stock. In Sedibeng, small stores and stock in many different places in the absence of a store room result in incorrect reconciliation of stock.
- There is often little supervision of facilities medicine stores, and limited effort by FM's to reconcile discrepancies (Dukes *et al*., 1997). FM's are often

overworked in the Sedibeng district with little or no time for DSM.

4.4.10 Delivery of medication

a.



b.

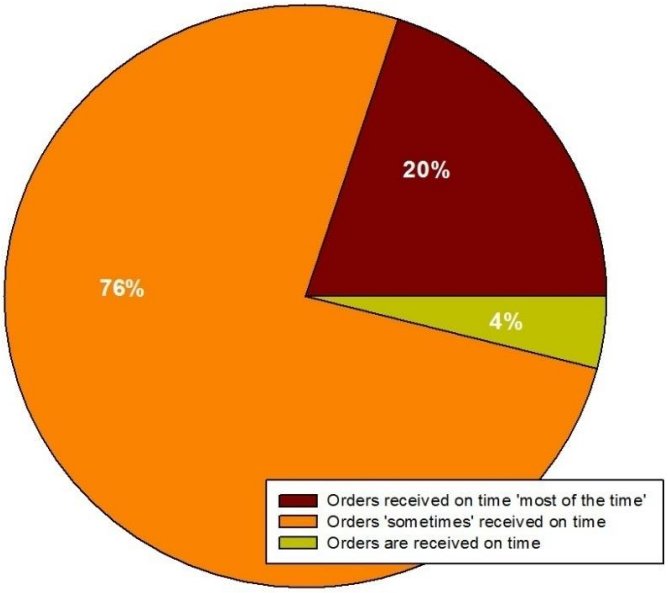


Figure 4.24: Lead time between request and receipt of drugs (a) and receipt of orders (b).

According to transport officers:

Table 4.9: Delivery of medication according to transport officers (N=4)

	% of transport officers
Orders have to be split due to insufficient space in the delivery vehicle	75%
Officers that admitted that only 'sometimes' is the balance of the order delivered on the same day	75%
Availability of a delivery schedule	100%

- All four of the transport officers (i.e. 100%) stated that there was no designated driver or vehicle to deliver medication.
- Three of the vehicles used to transport medication are normal cars and one vehicle is a closed van.
- All four of the transport officers admitted that they are not always able to adhere to the delivery schedule. In the Sedibeng district the turnaround time for an order is seven days. Transport has been cited by many studies as one of major problems affecting drug distribution. It is definitely a contributing factor in this study. The results of the study indicate the lack of a dedicated vehicle and a dedicated

driver to deliver medication is one of the contributing factors to out of stock situations, since the turnaround time for delivery of medication can be up to three weeks instead of the required seven days.

4.4.11 Response to patients on medication stock outs

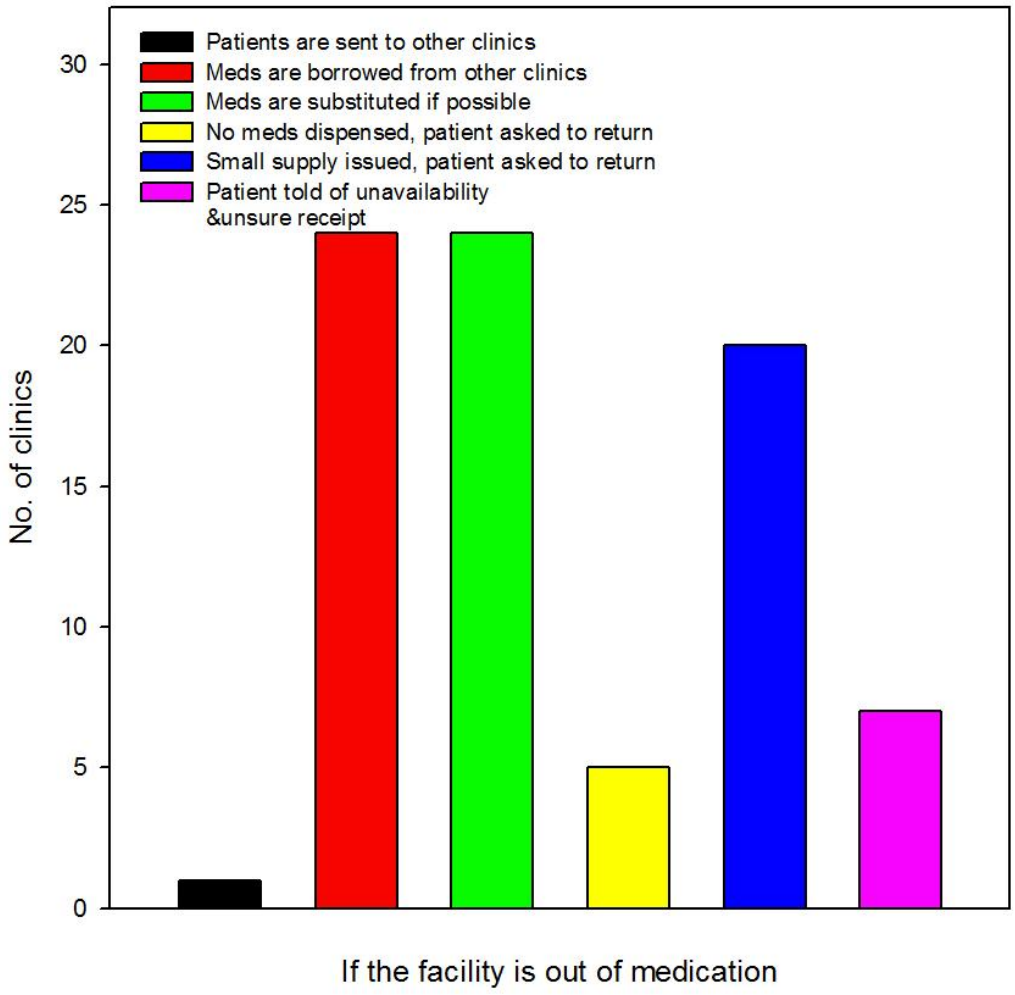


Figure 4.25: Process that is followed if the facility is out of medication (N=25).

4.4.12 Feedback from district pharmacy

- Feedback regarding the status of orders is communicated to all the clinics via the district pharmacy.
- No feedback from the transport department is received regarding expected delivery.
- Feedback is given to the clinics regarding out of stocks in the pharmacy but no feedback is given regarding the status of to-follow orders.

The district pharmacy was not included in this study and hence it cannot be ascertained as to whether the ordering roster issued by the district pharmacy to the PHC clinics was adhered to by the clinics.

4.4.13 Availability of documentation and ordering processes

- Twenty four of the clinics had available documentation regarding the procurement and receipt of medication.
- Twenty of the 25 clinics had the documentation filed.

4.4.14 Reasons for out of stock situations

- Ninety six percent of the clinics cited the most predominant reason for the experiencing of out of stocks is because the district is out of stock. Further research needs

to be conducted to establish factors influencing the availability of stock at the district pharmacy. However, this study identified a lack of ROL's, shortage of space in the medicine store and a lack of DSM training which all affect the availability of drugs at the clinic. In addition to this, haphazard ordering patterns from clinics in Sedibeng would make it difficult for the district pharmacy to quantify the needs of the clinics and this would affect the ROL's of the pharmacy.

- Although 22 clinics claimed that the medication stock out is addressed within forty eight hours, eleven clinics have indicated an average stock out period of tracer items of eight days or more.

According to the researcher checklist more than 75% of the clinics experience stock outs for the following reasons:

- Non adherence to ROL's,
- Bin cards are not updated regularly (only when the PA is present),
- Inaccurate consumption records,
- Insufficient space, resulting in stock being stored all over the facility.

The findings of this study are consistent with challenges identified in with other studies in terms of factors affecting DSM (Matse, 2005[b]).

Figure 4.26: Insufficient space and lack of shelving (Clinic B).

The above photo demonstrates black ordering boxes which contain stock which has not been checked and packed due to lack of storage space. It is difficult to identify what items are in the box since the district pharmacy supplies mixed items in the black boxes. A lack of space was cited as a reason for not unpacking the boxes. Hence clinics could report items as out of stock or stock could expire in the boxes if these boxes are not unpacked.

According to the study the following possible reasons have been identified for not unpacking stock regularly at clinics:

- The unavailability of a constant dedicated person to order and receive medication,
- Mismanagement of stock due to lack of monitoring access control in the absence of the PA,
- Possibility of theft due to stock not being checked and packed immediately on receipt,
- Stock being left outside during delivery due to the absence of a dedicated secure receiving area, resulting in spoilage and theft.

Of the clinics interviewed only 50% of clinics claimed to have been visited by the district pharmacist in the last month. Lack of supervision by the district pharmacy results in a lack of supervision of PA's resulting in poor DSM. According to the study, there is a lack of training of DSM at PHC's. Increasing support visits by pharmacists would assist in increasing onsite training and monitoring and evaluation which could assist in establishing ROL's, monitoring expiry dates and adhering to FEFO principles.

4.4.15 Standard operating procedures and reference material

Table 4.10: Percentage of clinics with the relevant available SOP (N=25)

Standard Operating Procedure (SOP)	Availability in clinics
Control of access to dispensary or medicine room	8%
Designation of the medicine room	8%
Issues to the district from the regional pharmacy	20%
Organization of medicine room	28%
Security in the medicine room	28%
Receipt and storage of medicine	32%
Issues from medicine room to consulting rooms	32%
Borrowing of medicine between institutions	20%
The use of stock cards (VA11)	28%
Stock taking in medicine and consulting rooms	32%
Product types requiring special handling and storage	12%
Cold chain management	32%
Checking and return of expired/obsolete/unusable and patient-returned stock to the district pharmacy	20%
Complaints of product quality and adverse drug reactions	16%

- All clinics (i.e. 100%) had access to the EDL/STG for PHC and 90% of these were 2008 editions.
- Only 22 clinics had access to a provincial formulary/code list.

The next chapter contains a summary of the results and conclusions.

CHAPTER 5

SUMMARY OF THE RESULTS AND CONCLUSIONS

This chapter summarises the findings of the study and concludes the study.

SECTION A

5.1 HUMAN RESOURCES

The study found that there was no specific dedicated person to manage drug supply at different PHC facilities in Sedibeng. At fourteen facilities there were PA's on a part time basis and nobody was responsible for DSM in the absence of the PA. The absence of a dedicated person to manage drug supply can be linked to other studies where similar situations contributed to out of stocks (Jha & Roy, 2005).

In one percent of the clinics a nurse or FM was responsible for DSM. The task of managing drug stores often depends on the already overburdened nurses and part-time PA's. The nurses were primarily responsible for providing health care to a large population. It was difficult for them to spend the time required to adequately store, maintain records and maintain the drug

items in the stores and to efficiently and effectively manage, supply and dispense drugs. The production of professional nurses has lagged behind in growth and the need for health services in South Africa has not triggered appropriate policy development and action in the area of nurse production. The lack of clearly defined or accepted national staffing norms for PHC constitutes a key gap in the harmonisation between the expansion of PHC services and the demand for nurses (Blaauw *et al.*, 2005).

From the results of the study, it became clear that there was a need for full-time PA's at PHC level, as was confirmed by a study conducted by Matse (2005[b]).

5.2 TRAINING OF NURSES AND PHARMACIST ASSISTANTS

- Training of nurses in DSM was not consistent amongst the study sample.
- In 88% of the clinics no nurses were trained in DSM in the last twelve months.
- Out of a total of 208 nurses only 34 nurses could produce a dispensing licence or a section 56A permit to dispense. This implied that nurses were managing drugs and dispensing medication without the appropriate qualification

or authorisation. This was a direct contravention of both the Nursing and Pharmacy Acts.

- In 50% of the clinics PA's were learner basic and could only perform certain functions in the absence of direct supervision by a pharmacist.
- In 48% of the clinics the PA's were post-basic and could dispense under indirect supervision of a pharmacist.
- Both leaner basic and post basic assistants were not based at one clinic permanently. Due to the shortage of trained PA's, they rotated between clinics. This resulted in a lack of dedicated trained staff members to manage drug supply.

The first objective of the study was:

To establish the availability of trained personnel to manage drug supply.

This objective was met by the results indicated above and it was found that the Sedibeng district did not have sufficient dedicated trained personnel to manage drug supply at each of the clinics.

SECTION B:

5.3 INFRASTRUCTURE AND SECURITY

5.3.1 Storage area of medication

- Nineteen clinics did not have large enough medicine stores to store a month's supply of medication. Inadequate storage could result in clinics ordering according to capacity instead of according to consumption, resulting in medication out of stocks resulting that patients will not receive medicines prescribed to them during out of stock periods. This is undesirable and impacts negatively on patient care.
- Other items such as toilet paper and milk powders were also stored in the medicine store in sixteen of the clinics, contributing to a further shortage of space for medicines,
- Medication was stored on the floor due to insufficient storage space,
- According to the GPP guidelines, the storage area in a medicine store should be large enough to allow for the orderly arrangement of stock and stock rotation. Medicines may also not be stored on the floor (SAPC, 2010). Thus in terms of GPP requirements for storage of medication, the Sedibeng district failed to comply.

5.3.2 Condition of medicine store

In 23 clinics there were no cracks and holes in the walls and only one clinic had a broken ceiling panel. Sedibeng district thus largely complied in terms of the conditions of a storeroom according to GPP requirements (SAPC, 2010).

5.3.3 Availability of a secure delivery area

- Only one clinic had a secure delivery area.
- Lack of monitoring systems was identified during receipt and inspection of medicines. In certain cases medicines were left outside for long periods of time before being checked. This could result in misappropriation and theft of medication. According to the GPP, medicines should only be accessible to an authorised prescriber and should be checked and stored in a locked area immediately upon receipt. The Sedibeng district failed to comply with these GPP requirements in terms of a secure delivery area (SAPC, 2010).

5.3.4 Protection of medicine from direct sunlight

- The medicines in 20% of the clinics had no protection from sunlight.
- One clinic had no electricity in the storeroom.

- According to the GPP, light conditions and temperature must comply with the minimum standards for storage of medicine (SAPC, 2010).

In this instance, the Sedibeng district did not fully comply to GPP requirements (SAPC, 2010). This issue can be corrected by addressing it with the relevant clinics.

5.3.5 Pest infestation

- Dead insects were discovered in the light fitting of one clinic.

Good housekeeping practices according to GPP requirements need to be emphasised with the specific clinic (SAPC, 2010).

5.3.6 Access control and security in the medicine store

According to the GPP, control of access to a medicine store must be of such a nature that only the licensed dispenser(s) has direct access to the medicine room (SAPC, 2010).

- According to the findings of this study, in nine of the clinics the key was in possession of the PA. In the absence

of the PA, the key was hung in the key cupboard, allowing unauthorised access to the medicine store.

- Nine of the clinics had a security door and eight of the clinics had burglar bars as a security measure.
- According to the GPP, all medicine stores need to have a security gate and burglar bars (SAPC, 2010). The Sedibeng district was thus partially compliant.

The second objective of this study was:

To explore the availability of infrastructure to store drugs at PHC level according to GPP requirements.

The objective was met from the results outlined above. However, from the results it was established that the district did not comply fully with the required GPP requirements (SAPC, 2010).

SECTION C:

5.3.7 Delivery and receipt of medication

- It was established that different staff members received medication ranging from the FM, nurse and PA.

- Stock was checked immediately or within 24 hours of receipt, as expected.

5.3.8 Checking of stock according to transport officers in the presence of security officers

Only one transport officer claimed that there was always a security officer to check stock upon delivery. The other three transport officers claimed that stock was checked only sometimes. According to transport officers at other times medication was left outside the clinic unchecked.

According to the GPP, medication should only be accessible to an authorised prescriber (SAPC, 2010). The Sedibeng district has a serious challenge due to a lack of secure delivery areas at the clinics as well as dedicated staff members to receive delivery of medication.

The Sedibeng district failed to comply with the necessary requirements in terms of receipt and checking of stock.

5.3.9 Cold chain management

- Overall cold chain management was maintained within the 24 clinics.

- Some clinics claimed that transport did not maintain the cold chain during delivery of medication.
- Nineteen clinics did not have back-up generators in possible cases of power failure.

The Sedibeng district complied with cold chain management at PHC level except for one clinic. This can be addressed with the relevant clinic and staff members can be trained in terms of cold chain management.

5.3.10 Arrangement of medication in the store room and the consulting room

- According to the results, facilities did not pack medication according to FEFO and FIFO resulting in expired stock

The third objective of the study was:

To study the distribution process in terms of availability and accessibility of drugs at PHC level.

This objective was met by the results outlined above. The district failed to comply in terms of adequate distribution processes due to lack of dedicated personnel.

- The district complied in 20 clinics in cold chain management but the transport department failed at times to maintain cold chain.

5.4 MEDICINE MANAGEMENT AND PROCESSES

5.4.1 Availability of bin cards

- The study found that facilities either did not have bin (stock) cards or that bin cards were not updated regularly. Hence, it made the task of managing drug supply difficult since medicine usage could not be established.

Previous studies have found that one of the key elements of effective distribution management of drugs at facility level is the keeping of reliable records of drug consumption, e.g., according to a study conducted in the state of Bihar in India to determine the reasons for drug shortages, it was found that there was no bin card system. Stock registers were poorly maintained. There was a lack of basic reordering skills at all levels; for example not knowing how to calculate monthly stock available and how to calculate orders on maximum and minimum quantities (Jha & Roy, 2005).

According to a study conducted by Gray and Suleman, (2009), if stock cards are correctly maintained they could be used to calculate consumption and hence quantities to order. The lack of updated bin cards contributed to a lack of adequate stock control systems, which in turn contributed to drug out of stocks, resulting in patients not receiving medication.

5.4.2 Method of calculation of drug ordering quantities

- The method of assessing drug requirements in the Sedibeng district was not appropriate. The demand estimations were not following criteria such as trends in consumption patterns or ROL's. Although some clinics had ROL's, these were not utilised when it came to ordering drugs. It appeared that not many of the staff members understood the method they claimed to use to determine quantities to be ordered. Staff members were ignorant about the different methods to determine ordering quantities e.g. the Maximum and Minimum Stock Order Levels, Consumption-Based ROL's or the Average Monthly Consumption. As a result the study concluded that staff relied on their working experience to determine the quantities to be ordered (Matse, 2005[b]).

The lack of utilisation of proper ordering systems further contributed to drug stock outs and the district once again failed to comply in the implementation of adequate stock control systems.

5.4.3 Availability of tracer and non-tracer items

- Both tracer and non-tracer items required by various clinics were either in short supply or altogether missing from the medicine store due to the reasons already mentioned above. Hence, at some clinics patients did not always receive medication.
- Due to poor inventory control, there were frequent stock outs which varied from one PHC clinic to another.

5.4.4 Stock take

- Stock take was also not conducted regularly in 68% of the clinics. This is a major contributing factor to over or under ordering since the facility has no idea as to what drugs to order. This is also a major contributor to out of stock and/or expired stock situations contributing to patients not receiving medication.

5.4.5 Responsibility for ordering of medication

From the study it was established that PA's were mostly responsible for ordering of medication. Thirteen clinics did not order medication when PA's rotated to other clinics. It can also be assumed that no record-keeping took place in the absence of an assistant, since there was no dedicated allocated person for DSM in the absence of a PA.

5.4.6 Expired stock

- The value of expired stock was high at some facilities. The study found that principles of FEFO and FIFO were not adhered to in some clinics, contributing to the high value of expired stock. The lack of adherence to ROL's could also have been a contributing factor to expired stock.

5.4.7 Delivery of medication

- There was no dedicated transport in terms of vehicles and drivers. Transportation of drugs at various levels was done by a car and deliveries of a single order were often split. The transport department could not adhere to the delivery roster, which resulted in drugs not being delivered on time to the clinics. This contributed to out of stock situations. According to a study conducted by Matse, transport of

medication has been cited by many studies as one of the major problems affecting the distribution of drugs (Matse, 2005[b]). This is definitely a contributing factor in the Sedibeng district to the drug out of stocks at PHC level.

5.4.8 Visit by the district pharmacists

There was a lack of monitoring and evaluation by district pharmacies as pharmacists did not manage to visit all clinics each month. The WHO (2003) cites reliable supervisory systems as one of the key elements of an effective distribution management of drugs. Findings according to the Matse study indicated that all parties involved in the management of drugs must play their part and work together to improve supply chain management and reduce drug shortages (Matse, 2005[b]).

5.4.9 Availability of SOP's and standard reference material

- There was no EDL, SOPs and STG's in some of the PHC clinics. This could have contributed to out of stock situations since the EDL is used as a guideline for the ordering of drugs. The STG assists in rational prescribing and usage of drugs. SOPs assist with the usage of formulas for ROL's, the ordering and receipt of drugs including cold chain management.

The fourth objective of the study was:

To identify if stock control systems were in place to ensure affordable and acceptable drugs at PHC level.

The objective of this study was met by the results illustrated above.

- The Sedibeng district failed to meet this objective due to not adhering to proper stock control procedures. Drug stock outs varied from three tracer items out of stock at one clinic and as many as eleven items at another clinic.

The fifth objective of the study was:

To update the current tool to effectively monitor drug supply in the Sedibeng district (a monitoring and evaluation tool is currently used from the clinic supervisors manual by the NDOH to monitor DSM in the Gauteng Province).

The researcher compared the drug supervisory tool with the questionnaire used in this study and identified challenges

experienced in DSM which were excluded from the supervisory tool.

The following aspects were not addressed in the supervisory tool:

- Availability of dedicated trained personnel to manage drug supply,
- Availability of dispensing licences and section 56A permits for nurses to dispense,
- The involvement of the transport department in the distribution process,
- The availability of a secure delivery area,
- The checking of stock immediately upon receipt of medication delivery,
- The availability of dedicated driver and an appropriate delivery vehicle,
- Some of the necessary SOP's and STG's required at the clinic were omitted.
- Monthly supervisory visits by the pharmacist.

The implementation of the NCS will address and overcome a number of the challenges identified in the supervisory tool.

There are definitely gaps between policy and practice in primary health care and improving primary level health services is notoriously slow. In order to improve DSM, a situational analysis is essential in identifying problem areas. Clear joint leadership and vision from management is imperative to facilitate implementation of recommendations based on identified challenges (Barron & Monticelli, 2003).

The key to safe and appropriate management of medicines is a coordinated approach that supports and encourages continuity in all areas of the community and the health care sector. There are three essential components for ensuring the quality use of medicine across the health care system.

- ✓ The first is to establish standards of practice that define SOP's.
- ✓ The second is to identify the positions or persons, working within the accepted limits of their roles, who are responsible for implementing each step of the process.
- ✓ Lastly a constant monitoring and evaluation system to ensure processes are implemented and followed.

The DOH continues to add new services to PHC without the addition of resources, infrastructure and staff. The role out of ARV services to all PHC clinics recently is but one example of this. National and provincial programme managers pass on policies and requests for tasks to districts without ensuring that they have the means to implement these (Matse, 2005[a]).

Policy implementation requires stepwise systems change, phasing of interventions, and rationalisation of resources. The details of systems are not explicitly set out in the policy. An example of this is that the requirement of a vehicle to deliver medication on a daily basis to all clinics is often overlooked. The DOH needs to plan for implementation in a detailed manner and to track loopholes along the way. The role of the Provincial DOH is not only to dictate change but also to support change through providing clear guidelines, unpacking the policy for the particular district and providing extra resources if and where necessary. Close monitoring of a new system and ongoing problem-solving is important.

The DOH needs to establish a benchmark against which health establishments can be assessed, gaps identified, and strengths

appraised. It needs to provide a national framework to certify that health establishments are compliant with standards.

The introduction of the NCS is one such frame work. The NCS correspond with the NDOH's strategic plan for 2009/2012, and the 10-Point Plan of 2009-2014, which highlights "improving the quality of health services" and "the establishment of a quality management and accreditation body" respectively.

The NCS will benefit pharmaceutical services by increasing awareness of pharmacy issues in the general health care arena; encourage staff to work together in multidisciplinary teams within facilities, and to provide a useful means of monitoring progress over time.

Due to the fact that this study did not include DSM at the district pharmacy; further studies will have to be conducted to establish factors affecting DSM at the Sedibeng district pharmacy.

The study found that each PHC clinic experienced different challenges and collectively these factors contributed to medication not being available according to the 99.5%

requirement at all times. None of the clinics were found to be totally compliant in terms of the objectives of this study.

In conclusion this study found that the DSM cycle in Sedibeng district is not meeting all requirements. However, the findings were consistent with previous studies and factors affecting DSM correspond to previous studies in terms of DSM at PHC centres.

The MEC for Gauteng Health will be notified of these results as he directed monitoring and evaluation teams to ensure drug availability of 99.5% stock levels at all times.

This chapter summarised key results obtained from the study. The next chapter will address key recommendations based on the outcome of the study.

CHAPTER 6

KEY RECOMMENDATIONS

This chapter outlines recommendations to improve DSM in the Sedibeng district based on the findings of the study.

SECTION A

6.1 HUMAN RESOURCES

A dedicated person needs to be appointed at each clinic that will be responsible for DSM preferably PA's, thus ensuring that all clinics have a full time PA on a permanent basis. Currently, the Sedibeng district has embarked on training twenty students as PA's. Pharmacy management has recommended that a two year contract be implemented to ensure a minimum period of retention upon completion of training.

6.1.1 Training

It is recommended that on the job training for store managers, PA's and nurses in basic stores and drug management be provided. This training should be compulsory and ongoing. The implementation thereof needs to be monitored. Job descriptions of designated people for drug supply should include duties of

DSM and quarterly performance evaluations should include DSM evaluations.

The Sedibeng district needs to ensure that that nurses who dispense and manage drugs are in possession of a dispensing licence.

.

SECTION B

6.2 INFRASTRUCTURE AND SECURITY

6.2.1 Storage of medication and condition of a medicine store and a secure delivery area

Proper storage space for a medicine store should be provided with adequate shelving, ventilation, light and temperature control systems at all levels. A secure delivery area also needs to be ensured at every clinic. Facility planning needs to be involved together with senior management and the pharmacy department. The necessary infrastructure needs to be budgeted for and the pharmacist should insist on delivering a service in a suitable environment. Facilities should comply with GPP requirements (SAPC, 2010). The SAPC can also be consulted to ensure management support.

6.2.2 Temperature control in the medicine store and consulting room

All clinics need air conditioners which are functional together with a service plan to ensure that the air conditioners are regularly maintained.

6.2.3 Pest infestation

A pest control policy should be made available together with a service provider for regular inspection and fumigation if necessary.

6.2.4 Access control and security in the medicine store

- All clinics need to ensure that the key for the medicine store is in the possession of an authorised prescriber as prescribed according to GPP standards (SAPC, 2010).
- A key register also needs to be implemented to ensure that the keys are only available to authorised prescribers of medication.
- All medicine cupboards need to be locked when it is not being used.

6.2.5 Delivery and receipt of medication

- A dedicated staff member should be responsible for receiving and checking of medication. Medication needs to be checked within 24 hours and the facility needs to be accountable for all shortages of drugs.
- The transport department needs to be trained on the importance of ensuring that documentation is signed upon delivering of medication and ensure that the physical stock corresponds to the delivery note. The clinic together with the transport department needs to report shortages immediately to the district pharmacy and the relevant department needs to be held accountable. The district pharmacy together with management support need to take disciplinary measures if there is non-compliance in this with regards to these procedures at PHC level.
- Communication between the transport department, the district pharmacy and PHC clinics, in terms of delivery and receipt of medication needs to be strengthened.
- The Sedibeng district needs to budget for and provide a separate vehicle and a designated driver for the transportation of drugs at different levels. Failure to address this issue will result in continuous out of stock

situations at clinics as medication will not be delivered on time to clinics.

- The district needs to consider the aspect of reducing loss and pilferage by implementing a security system across the supply chain.

6.2.6 Cold chain management

Overall cold chain management was maintained in the district but clinics without generators need to have a contingency plan in place in the event of a power failure. A monitoring system such as an alarm in the event of a power failure after hours needs to be implemented.

SECTION C

6.3 MEDICINE MANAGEMENT AND PROCESSES

6.3.1 Inventory control systems

Currently the PHC clinics in the Sedibeng district have a manual drug ordering system. The district needs to consider and plan for an automated logistics information management system that tracks stock levels and consumption patterns, making the inventory transparent throughout the system.

6.3.2 Availability of bin cards

The FM should be assigned to introduce and encourage the staff members to be more organised and to use stock cards (bin cards) for the medicine store along with the maintenance and regular update of the stock register and other records.

6.3.3 Method of calculation of drug ordering quantities

- Appropriate methods for quantifying drug requirements based on actual need should be utilised at clinics in the Sedibeng district i.e. on past consumption, morbidity or combination of all these. In service training together with monitoring on a monthly basis will assist in the implementation of this process.
- A control system that allows decisions on ‘when to re-order’ and ‘how much to order’ should be introduced. The ROL calculation should be efficient. In service training will assist in addressing the correct calculation of ROL’s.

6.3.4 Availability of tracer and non-tracer items

- The availability of all vital and essential drugs at all levels of health care delivery systems should be ensured. One of the limitations of this study was the exclusion of the district pharmacy and its suppliers in the sample. Further

research needs to be conducted to establish whether there are any bottlenecks in this supply chain.

- Use of buffer and safety stock for maintaining a desirable service level which can deal with emergency situations should be introduced at district level. This would allow for less out of stock situations to arise.

6.3.5 Stock take

A monthly stock count prior to ordering needs to be implemented and monitored by the FM. Evidence of stock count and stock take needs to made available and FM's need to be held accountable for non-compliance. In service training should also be conducted to assist in understanding the importance of stock take.

6.3.6 Responsibility for ordering of medication

A dedicated person needs to be appointed to ensure that medication orders are placed according to the order roster from the district pharmacy. Currently whilst PA's are still being trained, a joint effort is required by facilities managers, PA's and nurses to ensure implementation of proper stock control procedures until such time that each clinic has a dedicated staff member to manage drugs on a regular and permanent basis.

6.3.7 Expired stock

Implement a system to track expiry dates at PHC clinics, thereby minimizing expired stock. The implementation of the NCS requires the introduction of an expiry register at each facility. This is mandatory and will be monitored by the National Health Team together with pharmaceutical services.

6.3.8 Feedback from the district

- The communication gaps between the district pharmacy and PHC clinics needs to be strengthened thereby ensuring that PHC facilities are informed of drug delivery dates, out of stock drugs, short dated stock, protocol changes, etc. This can be implemented by attending the monthly FM's meeting and ensuring that pharmacy becomes a permanent feature on the agenda.
- The FM's need to ensure communication from the meeting is filtered down to the appropriate person.
- Telecommunication tools can also be used to inform facilities of the status of various drugs.

6.3.9 Visits by the district pharmacists

Appoint more pharmacists at the Sedibeng district to ensure proper monitoring and evaluation of PHC clinics. Community

service pharmacists could also assist by completing their community service in a PHC clinic.

6.3.10 Availability of SOP's and standard reference material

- The district pharmacy needs to ensure that all clinics have the necessary SOP's and reference material available.
- PHC facilities need to ensure the availability of SOP's and standard reference material as these are often not kept safely and need to be issued year after year.

The fifth objective of the study was:

- To update the current tool to effectively monitor drug supply in the Sedibeng district (a monitoring and evaluation tool is currently used from the clinic supervisors manual by the NDOH to monitor DSM in the Gauteng Province).

The supervisory tool which is currently used in the Sedibeng district needs to be reviewed and updated to incorporate all the aspects of DSM which were found to be a challenge in this study. Currently, the tool does not address the issue of human resources and training. A task team which consists of area managers for PHC clinics, the district pharmacists and FM's should be involved in this review. Monitoring and evaluation

should be mandatory at least once a month for each clinic and the findings need to be reported and recorded.

The updated DSM section of the tool needs to be used by pharmacists during supervisory visits. The Clinic Supervisory tool (DOH, 2003), if used correctly, could create the following situations:

- Ensure that clinics are consistently monitored and resources are in place,
- Ensure adequate amount of staff with appropriate skills
- Ensure that drugs, clinical supplies and equipment are adequate
- Ensure procedures, guidelines, norms and standards are followed
- A maintained infrastructure is ensured.

After every supervisory visit, pharmacists should present their findings and make recommendations regarding the implementation of these, based on a realistic time frame.

Progress can be tracked on a monthly/quarterly basis. This process is only possible through a joint effort by management of different departments. The results of the monitoring and

evaluation should be accompanied by an action list attaching responsible staff members to various actions identified. This needs to be reviewed monthly or quarterly. Challenges identified in the action list need to be escalated to senior management to assist in addressing identified gaps.

By implementing these recommendations, the Sedibeng district should be able to address the challenges identified in this study. This should improve drug availability and ultimately improve patient care at PHC level.

LIST OF REFERENCES

- Bakarich A., Finucane P., Harris J., Healy D., 2006. Problems with medication use in the Elderly, *Journal of Pharmacy Practice and Research,* vol. 26, pp: 59-62.

- Barron P., Monticelli F., 2003. Lessons learnt in the implementation of Primary health care. Experiences from Health Districts in South Africa. Health Systems Trust, Durban. (online) Available at www.hst.org.za. Accessed on July 27, 2011.

- Blaauw D., Chabikuli N., Gilson l., Schneider H., 2005. Human Resource policies health sector reform and the management of PHC. (online) Available at www.hst.org.za/uploads/files/sahr05_**chapter8**.pdf. Accessed on October 10, 2011.

- Booyens S. W., 1997. *Health Services Management.* Juta & Company. Cape Town

- Bradley H., Johnson Y., Von Zeil M., 2011. "Improving the Quality of Pharmaceutical Services", *South African Pharmacy Journal,* vol. 78, no. 4, pp: 42-43.

- Carol D., 2002. Pharmacist's Assistant Training, and the real world. *SA Pharmacist's Assistants Journal,* vol. 2, no. 4: pp 3-6.

- Chetley A., Hardon A., Hodgkin C., Haaland A., Fresle D., 2007. How to improve the use of medicines by consumers. Geneva World Health Organization. (online) Available at www.who.int/**medicines**/publications/WHO_PSM_PAR_2007.2.pdf - Accessed on September 3, 2011.

- Davids A., Mbelle N., Mohlala G., Peltzer K., Phaswana-Mafuya N., Ramlagan S., Zuma K., 2006. *Impact of the National Drug Policy on Pharmaceuticals in two Provinces in South.* (online) Available at http://www.hsrc.ac.za/module-KTree-doc_request-docid-1294.phtml. Accessed on August 31, 2011.

- Department of Health, 2003. *Clinic Supervisors Manual.* Government Printer. Department of Health, Pretoria.

- Department of Health, 2006. *Nursing Act no. 33 of 2005,* Government Gazette. Department of Health. (online) Available at www.info.gov.za/view/DownloadFileActi.
  Accessed on June 15, 2010.

- Department of Health, 2011. *National Core Standards for Health Establishments in South Africa*. (online) Available at www.doh.gov.za/docs/tenders/NCS%20for%20**Health**%20FINAL_1.
  Accessed on August 5, 2011.

- Dukes M.N.G., Garnett A., Hogerzeil H.V., Laing R.O., O'Connor R.W., Quick J.D., Rankin J.R., 1997. *Managing Drug Supply,* second edition, Kumarian Press, USA.

- Gauteng Department of Health, 2005. *Statistical Feedback on out of Stock and availability of EDL Medication at all levels.* Circular letter 39 of 2005. Directorate Clinical Support Services. Department of Health, Gauteng.

- Gauteng Department of Health, 2009. *Implementation of Demand Planning for Surgical and Pharmaceutical Sundries*.

Circular minute 118 of 2009, Directorate Clinical Support Services. Department of Health, Gauteng.

- Gray A., Gengiah T., and Naidoo P., 2005. The Pharmacist's Assistants: A case study of a mid-level worker, in: Ijumba Petrida & Barron Peter(eds). *In South African Health Review* (online) Available at: http://www.hst.org.za/uploads/files/sahr05chapter12.pdf. Accessed on October 11, 2011.

- Gray A., McCoy D., and Suleman F., 1988. *Technical report number 9: District Drug Management - lessons learnt from the ISDS in the Eastern Cape, KwaZulu-Natal and Northern Cape*. Health Systems Trust, Durban, August 1998. (online) Available on wiredspace.wits.ac.za/bitstream/handle/10539/1623/06References.pdf?...9. Accessed on August 31, 2011.

- Gray A., Suleman F., 2009. Strengthening Health Systems. Alliance for Health Policy and Systems Research, Annual Report 2009. World Health Organization (online). Available at www.who.int/entity/alliance-hpsr/alliancehpsr_annualreport09.pdf - Accessed on September 2, 2011.

- Hall W., 2003. Staffing Norms for PHC. *Health Systems Trust*, May. (online) Available at www.hst.org.za/generic/62 Accessed on June 10, 2010.

- Health Systems Trust, 2003. *The National Primary Health Care Facilities Survey*. Durban: Health Systems Trust. (online) Available at www.hst.org.za/.../district-drug-management-lessons-learnt-isds-east... - Cached. Accessed on August 31, 2011.

- Jha H.M., Roy C., 2005. *A study on the logistics Management and Supply Management System of Drugs at different levels in the Darbhanga District of Bihar*. Department of Community Medicine, Darbanga Medical College Lahieriasarai. (online) Available at nihfw.org/pdf/RAHI-II%20Reports/DARBHANGA.pdf. Accessed on April 26, 2010.

- Jokhio A.H., Lancashire R.J., Pappas G., 2008. Health System Managerial Staffing Patterns: Public Sector Experience from Pakistan. *The Internet Journal of World Health and Societal Politics.* Vol. 5. (Online) available at www.ispub.com/health. Accessed on June 11, 2011.

- Kruger S., 2009. "Position Paper on Dispensing Licences". *The South African Society of Occupational Health Nursing Practitioners.* September 2009. National Office, Sunward Park, Gauteng. (online) Available at www.sasohn.org.za/images/PositionPaperDispensingLicense.p Accessed on July 27, 2011.

- Loffstadt D., Schneider H., Steyn F., and Van Rensburg H. C. J., 2007. Human resource development and antiretroviral treatment in Free State province, South Africa. *Human Resources for Health Journal*, vol 6. (online) Available at www.ncbi.nlm.nih.gov › Journal List › Hum Resour Health › v.6; 2008.
  Accessed on April 26, 2010.

- Matse P. M., 2005[a]. Essential drugs at PHC, Chapter 1. (online) Available at wiredspace.wits.ac.za/bitstream/handle/10539/1623/01Chapter1.pdf?
  Acessed on August 31, 2011.

- Matse P.M., 2005[b]. Essential drugs at PHC, Chapter 4. (online) Available at wiredspace.wits.ac.za/bitstream/handle/10539/1623/01Chapter4.pdf?
  Accessed on August 31, 2011.

- McGilvray M., Miles K., Seito O., 2006. Nurse prescribing in low resource settings: professional considerations. *International Nursing Review,* vol. 53, pp: 290-296.

- Mohammad N., Raja S., 2004. *A Handbook on Supply Chain Management for HIV/AIDS Medical Commodities.*HIV and AIDS Programs. (online) Available at www.docslibrary.com/a-handbook-on-supply-chain-management-f..
  Accessed on August 31, 2011.

- National Department of Health, 1996. *National Drug Policy for South Africa*. Government Printer. Department of Health, Pretoria.

- National Department of Health, 2003. *Guidelines for District Health Planning and Reporting.* National Department of Health, Pretoria: South Africa, 2003 (online) Available at

http://www.doh.gov.za/docs/factsheets/**guidelines**/dhp/index.html - 14k -

Accessed on August 31, 2011.

- National Department of Health, 2009. *Strategic Plan for the Department of Health 2009/10-2011/2012*. Government Printer, Department of Health, Pretoria.

- Ndilta D., 2009. *Medicines and Primary Health Care: Challenges and hopes in the Church Health Systems. Contact Magazine A* publication of the World Council of Churches.vol 187 January-May .Kenya (online) Available at www.epnetwork.org.http://wcccoe.org/wcc/news/contact.html.

  Accessed on April 26, 2010.

- Ohuabunwa M. S. I., 2008. The Challenges of Making Quality Essential Drugs And Supply Available For PHC Services In Nigeria. (online) Available at essential drugs in nigeriahttp://www.ngnhc.org/docs/NHC2009/papers/Making Essential Dr...

  Accessed on August 30, 2011.

- South African Pharmacy Council, 2010. *Good Pharmacy Practice of South Africa.* 4th Edition. Office of the Registrar, Pretoria.

- South African Pharmacy Council website, 2011. Scope of practice of pharmacy staff, Pharmacy Council. (online) Available at www.pharmcouncil.co.za/documents/regpractice doc.
  Accessed on October 11, 2011

- Stead G., and Struwig F., 2001. *Planning, Designing and Reporting Research*. Maskew Miller Longman (Pty) Ltd Cape Town.

- Stuijt A., 2007. *SA Causing XDR TB via Poor Drug-Regimen for TB+HIV.* (online) Available at SA **Causes** XDR **TB** Via Poor **Drugs** For **TB**+**HIV**. www.rense.com/general77/poor.htm
  Accessed on October 11, 2011.

- The Global Fund to fight AIDS, Tuberculosis and Malaria 2010. (online). Available at www.theglobalfund.org/
  Accessed on August 11, 2011.

- Weber R.J., Skleda S.J., Sirianni C.R., Frank S., Yourich B., and Martinelli B., 2004. The impact of pharmacist and technician teams on medication process quality and nurse satisfaction. *Hospital Pharmacy*, vol. 39, no. 39: pp. 12. (online) Available at: http://cat.inist.fr/?aModele=afficneN&cpsidt=16348289. Accessed on October, 2011.

- Whittaker S., 2011. Introducing standards to improve healthcare delivery in resource restricted countries. (online) Available at: www.safecare.org/.../SafeCare%20standards%20for%20Clinics%20and%20health% Accessed on October 10, 2011.

- World Health Organisation, 1998. *Managing Drug Supply.* Essential Drugs Monitor no 25 & 26. pp: 1-5. World Health Organisation. Geneva (online) Available at: www.who.int/**medicines**/publications/**essentialmedicines**/en/. Accessed on August 30, 2011.

- World Health Organisation, 2003. *How to investigate the use of medicines by consumers*. Geneva, World Health Organization. (online). Available at: http://www.who.int/medicinedocs/collect/edmweb/pdf/whozip08e/whozip08e.pdf Accessed at August 30, 2011.

- World Health Organisation, 2003. Situation of Antiretroviral Drug use in Nigeria by FMOH in collaboration with WHO, November 2003. (online) Available at: collections.infocollections.org/whocountry/collect/.../s6864e.p Accessed on October 10, 2011.

APPENDIX 1:

UNIVERSITY OF LIMPOPO (Medunsa Campus) CONSENT FORM

Statement concerning participation in a /Research Project*.

Name of Study:

"Problems affecting drug supply management at primary health care level in the Sedibeng district"

I have read the information the aims and objectives of the proposed study and was provided the opportunity to ask questions and given adequate time to rethink the issue. The aim and objectives of the study are sufficiently clear to me. I have not been pressurized to participate in any way.

I understand that participation in this Study is completely voluntary and that I may withdraw from it at any time and without supplying reasons.

I know that this Study has been approved by the Medunsa Research Ethics Committee (MCREC), University of Limpopo (Medunsa Campus) /Sedibeng district. I am fully aware that the results of this study will be used for scientific purposes and may be published. I agree to this, provided my privacy is guaranteed.

I hereby give consent to participate in this Study.

.....		.....
Name of participant		Signature of participant
.....	……..	.....
Place	Date	Witness

Statement by the Researcher

I provided verbal information regarding this Study

I agree to answer any future questions concerning the Study as best as I am able to.

I will adhere to the approved protocol.

.....	.....	.....	.....
Name of Researcher	Signature	Date	Place

APPENDIX 2:

INFORMED CONSENT FORM

I hereby confirm that I have been informed by the researcher, Ms Shamima Tayob about the nature and benefits of the study entitled:

“Problems affecting drug supply management at primary health care level in the Sedibeng district”

I have also received, read and understood the above written information (Participant Information Leaflet and Informed Consent) regarding the study.

I am aware that the results of the study will be anonymously processed into a study report.

In view of the requirements of this research, I agree that the data collected during this study can be processed in a computerised system by The Sedibeng district Pharmacy or on their behalf.

I may, at any stage, without prejudice, withdraw my consent and participation in the study.

I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.

PARTICIPANT

Printed Name	**Signature / Mark**	**Date and Time**

I, Shamima Tayob, herewith confirm that the above participant has been fully informed about the nature of the above study.

RESEARCHER

Printed Name	**Signature**	**Date**

APPENDIX 3					
QUESTIONNAIRE TO TRANSPORT OFFICER					
1. Is there a dedicated driver to deliver medication ?				**Yes**	**No**
2. Is there a dedicated vehicle to deliver medication?				**Yes**	**No**
3. What type of vehicle do you use to transport medication?	**Closed Van**	**Open van**	**Car**	**Other- specify.**	
4. Does the order fit into the vehicle at once?	**Always**	**Sometimes**	**Orders have to be split**		
5. If the order is split, do you deliver the balance the same day?	**Sometimes**	**Always**	**Never**		
6. Do you have a schedule which you follow to deliver medicine from district pharmacy to the PHC clinic?				**Yes**	**No**
7. Are you always able to adhere to the delivery schedule ?				**Yes**	**No**
8. Are security personnel always available to count the number of boxes?	**Always**	**Sometimes**	**Never**		
9. Is there a dedicated person to receive the order when it delivered to the clinic?				**Yes**	**No**
10. Who is the person receiving the order at the clinic?	**Store manager**	**Facility Manager**	**Security**	**Other**	
11. Are the number of the boxes checked immediately when the delivery is received at the clinic?	**Sometimes**	**Always**	**Never**		
12. Please explain what happens if the what procedure is followed if the order is not checked immediately.					
13. Is there an accompanying delivery note with each order?				**Yes**	**No**
14. Is the order checked against the delivery note in your presence?				**Yes**	**No**
15. Explain what action is taken if the order does not correspond to the delivery note					
16. Is the delivery note signed by the person receiving the order?				**Yes**	**No**
17. Do you return a copy of the signed delivery note to the pharmacy?				**Yes**	**No**
18. In your experience, have there been discrepancies in terms of delivery of medication?				**Yes**	**No**
19. Is the cold chain maintained when delivering medication?	**Sometimes**	**Always**	**Never**		
20. If the cold chain is not maintained, who do you report this to?	**Do not report**	**PHC clinic**	**District Pharmacy**		

APPENDIX 4: QUESTIONNAIRE TO FACILITY MANAGER AND /OR STORE MANAGER

SECTION A –FACILITY MANAGER

Reference (Unique No.):	**Completion Date:**	**District:**	
1.Name of Facility		**Name of Sub-district:**	
2. Facility Type	**a. Community Health Centre**	**b. Primary Health Clinic**	**e. Other(s) (specify): _____**

HUMAN RESOURCES

3. Is there a specific person responsible for medicine supply management ?	**Yes**	**No**	**Designation**

4. If there is no dedicated person to manage drug supply, please explain how drugs are managed at the facility.

TRAINING DETAILS

Please indicate number of staff who have been trained in dispensing.

5a. PHC nurses	**No. trained:**	**No. in training:**	**No .untrained:**
b. Pharmacist Assistants.	**No. trained:**	**No in training:**	**No. untrained:**

6. No. of people that have received training in DSM in the last twelve months	**No=**

Additional Comments:

SECTION B- FACILITY MANAGER/STORE MANAGER

INFRASTRUCTURE AND SECURITY

7.a Indicate areas where medicine is stored	**Pharmacy**	**Medicine Store**	**Nurses consulting Room**	**Other**

8. Is the storage area large enough to store all the stock for a month's supply?	**Yes**	**No**
9. Are only medicines stored in the areas mentioned above?	**Yes**	**No**
10. Are there any cracks, holes in the wall's in the area's where medication is stored?	**Yes**	**No**
11. Is the ceiling in a good condition in the area where medicine is stored?	**Yes**	**No**
12. Is there a secure delivery area for medication?	**Yes**	**No**

13. Is the medicine store protected from sunlight by means of the following?	**Blinds**	**paint**	**Curtains**	**none**	**Other**

14. Is the medicine room free from any signs of pest infestation (i.e. cockroaches, rats ,	**Yes**	**No**

ants)?					
15. Is the access to the pharmacy by unauthorised persons controlled?				**Yes**	**No**
16. Who has the key for the medicine store/ pharmacy? **(Tick the relevant category/categories of staff)**				**Pharmacist**	**Other nurses**
				Pharmacist assistant	**Cleaner**
				Sister in charge	**Other**
17. Available Security Systems	**a. CCTV**	**b. Alarm**	**c. Guard**	**d. Burglar bars**	**e. Security door**

FACILITY MANAGER/STORE MANAGER SECTION C

STORAGE AND CONTROL PROCESSES

18. Which of the following receiving procedure/s apply at this facility?	**Check number of boxes and sign driver's note**	**Check stock received against invoice**	**Other**	**No procedure**	
19. Who is responsible for receiving drugs in the facility?	**Pharmacist assistant**	**Pharmacist**	**Nurse**	**Store manager**	**Security**	**Other**
20. Within what period of time is stock checked after receipt ?	**Immediately**	**The same day**	**Within 24 hours**	**Later**	

21. Are medicines packed according to the FEFO principle?								**Yes**	**No**
22. Are there any drugs stored in direct contact with the floor?								**Yes**	**No**
23. Which option describes the ventilation process / temperature control of the Pharmacy/Medicine store best?	**Medicine Room (M/R)**	**Pharmacy (P)**	**Consulting room (CR)**	**M/R**	**P**	**C/R**	**M/R**	**P**	**C/R**
	Air Conditioner (functional)			**Fans**			**Air bricks**		
24. Is the room temperature recorded twice daily?				**Yes**			**No**		

Additional comments:

COLD CHAIN MANAGEMENT AND STORAGE.

25a. Is only medicines stored in all the designated medication fridges and refrigerator (no food, no drinks)?	**Yes**	**No**
b. Is there sufficient space in the refrigerator/cold room to store medication and provide adequate flow?	**Yes**	**No**
c. Is there a thermometer in the fridge?	**Yes**	**No**

d. Is the temperature of the refrigerator(s) maintained between 2°C and 8°C?	**Yes**	**No**
e. Is the temperature recorded twice daily?	**Yes**	**No**
f. Are fridges defrosted and cleaned twice a month or when the ice is more than 5mm?	**Yes**	**No**
g. When there is a power failure, is there a backup generator in case of a power failure?	**Yes**	**No**
h. Is the cold chain maintained when receiving stock from the district pharmacy?	**Yes**	**No**
Additional comments:		

SECTION C- FACILITY MANAGER/STORE MANAGER									
Medicine Management and Processes.									
26 Indicate which inventory Management/Stock Control system is used.	**Manual/Paper Based**		**Computerised**		**None**				
27. Are bin /stocks available in the facility for tracer items?	**Consulting room**		**Updated**		**Medicine room**		**Updated**		
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	
28. Which of the following is reflected on the stock card/computer?	**Max stock level**		**Average Monthly Consumption**				**Reorder level/factor**		
29. Has the ROL been calculated for all tracer items in the store?	**Yes**		**No**						
30. Are the re-order levels of tracer items reviewed?	**Yes**		**No**		**If yes how often**				
31. What was the average stock out period of tracer items?	**1-3 days**		**4-7 days**		**8 days or more**				
32. Are there any items out of stock currently according to the tracer list tracer list?	**Yes**		**No**		**No of items=**				
33. Who is responsible for ordering of medication in the facility?	**Pharmacist**	**Pharmacist Assistant**	**Nurse**	**Store manager**	**Other**				
34. Did any drugs expire over the last 12 months?	**Yes**		**No**						
35. If yes what was the estimated monetary value of the items expired?	**R**		**Don't Know**						
36. How does the supply system track expiry date? Please explain									
37. When was the last stock take conducted?	**Date:**								
38. What is your lead time between request and receipt of drugs?	**No of day's:**		**Don't Know**						
39. Do you receive your order on time from the district pharmacy?	**Yes**	**No**	**Sometimes**	**Most of the time**					
40. What action is taken if orders are not received on time?	**Contact pharmacy**	**Contact Transport**	**Other**						
41. Do you report on stock out situation?	**Yes**	**No**	**For All Medicines**	**For Tracer Medicines**	**To Whom-**				
42. If the facility is out of stock of medication, what do you do? Please choose the most appropriate answer/s below									
a. Do you send patients to other clinics?	**Yes**	**No**							
b. Do you borrow from other clinics?	**Yes**	**No**							
c. Do you substitute medication if possible?	**Yes**	**No**							
d. Do you send the patient without medication and ask them to come back?	**Yes**	**No**							

e. Do you give patient a small supply and ask them to come back?	**Yes**	**No**
f. Do you tell the patient that there is no medication at clinics and you are not sure when you will receive medication?	**Yes**	**No**

43. Do you receive feedback regarding the status of your orders?	**Expected delivery**		**Out of stock in pharmacy**		**Status of to follow orders**	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**

44. Are all procurement and receipt documents filed?	**Yes**	**No**
45. List three main reasons why you experience stock out?		
a.		
b.		
c.		
46. Is medication stock out addressed within 48 hours?	**Yes**	**No**
If not –please explain why?		
47. Has the facility been visited by the district pharmacist in the last month?	**Yes**	**No**

APPENDIX 5 : RESEARCHER CHECK LIST																	
Reference (Unique No.):	1.Completion Date:				Name of facility												
2. Check area's where medicines are stored	a. Pharmacy		b. Dispensary		c. Bulk Store		d. Nurse Consulting room										
3. Is only medicine stored in areas identified in Question 2.							Yes		No								
4. If the answer to Q3 is no –please identify what else is stored in the medicine store medicine store	Other items-																
5.Check for availability of dispensing licence/ SECTION 56A certificate	NA		Dispensing licecence				Section 56A Certificate										
			Yes		No		Yes		No								
6. Check for availability of section 38a or a section 56a permit to dispense medicines			NA		Yes		No										
STORAGE OF MEDICATION:	Chart available						Chart updated										
7. Check availability of the temperature chart in Medicine room / consulting room	Medicine Store			Consulting room			Medicine Store			Consulting Room							
	Yes		No	Yes		No	Yes		No	Yes		No					
8. Check if there are expired items in the facility	Medicine store			Pharmacy			Consulting rooms										
9. Check if medicines are packed according to FEFO principle	Medicine Store						Consulting Room										
	Yes		No				Yes		No								
10. Check if there are no damaged containers or packages on the shelves?	Medicine Store						Consulting room										
	Yes		No				Yes		No								
11. Check the number of items out of stock	Tracer items						Non tracer Items										
	No=						No=										
12. Check the value of expired stock for the last three months	Value																
	Yes		No				Yes		No								
13. Check that there are no supplies stored in direct contact with the floor	Medicine store						Consulting room										
	Yes		No				Yes		No								
14. Check for evidence of stock take in facility	Medicine room			Consulting room			Frequency=										
	Yes		No	Yes		No											
15. Check if bin cards for tracer items are available and updated	Medicine Room			Consulting room			Updated regularly										
	Yes		No	Yes		No	Yes		No								
16. Check if each tracer item has a re-order level	Medicine Room			Consulting room			Reviewed three monthly										
	Yes		No	Yes		No	Yes		No								
17. Check if only medicines are stored in the refrigerator (No food, no drinks)							Yes		No								
a. Check if the temperature of the refrigerator(s) is between 2°C and 8°							Yes		No								
b. Check if fridges are clean and ice is less than 5mm thick							Yes		No								
c. Check if a temperature chart is available and up to date	Chart available						Chart updated twice daily										
	Yes		No				Yes		No								
d. Check if cleaning records are available	Record available						Ice less than 5mm thick										
	Yes		No				Yes		No								
18. Check documents for procurement and receipt of medication	Available			Not available			Filed										
							Yes		No								
19. Check order files to determine if stock is counted prior to ordering and re-order levels indicated of each item on order file	Stock counted for all items						Re-order level recorded for each item										
	Yes			No			Yes			No							

STANDARD OPPERATING PROCEDURES AND REFERENCE MATERIAL			
20. Check if the following SOP's are available in the facility (Addendum 1 of Circular 4 of 2007)			
a. Control of access to dispensary or medicine room		**Yes**	**No**
b. Designation of the medicine room		**Yes**	**No**
c. Issues to the district from the regional pharmacy		**Yes**	**No**
d. Organisation of medicine room		**Yes**	**No**
e. Security in medicine room		**Yes**	**No**
f. Receipt and storage of medicine		**Yes**	**No**
g. Issues from medicine room to consulting rooms		**Yes**	**No**
h. Borrowing of medicine between institutions		**Yes**	**No**
i. The use of stock cards (VA 11)		**Yes**	**No**
j. Stock taking in medicine and consulting rooms		**Yes**	**No**
k. Product types requiring special handling and storage		**Yes**	**No**
l. Cold chain management		**Yes**	**No**
m. Checking and return of expired/obsolete/unusable and patient return stock to the district pharmacy		**Yes**	**No**
n. Complaints of product quality and adverse drug reactions		**Yes**	**No**
21. Check if the pharmacy/facility has copies of, or electronic access to:		**Yes**	**No**
a. EDL/STG - Adult Standard Treatment Guidelines for Hospital			**Edition/ date**
b. EDL/STG - Paediatric Standard Treatment Guidelines for	**Yes**	**No**	
c .EDL/STG - Primary Health Care Standard Treatment Guidelines	**Yes**	**No**	
d. A Provincial Formulary/Code List	**Yes**	**No**	

APPENDIX 6: TRACER MEDICINES MONITORING – Primary Health Care

Reference (Unique No.):	Date:	District
2. Name of Facility:	**3.** Sub District:	

No.	Generic Name	Route	Form	Recorded Stock	Physical Stock	Qty Expired
1	Adrenalin 1mg/ml	IM	Amp			
2	ARVs (all)	Oral	Tab or Susp			
3	Cefixime 400mg	Oral	Caps			
4	Ceftriaxone 250mg or 1g	IV	Vial			
5	Diazepam 5mg/ml	IV/IM	Vial			
6	EPI Vaccines (all)	IM	Vial			
7	Insulin Soluble 100IU/ml all	IM	Vial			
8	Norethisterone 200mg/ml or Medroxyprogesterone 150mg/ml	IM	Vial			
9	Salbutamol Inhaler 200 doses	INH	Spray			
10	Sodium Chloride 0.9%	IV	Vial			
11	TB Medicines (all)	Oral	Tab			
12	Amoxicillin 125mg/ml	Oral	Susp			
13	Amoxicillin 250mg or 500mg	Oral	Caps			
14	Co-trimoxazole 25mg/ml	Oral	Susp			
15	Co-trimoxazole 480mg or 960mg	Oral	Tab			
16	Hydrochlorothiazide 12.5mg or 25mg	Oral	Tab			
17	Ibuprofen 200mg	Oral	Tab			
18	Metformin 500mg or 850mg	Oral	Tab			
19	Oral Rehydration Salt (ORS)	Oral	Sachet			
20	Paracetamol 24mg/ml	Oral	Susp			
21	Paracetamol 500mg	Oral	Tab			

APPENDIX 7:

GLOSSARY

Auxiliary Worker Pharmacy - Refers to workers who are at different phases of training as pharmacist assistants and can practice according to guidelines set about by the SAPC depending on the stage of training.

Community service pharmacist - is a qualified pharmacist but is obliged to practice for a period of a year in the public sector as prescribed by the SAPC.

Consumption based estimates - Prediction of future drug requirements on the basis of historic information on drug consumption.

Cross-sectional studies- involve data collected at a defined time. Cross-sectional studies may involve special data collection, including questions about the past, but they often rely on data originally collected for other purposes.

Descriptive research- involves gathering data that describe events and then organizes, tabulates, depicts, and describes

the data collection. It often uses visual aids such as graphs and charts to aid the reader in understanding the data distribution.

District Health - A district health system is the vehicle for providing quality primary health care to everyone in a defined geographical area. It is a system of health care in which individuals, communities and all the health care providers of the area participate together in improving their own health.

Drugs/Medicines/Medication - a drug taken to cure and/or ameliorate any symptoms of an illness and the words.

Drugs/Medicines/Medication will be used **interchangeably** for the purposes of this study.

Drug supply management at PHC - Means the procurement, appropriate storage, in a specific order separating different dosage forms, monitoring expiry dates, maintaining cold chain if applicable, having bin cards with each item having the name, reorder level, code number, date received and issues always recorded, stored off the floor in a lockable store room where the temperature is controlled, monitored and recorded twice daily.

General assistant - is one who works in the pharmacy but has no formal training with regards to pharmacy and is not allowed to be in direct contact with medication. General assistants assist with cleaning and other non pharmaceutical duties.

Generic - Is the official medical name for the active ingredient of the medicine.

Facility - Overall PHC activities and personnel in one local PHC.

Facility manager - A personnel appointed, delegated or assigned to manage.

Maximum stock level - this level is the target level which is the stock needed to satisfy demand until the next order after this one is received.

Medicine room - Is a secure, organized, temperature controlled room within a primary health care clinic, designated for use of the storage of bulk stocks of medicines, which must comply with the minimum standard supply of medicines in a primary health care clinic (refer rules1.6.2-1.6.7 of the Good pharmacy

practice rules published in terms of Section 35A of the pharmacy act of 1974). No dispensing of medicines for patients may be done in a medicine room.

Nursing Act No 33 of 2005 - The prescribing and dispensing practices of registered nurses in accordance with the provisions of the Medicines and Related Substances Act No. 101 of 1965, as amended ("the Medicines Act") and the Nursing Act No. 33 of 2005 ("the Nursing Act"). A registered nurse must, obtain prior authorisation from the South African Nursing Council ("the Nursing Council") in order to be able to prescribe Scheduled substances.

This authorisation is obtained from the Nursing Council in accordance with the provisions of section 56(1) of the Nursing Act, which is dealt with in detail below; to compound and dispense the Scheduled substances only if he or she has the requisite dispensing licence to do so.

A registered nurse must apply to the Director-General of the Department of Health ("the Director-General") in terms of section 22C of the Medicines Act in order to acquire a

dispensing licence. The Director-General will only issue a dispensing licence to the registered nurse once the nurse has -

- Made payment of the prescribed fee for this license; and
- Successfully completed a supplementary course determined by the South African Pharmacy Council ("the Pharmacy Council") after consultation with the Health Professions Council of South Africa, the Allied Health Professions Council of South Africa and the Nursing Council.

In terms of section 56(6) of the Nursing Act, a registered nursing practitioner is only permitted to prescribe medicines and Scheduled substances to patients in on-site clinics if -

- he or she has been authorised to do so by the medical practitioner who is in charge of the specific on-site clinic. The medical practitioner is required to have consulted with the Nursing Council prior to the issue of such an authorisation to the registered nurse. The medical practitioner is required to complete an authorisation form which permits the specific nurse to diagnose and prescribe medicines for the specific treatment protocols that have been indicated by the medical practitioner on the form; and

- only if the medical practitioner is not personally available at the on-site clinic in order to diagnose the patient and prescribe and dispense the requisite medicines (provided the medical practitioner is in possession of a dispensing license).

Nursing Act No. 50 of 1978, Section 38A - Special provisions relating to certain nurses. Notwithstanding the other pro-visions of this Act and the provisions of the Medicines and Related Substances Control Act, 1965 (Act No. 101 of 1965), of the Pharmacy Act, 1974 (Act No. 53 of 1974), and of the Medical, Dental and Supplementary Health Service Professions Act, 1974 (Act No. 56 of 1974), any registered nurse who is in the service of the Department of Health, Welfare and Pensions, a provincial administration, a local authority or an organization performing any health service and designated by the Director-General: Health, Welfare and Pensions after consultation with the South African Pharmacy Board referred to in section 2 of the Pharmacy Act, 1974, and who has been authorized thereto by the said Director-General, the Director of Hospital Services of such provincial administration, the medical officer of health of such local authority or the medical practitioner in charge of

such organization, as the case may be, may in the course of such service perform with reference to:

(a) The physical examination of any person;

(b) The diagnosing of any physical defect, illness or deficiency in any person;

(c) The keeping of prescribed medicines and the supply, administering or pre-scribing thereof on the prescribed conditions; or

(d) The promotion of family planning, any act which said Director-General, Director of Hospital Services, medical officer of health or medical practitioner, as case may be after consultation with the council determine in general or in a particular case or in cases of a particular nature: Provided that such nurse may perform such act only whenever the services of a medical practitioner or pharmacist, as the circumstances may require, are not available.[S. 38A inserted by s. 2 of Act No. 71 of 1981.]

Out of stock - According to circular 39 of 2005 an out of stock item maybe defined as the complete absence of an item that needs to be available. Thus all pack sizes of the item (pre-packs and bulk) is unavailable.

Primary Health Care - A set of prescribed services, generally falling within the skill base of professional nurse, technician, mid level worker, counsellor, community health worker, midwife and emergency medical practitioner. These services may be first point of contact or follow up.

Pharmacist - Provides pharmaceutical care by taking responsibility for the patient's medicine related needs and being accountable for meting these needs.

Pharmacist assistant - Is one who has undergone two years of in service training and is allowed to dispense from schedule 1 to 6 under the direct supervision of a pharmacist. In the public sector, a pharmacist assistant is allowed to dispense under indirect supervision at PHC clinics under specific pre-conditions. The PA is then supervised from a distance by the pharmacist.

Pharmacist intern - A pharmacist intern is one who has completed four years of theoretical study and will apply this theoretical knowledge in order to gain practical experience which extends over a period of twelve months. This is a

structured practical training programme provided by the SAPC under the direct supervision of a pharmacist.

Quantitative Research - Research which examines phenomena through numerical representation of observations and statistical analysis. Research is quantitative when it measures, compares and generalizes its findings.

Re-order level - The reorder level is the quantity of remaining stock that should trigger a reorder of the item. In the minimum and maximum stock ordering system, this is called the *minimum stock level.*

Retrospective data - In the case of a retrospective study, the investigator collects data from past records and does not follow future records or patients up as is the case with a prospective study.

Standard operating procedure - Is a written authorized procedure which gives instruction steps for performing operations which must be followed in order to complete a specific job task safely, with no adverse impact on the

environment, and in a way that maximises operation and production requirement.

Store Manager - A store manager refers to a person who is responsible for the medicine store in the facility. This could be a pharmacist assistant or a staff member appointed by the facility manager to manage the drug supply for the facility. The duties of this person will include but not be limited to ordering of medication for the facility, filling in of bin cards, monitoring drug usage, ensuring maintenance of cold chain, maintenance of the medicine store and issuing of medication to consulting rooms.

Tracer drugs - Consists of approximately 20 pharmaceuticals that are selected to evaluate availability of essential products. The items to be selected for a tracer list should be relevant for public health priorities and should be expected to be available able at all times in the level of facilities of interest (e.g. clinics or hospitals).

Transport officer - is one who is employed by the Department of Health, who is in possession of a valid driver's licence and

who is authorised to transport medication to designated facilities.

APPENDIX 8:

MEDICINE SUPPLY MANAGEMENT CHECKLIST

Facility Manager: _____

Name of Pharmacist:_____

PHC FACILITY		**DATE**	

[✓] Tick appropriate box

A. Infrastructure	Y	N
Are medicines kept in the storeroom, consulting room or both? Specify:	Y	N
Is the temperature in the storeroom kept below 25°C?	Y	N
Are working surfaces and shelves where medicines are kept finished with a smooth impermeable material? :	Y	N
Are there separate facilities for washing hands and cleaning equipment?	Y	N
Are there tablet counting trays?	Y	N
Are they cleaned after every use?	Y	N
Is the access to the medicine storeroom controlled for unauthorized persons? :	Y	N
Are waste containers available (in line with the IPC policy)?	Y	N
The medicine store is large enough to keep all supplies? :	Y	N
The medicine store is kept locked at all times when not in use	Y	N
There are no cracks, holes or sign of water damage in the medicine store :	Y	N
There is a ceiling in the medicine store which is in good condition	Y	N
The medicine store is appropriately air conditioned	Y	N
The windows are painted in white (or have curtains) and are secured with grills		

	Y	N
There are no signs of pest infestations in the medicine store (i.e. cockroaches, rats)	Y	N
The medicine store is tidy; shelves are dusted, the floor is swept, and walls are clean	Y	N
Supplies are stored neatly on shelves or in boxes	Y	N
There are no supplies in direct contact with the floor (boxes are kept in pallets)	Y	N

B. Selection

Are medicines prescribed by generic name?	Y	N
Are medicines adequately labelled?	Y	N
Are medicines prescribed from essential medicines list?	Y	N
Is the essential drug list/formulary available to practitioners?	Y	N

C. Procurement - Stock cards/ Ordering Supplies		
Do you have an SOP for procurement of medicine stock?	Y	N
Is it signed and dated?	Y	N
Do you know how to calculate the Average Monthly Consumption (AMC) – ask one to calculate it then Check Formula	Y	N
Do you take into consideration stock out period when calculating the AMC	Y	N
Do you calculate the Maximum Stock by multiplying the AMC by the Maximum Stock Factor	Y	N
Has the Maximum Stock been calculated for each item in the store	Y	N
Is the Maximum Stock recorded on each item's stock card (in pencil)	Y	N

When was the last time that the Maximum Stock was reviewed? Indicate:		
Is a standard requisition form used?	Y	N
Are all orders placed in writing using the prescribed forms?	Y	N
Is the requisition book kept at the facility?	Y	N
Is all information on the requisition form accurate and clearly written?	Y	N
How often do you place an order? Explain:		
What is your average lead-time?		
What is your facility's reorder factor? Explain:		
D. Distribution		
How are stock outs addressed when they occur? Explain		
What is the average length of time of stock out for critical items (tracer medicines)? Indicate:		
How are stock oversupplies handled when they occur? Explain:		
Are quantities received checked against quantities ordered?	Y	N
Are safety stock levels determined and adjusted accordingly?	Y	N
Do you receive feedback regarding the status of your orders (expected delivery dates for orders placed, dues out from depot, expected delivery dates for dues out items, etc.)?	Y	N
Do you know whom to contact in patients of emergencies (stock out)?	Y	N
E. Storage		
Supplies are systematically classified on the shelves (i.e. by dosage forms or therapeutic class)	Y	N
Are generic names used with every medicine?	Y	N
Tablets and other dry medicines (e.g. ORS) are stored in airtight containers	Y	N
Liquids, ointments and injectables are stored on the middle shelves	Y	N
Supplies such as surgical items, condoms and bandages are stored in the bottom shelves	Y	N

Items are grouped in amounts that are easy to count	Y	N
There are no expired medicines in the store	Y	N
Medicines are utilised in terms of first expiry first out principle (FEFO)	Y	N
Supplies with no expiry or manufacture date are stored in the order received (FIFO)	Y	N
Supplies with a manufacture date only are stored in chronological order	Y	N
There are no damaged containers or packages on the shelves	Y	N
There are no overstocked, or obsolete items on the shelves	Y	N
The disposal of medicines is recorded in a separate register and includes the date, time, witness, value, quantities and reason(s)	Y	N
NarcotiPrimary health care facility supervisor and psychotropic medicines are in a separate double-locked storage space	Y	N
Are items checked regularly for potential deterioration (i.e. bad odour or discoloured tablets)	Y	N
Temperature sensitive items are stored in a refrigerator	Y	N
The refrigerator is in working condition	Y	N
There is no health care personnel food in the refrigerator	Y	N
A temperature record is available and up-to-date	Y	N
F. Use	Y	N
Does the labelling of medicines meet the legal requirements? (Supervisor to take 3 random samples of prescriptions issued to 3 – 5 patients. Tick from the list: Name of patient, name of medicine, strength and quantity, instructions on how to take the medicine, name of facility, exp date and batch number)	Y	N
Is the person dispensing the medicines licensed or registered?	Y	N

Quality Control/ Patient Care		
The health care worker checks for poor quality items, such as: -		
o Discolouration of medicines,	Y	N
o Sediments in medicines	Y	N
o Broken and or leaking containers	Y	N
o Spoiled labels on medicine containers		
o Unsealed and unlabelled medicine containers	Y	N
o Expired medicines on shelves	Y	N

Excess medicine in facility	Intervention
Short dated stock in facility	

Out of stock medication

out of stock	reasons	intervention

APPENDIX 9:

UNIVERSITY OF LIMPOPO
Medunsa Campus

MEDUNSA RESEARCH & ETHICS COMMITTEE

CLEARANCE CERTIFICATE

P O Medunsa
Medunsa
0204
SOUTH AFRICA

Tel: 012 - 521 4000
Fax: 012 - 560 0086

MEETING: 05/2011

PROJECT NUMBER: MREC/H/69/2011: PG

PROJECT :

Title:	Challenges in the management of drug supply in Public Health Care Centres in the Sedibeng District, Gauteng Province.
Researcher:	Mrs S Tayob
Supervisor:	Helberg EA
Co-supervisor:	Bezuidenhout S
Hospital Superintendent:	Omole OB
Department:	Pharmacy
School:	Health Care Sciences
Degree:	MSc (Med) in Pharmacy

DECISION OF THE COMMITTEE:

MREC approved the project.

DATE: 08 June 2011

PROF GA OGUNBANJO
CHAIRPERSON MREC

RESEARCH & PARTNERSHIP
2011 -06- 09
MEDUNSA CAMPUS

Note:
i) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.
ii) The budget for the research will be considered separately from the protocol.
PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

African Excellence - Global Leadership

APPENDIX 10:

SEDIBENG DISTRICT HEALTH

STOCK CONTROL CARD

Note : For every discrepancy on running balance a reason must be supplied with PHARMACIST signature !

V A 1 1

FACILITY:..... Page no.

ITEM:……....

STRENGTH :…… PACK SIZE:…….

CODE NO :……..…….. UNIT OF ISSUE:…….

RE-ORDER LEVEL:

DATE	ISSUING STOCK			STOCK RECEIVED (Red pen!)					RUNNING	SIGN
	ORDER NO	ISSUED TO	QTY	INVOICE NO	FROM	QTY	BATCH	EXP	BALANCE	

APPENDIX 11:

SHAMIMA TAYOB: 2011 10:45 Wednesday, October 5, 2011 19
PROGRAM FILE SHAMIMA.sas *** DATA FILE DATA Shamima data.xlsx
SECTION A: FACILITY MANAGER
PRINTOUT NUMBER 1

The FREQ Procedure

facility

facility	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Beverly Hills	1	4.00	1	4.00
Boipatong	1	4.00	2	8.00
Boitumelo	1	4.00	3	12.00
Bophelong	1	4.00	4	16.00
Driehoek	1	4.00	5	20.00
EMPILISWENI	1	4.00	6	24.00
Evaton Main	1	4.00	7	28.00
Helga Kuhn	1	4.00	8	32.00
Johan Deo	1	4.00	9	36.00
Johan Heyns	1	4.00	10	40.00
Le Vai Mbatha	1	4.00	11	44.00
Market Ave	1	4.00	12	48.00
Meyerton	1	4.00	13	52.00
Mpumelelo	1	4.00	14	56.00
Osisweni	1	4.00	15	60.00
Pontshong	1	4.00	16	64.00
Retswelapele	1	4.00	17	68.00
Rustervaal	1	4.00	18	72.00
Sharpville	1	4.00	19	76.00
Thlokomelong	1	4.00	20	80.00
Tshepiso	1	4.00	21	84.00
Zone 11	1	4.00	22	88.00
Zone 12	1	4.00	23	92.00
Zone 17	1	4.00	24	96.00
Zone 3	1	4.00	25	100.00

District

District	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Sedibeng	25	100.00	25	100.00

Sub_district

Sub_district	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Emfuleni	25	100.00	25	100.00

****

Facility_type

Facility_type	Frequency	Percent	Cumulative Frequency	Cumulative Percent
community HC	4	16.00	4	16.00
primary HC	21	84.00	25	100.00

****

SECTION A: HUMAN RESOURCES

The FREQ Procedure

q3

q3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
yes	25	100.00	25	100.00

Designations

Designations	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Facility manager	1	4.17	1	4.17
assistant	9	37.50	10	41.67
nurse	1	4.17	11	45.83
pharmacist assistant	11	45.83	22	91.67
sister in charge	2	8.33	24	100.00

Frequency Missing = 1

q4

q4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Part time pharmacist assistant	1	5.26	1	5.26
assistant once a week	6	31.58	7	36.84
assistant twice a week	3	15.79	10	52.63
assistant twice a week or facility manager	1	5.26	11	57.89
full time assistant	4	21.05	15	78.95
pharmacist assistant available on weekly basis	1	5.26	16	84.21
pharmacist assistant twice a week	2	10.53	18	94.74
proffessional nurse	1	5.26	19	100.00

Frequency Missing = 6

****

SECTION A: TRAINING DETAILS
PRINTOUT NUMBER 3.1

The FREQ Procedure

nurses_trained

nurses_trained	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	4.00	1	4.00
1	2	8.00	3	12.00
2	9	36.00	12	48.00
3	2	8.00	14	56.00
4	6	24.00	20	80.00
6	1	4.00	21	84.00
7	1	4.00	22	88.00
9	1	4.00	23	92.00
10	1	4.00	24	96.00
12	1	4.00	25	100.00

nurses_in_training

nurses_in_training	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	16	64.00	16	64.00
1	6	24.00	22	88.00
2	2	8.00	24	96.00
3	1	4.00	25	100.00

nurses_untrained

nurses_untrained	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	4.00	1	4.00
1	7	28.00	8	32.00
2	7	28.00	15	60.00
3	5	20.00	20	80.00
5	1	4.00	21	84.00
8	1	4.00	22	88.00
9	1	4.00	23	92.00
12	1	4.00	24	96.00
23	1	4.00	25	100.00

****
****

pa_trained

pa_trained	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	13	52.00	13	52.00
1	12	48.00	25	100.00

pa_in_training

pa_in_training	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	16	64.00	16	64.00
1	9	36.00	25	100.00

pa_untrained

pa_untrained	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	25	100.00	25	100.00

q6

q6	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	22	88.00	22	88.00
1	2	8.00	24	96.00
2	1	4.00	25	100.00

q6_specify

q6_specify	Frequency	Percent	Cumulative Frequency	Cumulative Percent
pharmasist assistant	1	100.00	1	100.00

Frequency Missing = 24

APPENDIX 12:

SHAMIMA TAYOB: 2011 10:45 Wednesday, October 5, 2011 24
PROGRAM FILE SHAMIMA.sas *** DATA FILE DATA Shamima data.xlsx
SECTION B: INFRASTRUCTURE AND SECURITY
PRINTOUT NUMBER 4

The FREQ Procedure

q7_1

q7_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
medicine store	21	100.00	21	100.00

Frequency Missing = 4

q7_2

q7_2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
nurses consulting room	25	100.00	25	100.00

q8

q8	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	19	76.00	19	76.00
yes	6	24.00	25	100.00

q9

q9	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	8	33.33	8	33.33
yes	16	66.67	24	100.00

Frequency Missing = 1

q10

q10	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	23	92.00	23	92.00
yes	2	8.00	25	100.00

****

q11

q11	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	1	4.00	1	4.00
yes	24	96.00	25	100.00

q12

q12	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	24	96.00	24	96.00
yes	1	4.00	25	100.00

q13

q13	Frequency	Percent	Cumulative Frequency	Cumulative Percent
blinds	8	57.14	8	57.14
none	5	35.71	13	92.86
paint	1	7.14	14	100.00

Frequency Missing = 11

q13_other

q13_other	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no store room	1	9.09	1	9.09
no sun inside room	1	9.09	2	18.18
no windows	9	81.82	11	100.00

Frequency Missing = 14

****

q14

q14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	2	8.33	2	8.33
yes	22	91.67	24	100.00

Frequency Missing = 1

q15

q15	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	2	9.09	2	9.09
yes	20	90.91	22	100.00

Frequency Missing = 3

********** **********

SECTION B: INFRASTRUCTURE AND SECURITY
PRINTOUT NUMBER 4.1

The FREQ Procedure

q16	Cumulative Frequency	Cumulative Percent	Frequency	Percent
No store room	1	2.38	1	2.38
nurse	1	2.38	2	4.76
other nurses	3	7.14	5	11.90
pharmasist assistant	16	38.10	21	50.00
sister in charge	21	50.00	42	100.00

Frequency Missing = 33

q17	Cumulative Frequency	Cumulative Percent	Frequency	Percent
alarm	2	5.71	2	5.71
burglar bars	11	31.43	13	37.14
guard	6	17.14	19	54.29
locks on cupboards	2	5.71	21	60.00
normal door	2	5.71	23	65.71
security door	12	34.29	35	100.00

Frequency Missing = 40

APPENDIX 13:

SHAMIMA TAYOB: 2011 10:45 Wednesday, October 5, 2011 71
PROGRAM FILE SHAMIMA.sas *** DATA FILE DATA Shamima data.xlsx
SECTION C: STORAGE AND CONTROL PROCESSES
PRINTOUT NUMBER 5

The FREQ Procedure

q18_1

q18_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
x	24	100.00	24	100.00

Frequency Missing = 1

q18_2

q18_2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
x	24	100.00	24	100.00

Frequency Missing = 1

q19_1

q19_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
pharmasist assistant	21	100.00	21	100.00

Frequency Missing = 4

q19_2

q19_2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
nurse	8	100.00	8	100.00

Frequency Missing = 17

q19_other

q19_other	Frequency	Percent	Cumulative Frequency	Cumulative Percent
sister in charge	10	100.00	10	100.00

Frequency Missing = 15

q20

q20	Frequency	Percent	Cumulative Frequency	Cumulative Percent
once a week	1	4.00	1	4.00
the same day	14	56.00	15	60.00
within 24 hrs	10	40.00	25	100.00

q21

q21	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	2	8.33	2	8.33
yes	22	91.67	24	100.00

Frequency Missing = 1

q22

q22	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	12	48.00	12	48.00
yes	13	52.00	25	100.00

q23_1

q23_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
C/R FAN & WINDOWS	1	4.35	1	4.35
C/R airbricks	1	4.35	2	8.70
M/R aircon	10	43.48	12	52.17
M/R aircon/not working	6	26.09	18	78.26
NONE	4	17.39	22	95.65
aircon	1	4.35	23	100.00

Frequency Missing = 2

q23_2

q23_2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
fans	2	66.67	2	66.67
pharmacy AIRCON	1	33.33	3	100.00

Frequency Missing = 22

q23_3

q23_3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
air brick	2	100.00	2	100.00

Frequency Missing = 23

q24

q24	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	15	60.00	15	60.00
yes	10	40.00	25	100.00

****

q24_comments

q24_comments	Frequency	Percent
NOT SURE IF AIRCON IS WORKING	1	9.09
a/c remote no batteries	1	9.09
aircon/not working	3	27.27
insufficient shelving, no one to check temperatures if no pharmacist assistant	1	9.09
no aircon	2	18.18
no shelves	1	9.09
no working thermometer	2	18.18

Frequency Missing = 14

SECTION C: COLD CHAIN MANAGEMENT AND STORAGE
PRINTOUT NUMBER 6

The FREQ Procedure

q25_1

q25_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	1	4.00	1	4.00
yes	24	96.00	25	100.00

q25_2

q25_2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	8	32.00	8	32.00
yes	17	68.00	25	100.00

q25_3

q25_3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	1	4.00	1	4.00
yes	24	96.00	25	100.00

q25_4

q25_4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	1	4.17	1	4.17
yes	23	95.83	24	100.00

Frequency Missing = 1

q25_5

q25_5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	1	4.17	1	4.17
yes	23	95.83	24	100.00

Frequency Missing = 1

****

q25_6

q25_6	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	12	48.00	12	48.00
yes	13	52.00	25	100.00

q25_7

q25_7	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	19	79.17	19	79.17
yes	5	20.83	24	100.00

Frequency Missing = 1

q25_8

q25_8	Frequency	Percent	Cumulative Frequency	Cumulative Percent
yes	24	100.00	24	100.00

Frequency Missing = 1

q25_comments

q25_comments	Frequency	Percent
cold chain is ordered twice a week due to power failure and lack of space	1	33.33
fridge not working for past 3 weeks, use cooler box	1	33.33
no thermometer in fridge	1	33.33

Frequency Missing = 22

****

SECTION C: MEDICINE MANAGEMENT AND PROCESSES
PRINTOUT NUMBER 7

The FREQ Procedure

q26

q26	Frequency	Percent	Cumulative Frequency	Cumulative Percent
manual/paper base	25	100.00	25	100.00

q27_1

q27_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
reorder level/factor	21	100.00	21	100.00

Frequency Missing = 4

q27_2

q27_2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
max stock level	2	100.00	2	100.00

Frequency Missing = 23

q27_3

q27_3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
average monthly consumption	1	100.00	1	100.00

Frequency Missing = 24

q28_1

q28_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
phamasist assistant	20	100.00	20	100.00

Frequency Missing = 5

****

q28_2

q28_2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
nurse	4	100.00	4	100.00

Frequency Missing = 21

q28_other

q28_other	Frequency	Percent	Cumulative Frequency	Cumulative Percent
facility manager	1	12.50	1	12.50
sister in charge	7	87.50	8	100.00

Frequency Missing = 17

q29

q29	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	4	17.39	4	17.39
2	2	8.70	6	26.09
3	1	4.35	7	30.43
4	2	8.70	9	39.13
6	4	17.39	13	56.52
7	1	4.35	14	60.87
8	2	8.70	16	69.57
10	1	4.35	17	73.91
11	1	4.35	18	78.26
12	3	13.04	21	91.30
14	1	4.35	22	95.65
16	1	4.35	23	100.00

Frequency Missing = 2

****

q30

q30	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1 - 3 days	2	8.70	2	8.70
4 - 7 days	11	47.83	13	56.52
8 days or more	10	43.48	23	100.00

Frequency Missing = 2

q31

q31	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	5	20.00	5	20.00
yes	20	80.00	25	100.00

q32

q32	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	15	65.22	15	65.22
yes	8	34.78	23	100.00

Frequency Missing = 2

q32_often

q32_often	Frequency	Percent	Cumulative Frequency	Cumulative Percent
3 monthly	6	85.71	6	85.71
monthly	1	14.29	7	100.00

Frequency Missing = 18

****

q33

q33	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	1	4.00	1	4.00
yes	24	96.00	25	100.00

q34

q34	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	9	36.00	9	36.00
yes	16	64.00	25	100.00

q35_1

q35_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
R1202.27	1	7.14	1	7.14
R126203.00	1	7.14	2	14.29
R16846.63	1	7.14	3	21.43
R2020.92	1	7.14	4	28.57
R21242.45	1	7.14	5	35.71
R23818.41	1	7.14	6	42.86
R26150.97	1	7.14	7	50.00
R30.87	1	7.14	8	57.14
R3218.84	1	7.14	9	64.29
R3922.58	1	7.14	10	71.43
R648.58	1	7.14	11	78.57
R7212.70	1	7.14	12	85.71
R98.04	1	7.14	13	92.86
don't know	1	7.14	14	100.00

Frequency Missing = 11

****

q35_2

q35_2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
R220.08	1	33.33	1	33.33
R2843.79	1	33.33	2	66.67
R99.60	1	33.33	3	100.00

Frequency Missing = 22

q36

q36	Frequency	Percent
NO SPECIFC PLAN	1	9.09
fridge failure	3	27.27
mark short dated stock with a red sticker	1	9.09
monitored by pharmacist assistant	1	9.09
no specific method	1	9.09
no system	1	9.09
not monitored regularly	1	9.09
red sticker on brazier bins indicating the short expiring date	1	9.09
short dated stock listed and send to other clinics	1	9.09

Frequency Missing = 14

****

q37

q37	Frequency	Percent	Cumulative Frequency	Cumulative Percent
001010	1	5.88	1	5.88
040711	1	5.88	2	11.76
080511	1	5.88	3	17.65
130611	1	5.88	4	23.53
210711	1	5.88	5	29.41
220711	1	5.88	6	35.29
270511	1	5.88	7	41.18
270711	1	5.88	8	47.06
280311	2	11.76	10	58.82
300511	1	5.88	11	64.71
300611	1	5.88	12	70.59
no stock take	3	17.65	15	88.24
none	1	5.88	16	94.12
not conducted	1	5.88	17	100.00

Frequency Missing = 8

q38

q38	Frequency	Percent	Cumulative Frequency	Cumulative Percent
14 days	22	88.00	22	88.00
2 - 3 weeks	1	4.00	23	92.00
7 - 14 days	1	4.00	24	96.00
7 days	1	4.00	25	100.00

q39

q39	Frequency	Percent	Cumulative Frequency	Cumulative Percent
most of the time	5	20.00	5	20.00
sometimes	19	76.00	24	96.00
yes	1	4.00	25	100.00

****

q40

q40	Frequency	Percent	Cumulative Frequency	Cumulative Percent
contact pharmacy	25	100.00	25	100.00

q41

q41	Frequency	Percent	Cumulative Frequency	Cumulative Percent
yes	25	100.00	25	100.00

q41_specify1

q41_specify1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
for all meds	20	100.00	20	100.00

Frequency Missing = 5

q41_specify2

q41_specify2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
for tracer medicines	12	100.00	12	100.00

Frequency Missing = 13

q41_to_whom

q41_to_whom	Frequency	Percent	Cumulative Frequency	Cumulative Percent
district pharmacy	4	17.39	4	17.39
pharmacist	12	52.17	16	69.57
pharmacy	4	17.39	20	86.96
supervising pharmacist	3	13.04	23	100.00

Frequency Missing = 2

****

q42_1

q42_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	23	95.83	23	95.83
yes	1	4.17	24	100.00

Frequency Missing = 1

q42_2

q42_2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	1	4.00	1	4.00
yes	24	96.00	25	100.00

q42_3

q42_3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	1	4.00	1	4.00
yes	24	96.00	25	100.00

q42_4

q42_4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	20	80.00	20	80.00
yes	5	20.00	25	100.00

q42_5

q42_5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	5	20.00	5	20.00
yes	20	80.00	25	100.00

****

q42_6

q42_6	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	18	72.00	18	72.00
yes	7	28.00	25	100.00

q43_ed

q43_ed	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	25	100.00	25	100.00

q43_os

q43_os	Frequency	Percent	Cumulative Frequency	Cumulative Percent
yes	25	100.00	25	100.00

q43_sfo

q43_sfo	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	25	100.00	25	100.00

q44

q44	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	2	8.00	2	8.00
yes	23	92.00	25	100.00

****

q45_1

q45_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
district out of stock	24	96.00	24	96.00
no proper reorder levels	1	4.00	25	100.00

q45_2

q45_2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Not sufficient space	1	4.55	1	4.55
district stock out	1	4.55	2	9.09
don’t order enough	1	4.55	3	13.64
late submission of orders	1	4.55	4	18.18
missed ordering	1	4.55	5	22.73
more pt's new township opened	1	4.55	6	27.27
no bin cards	1	4.55	7	31.82
no reorder levels	4	18.18	11	50.00
no reviewing of reorder levels	1	4.55	12	54.55
not correct ROL	2	9.09	14	63.64
pt load INCREASED	1	4.55	15	68.18
pt referred from other clinics	6	27.27	21	95.45
reducing of order by district pharmacy	1	4.55	22	100.00

Frequency Missing = 3

****

q45_3

q45_3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
DO NOT ORDER TIMEOUSLY	1	5.88	1	5.88
don’t order in time	2	11.76	3	17.65
lack of space	2	11.76	5	29.41
no reorder levels	2	11.76	7	41.18
no stock count	1	5.88	8	47.06
not enough space to adhere to re-order level	1	5.88	9	52.94
nurses do not fill bin cards when assistant is not there	1	5.88	10	58.82
pt referred from other clinics	1	5.88	11	64.71
referral for meds to other clinics	1	5.88	12	70.59
reorder levels incorrect	1	5.88	13	76.47
seasonal changes	1	5.88	14	82.35
seasonal changes e.g antibiotic use increases in winter	1	5.88	15	88.24
storage not sufficient	1	5.88	16	94.12
unexspected pt load	1	5.88	17	100.00

Frequency Missing = 8

q46

q46	Frequency	Percent	Cumulative Frequency	Cumulative Percent
yes	22	100.00	22	100.00

Frequency Missing = 3

q47

q47	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	11	50.00	11	50.00
yes	11	50.00	22	100.00

Frequency Missing = 3

APPENDIX 14:

SHAMIMA TAYOB: 2011 10:45 Wednesday, October 5, 2011 130
PROGRAM FILE SHAMIMA.sas *** DATA FILE DATA Shamima data.xlsx
TRANSPORT OFFICER
PRINTOUT NUMBER 1

The FREQ Procedure

q1

q1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	4	100.00	4	100.00

q2

q2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	4	100.00	4	100.00

q3_1

q3_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
close van	1	100.00	1	100.00

Frequency Missing = 3

q3_2

q3_2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
car	4	100.00	4	100.00

q3_other

q3_other	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Golf	1	100.00	1	100.00

Frequency Missing = 3

****

q4

q4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
orders has to be split	3	75.00	3	75.00
sometimes	1	25.00	4	100.00

q5

q5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
never	1	25.00	1	25.00
sometimes	3	75.00	4	100.00

q6

q6	Frequency	Percent	Cumulative Frequency	Cumulative Percent
yes	4	100.00	4	100.00

q7

q7	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	4	100.00	4	100.00

q8

q8	Frequency	Percent	Cumulative Frequency	Cumulative Percent
always	1	25.00	1	25.00
never	1	25.00	2	50.00
sometimes	2	50.00	4	100.00

****

q9

q9	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	4	100.00	4	100.00

q10_1

q10_1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
store manager	2	100.00	2	100.00

Frequency Missing = 2

q10_2

q10_2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
facility manager	2	100.00	2	100.00

Frequency Missing = 2

q10_3

q10_3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
security	3	100.00	3	100.00

Frequency Missing = 1

****

q10_other

q10_other	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Pharmacist assistant	1	33.33	1	33.33
depend on who is available	1	33.33	2	66.67
nurses	1	33.33	3	100.00

Frequency Missing = 1

q11

q11	Frequency	Percent	Cumulative Frequency	Cumulative Percent
seldom	1	25.00	1	25.00
sometimes	3	75.00	4	100.00

q12

q12	Frequency	Percent	Cumulative Frequency	Cumulative Percent
boxes are left outside with security. If pharmacist assistant iS available boxes are counted	1	33.33	1	33.33
boxes are seldom counted	1	33.33	2	66.67
depending on who is available, sometimes the number of boxes are counted, At other times boxes are left outside dorr at clinic without being checked	1	33.33	3	100.00

Frequency Missing = 1

q13

q13	Frequency	Percent	Cumulative Frequency	Cumulative Percent
yes	4	100.00	4	100.00

****

PROGRAM FILE SHAMIMA.sas *** DATA FILE DATA Shamima data.xlsx
TRANSPORT OFFICER
PRINTOUT NUMBER 1

The FREQ Procedure

q14

q14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	4	100.00	4	100.00

q15

q15	Frequency	Percent
If number of boxes do not correspond district pharmacy is contacted	1	33.33
No adion most of the time orders are not checked	1	33.33
Order left at clinic. It is not checked most of the time during delivery	1	33.33

Frequency Missing = 1

q16

q16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	3	75.00	3	75.00
sometimes	1	25.00	4	100.00

q17

q17	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	2	50.00	2	50.00
sometimes	2	50.00	4	100.00

q18

q18	Frequency	Percent	Cumulative Frequency	Cumulative Percent
NOT SURE	1	25.00	1	25.00
yes	3	75.00	4	100.00

****

q19

q19	Frequency	Percent	Cumulative Frequency	Cumulative Percent
always	2	50.00	2	50.00
sometimes	2	50.00	4	100.00

q20

q20	Frequency	Percent	Cumulative Frequency	Cumulative Percent
N/A	1	50.00	1	50.00
do not report	1	50.00	2	100.00

Frequency Missing = 2