

**SITUATION ANALYSIS OF DRUG SUPPLY
MANAGEMENT IN TSHWANE**

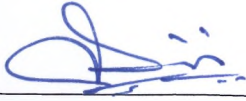
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University of the
Witwatersrand

**A research report submitted to the Faculty of Health
Sciences, University of the Witwatersrand,
Johannesburg, in partial fulfillment of the
requirements for the degree of Master of Science in
Medicine in Pharmaceutical Affairs
Johannesburg, 2003**

I, Deusdedit Katetegirwe Mubangizi, declare that this research report is my work. It is being submitted for the degree of Master of Science in Medicine in Pharmaceutical Affairs in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.



[Signature of candidate]

18th day of DECEMBER, 2003

In memory of my dear mother

Susan B. Katetegirwe

1932 - 1999

ABSTRACT

Tshwane is one of three metropolitan municipalities in Gauteng Province and a cross border district with North West Province. Tshwane has a complex Drug Supply Management system. Gauteng Provincial Authority (GPA), North West Provincial Authority (NWP) and City of Tshwane Metropolitan Municipality (CTMM) play significant roles. This has resulted in duplication of duties and inefficient use of resources.

The aim of the study was to describe the current Drug Supply Management System in Tshwane, identify any weaknesses plus the factors responsible for the observed weaknesses and formulate recommendations for improvement.

It was both a retrospective and prospective observational study using indicators and structured questionnaires based on those developed by World Health Organisation and Health Systems Trust. Prospective data was collected between September and December 2002 while retrospective data covered the period from July 2001 to the day of data collection (approximately one year).

Major Observations

Based on the WHO drug use indicators, Drug Supply Management in Tshwane was below performance targets.

- The facilities and conditions for storage for medicines were inadequate.
- The service level of the pharmacies/sub-depots to primary health care facilities was low.
- Availability of drugs was low and key drugs were frequently out of stock.
- Stock control procedures were inadequate.
- Availability of, and adherence to, standard operating procedures was inadequate.
- The methods used to quantify drug utilization were inadequate.
- The personnel for Drug Supply Management were inadequate in number and training. Their skills were not appropriately deployed.
- The use of generic names was very low.
- The use of antibiotics was high.
- There was inadequate information flow about budget and budgeting processes.

The cadre, training and method of deployment of the staff in charge plus availability of standard operating procedures had not had a significant impact on the status of Drug Supply Management in Tshwane ($p > 0.05$).

Clinics supplied by independent sub-depots were associated with more availability and less stock out incidences of key drugs, as compared to those supplied by hospital pharmacies ($p = 0.0024$). Use of a formal method of quantification of drug requirements was associated with more availability and less stock out incidences of key drugs, as compared to relying only on working experience to quantify drug requirements ($p = 0.01381$).

Major Recommendations

The following recommendations were made to improve Drug Supply Management in Tshwane:

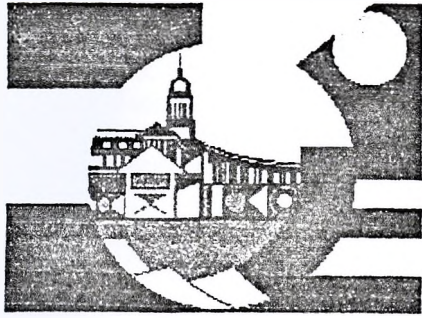
- Ensure that each clinic has a person properly trained in and dedicated to Drug Supply Management who should be effectively supervised.
- Ensure that each clinic has and uses well-developed standard operating procedures.
- Formal quantification methods should be developed, standardized and used in all areas of management.
- Primary Health Care Facilities should be supplied from an independent Sub-depot as opposed to a hospital pharmacy.
- Strengthen and increase accountability for drugs up to dispensing level.
- Improve information flow about budget and budgeting process and involve clinic staff in budget control.

Some of these recommendations were presented to and accepted by the Tshwane Joint Task Team on Drug Supply Management, the Health District Joint Management Team and the Gauteng Health District Forum in 2003.

ACKNOWLEDGEMENTS

I sincerely thank the following for their support, which made this study possible:

- ♥ Prof. Paul Danckwerts and Dr. Gareth Lowndes (Department of Pharmacy, WITS Medical School), my academic supervisors for their guidance.
- ♥ Dr. Faith Kumalo (ISDS facilitator, Tshwane), my field supervisor, for her valuable guidance at all stages.
- ♥ All the members of the Task Team on Drug Supply Management in Tshwane for their valuable comments and encouragement.
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- ♥ The Initiative for Sub-District Support (ISDS) of Health Systems Trust that provided the grant for this study.
- ♥ Uganda Health Sector Support Programme that financed my studies.
- ♥ National Drug Authority that granted me study leave.
- ♥ My family plus all my friends at the University of Witwatersrand and at National Drug Authority who constantly encouraged me.



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To whom it may concern

AUTHORISATION OF MR. DEUS MUBANGIZI TO CONDUCT A SITUATION ANALYSIS OF DRUG SUPPLY MANAGEMENT IN TSHWANE CLINICS

This is to certify that Mr. Deus K. Mubangizi, a Pharmacist and Masters Student at the University of the Witwatersrand, has been authorized to conduct a situation analysis of Drug Supply Management in Tshwane clinics. This followed a request by the Tshwane Joint Health Management Committee to Health Systems Trust to help in improving Drug Supply Management in Tshwane. He was engaged by Health Systems Trust to conduct the situation analysis.

I have read the protocol and tools to be used to conduct the situation analysis and find no ethical issues. I therefore have no objection to their use. I also understand that Mr. Mubangizi will use some of the data in his Research Report for his Masters Degree at the University of Witwatersrand and hereby confirm that I have no objection to this.

Please accord him all the necessary assistance.

Dr. Marie Vermaak

GENERAL MANAGER: HEALTH CARE

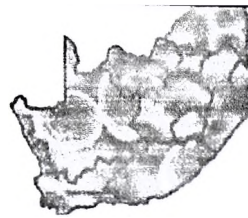
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24 July 2002

**Authorisation of Mr. Deus Mubangizi to conduct a situation analysis of Drug
Supply management in Tshwane District**

To whom it may concern

This is to certify that Mr. Deus K. Mubangizi, a Pharmacist and Masters Student at the University of the Witwatersrand, has been authorised to conduct a situation analysis of Drug Supply Management in Tshwane clinics. This followed a request by the Tshwane Joint Health Management Committee to Health Systems Trust to help in improving Drug Supply Management in Tshwane. He was engaged by Health Systems Trust to conduct the situation analysis.

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Dr. Faith Kumalo

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I should like to advise you that the protocol and title that you have submitted for the degree of Master Of Science in Medicine (Part-Time).(Coursework) have been approved by the Postgraduate Committee at its recent meeting. Please remember that any amendment to this title has to be endorsed by your Head of Department and formally approved by the Postgraduate Committee.

Dr GJ Lowndes, Prof P Dankwerts has/have been appointed as your supervisor/s. Please maintain regular contact with your supervisor who must be kept advised of your progress.

Please note that approval by the Postgraduate Committee is always given subject to permission from the relevant Ethics Committee, and a copy of your clearance certificate should be lodged with the Faculty Office as soon as possible, if this has not already been done.

Yours sincerely

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Faculty Registrar
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Division of the Deputy Registrar (Research)

COMMITTEE FOR RESEARCH ON HUMAN SUBJECTS (MEDICAL)

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CLEARANCE CERTIFICATE

PROTOCOL NUMBER M03-10-24

PROJECT

A Situation Analysis of Drug Supply
Management in Tshwane, Gauteng Province
South Africa

INVESTIGATORS

Mr DK Mubangizi

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DATE CONSIDERED

03-10-31

DECISION OF THE COMMITTEE

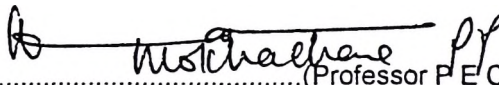
Approved unconditionally

Unless otherwise specified the ethical clearance is valid for 5 years but may be renewed upon application

This ethical clearance will expire on 1 January 2008.

DATE 03-11-20

CHAIRMAN.....



(Professor P E Cleaton-Jones)

* Guidelines for written "informed consent" attached where applicable.

c c Supervisor: Dr G Lowndes

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DECLARATION OF INVESTIGATOR(S)

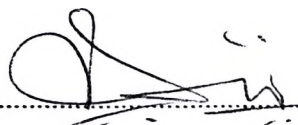
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I/we fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. I agree to a completion of a yearly progress form. I/we agree to inform the Committee once the study is completed.

DATE

18th November 2003

SIGNATURE



PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

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ABBREVIATIONS

ABs.....:	Antibiotics
CCM.....:	Cold Chain Management
CHC.....:	Community Health Centre
CTMM.....:	City of Tshwane Metropolitan Municipality
DoH.....:	Department of Health
DSM.....:	Drug Supply Management
DTC.....:	Drug and Therapeutics Committee
EDL.....:	Essential Drug List
EN.....:	Enrolled Nurse
EPI.....:	Expanded Programme on Immunisation
FEFO.....:	First Expiring First Out
FIFO.....:	First In First Out
GPA.....:	Gauteng Provincial Authority
NWPA.....:	North West Provincial Authority
PA.....:	Pharmacists' Assistant
PHC.....:	Primary Health Care
PRP.....:	Pretoria Regional Pharmacy
RDU.....:	Rational Drug Use
RN.....:	Registered Nurse
ROL.....:	Re-Order Level
SOPs.....:	Standard Operating Procedures
STG.....:	Standard Treatment Guidelines
WHO.....:	World Health Organisation

GLOSSARY

The following terms shall take the following meaning in this study. These are adapted from world Health Organisation (WHO) ¹.

- a. **Generic name** shall be the name that appears in the Standard Treatment Guidelines and Essential Drug List for South Africa.
- b. **Consultation time** shall be duration from beginning to end for individual consultations. If patients are seen one by one in a consultation room, this will mean measuring the time between entering and leaving the consultation room.

- c. **Dispensing time** shall be duration from beginning to the end of patient interaction with the dispenser. It shall refer to the time from when the patient approaches the dispensary window to receive medicine to when he or she leaves the window. The waiting time before the patient hands the prescription in to be filled is not counted. If medicines are dispensed by the Prescriber in the consultation room, the time spent in the room shall be taken as the total consultation and dispensing time.
- d. **Drugs Dispensed**, when the drug dispensed is the one prescribed but in quantities different from the prescription due to low stocks or an institutional policy limit, shall be counted as if it has been dispensed as indicated, with a special note on the record form.
- e. **Drugs Adequately Labelled** shall be those drug packages containing at least patient name, drug name and when the drug should be taken.
- f. **Adequate Patient's knowledge about medication** shall be when the patient can demonstrate knowledge of **when and in what quantity** each drug actually dispensed should be taken. Failure to know either of these two points about any of the drugs dispensed shall be scored as inadequate patient knowledge. Terms used to state **when** drugs should be taken shall relate to actual time intervals. These shall be evaluated against data written on drug package or prescription form.
- g. **Availability of Key Drugs**. For the purpose of this indicator, brand name and generic drugs are chemically equivalent. The quantity in stock shall not be considered. Even if only one bottle or a few tablets are available, the drug should be recorded as being in stock. Each formulation, strength and pack size was considered as a different item even if they contained the same active ingredient.
- h. **Antibiotics**. For the purpose of assessing the percentage of encounters with an antibiotic prescribed, the following classes of antimicrobial agents, derived from the WHO Model List of Essential Drugs, were included in the definition of an antibiotic
- Penicillins
 - Other antibacterials
 - Anti-infective dermatological drugs
 - Anti-infective ophthalmological agents
 - Anti-diarrhoeal drugs with streptomycin, neomycin, nifuraxazide or combinations

For clarity, Metronidazole and co-trimoxazole were considered antibiotics but nystatin was not.

- i. **Health Facility** is used to collectively mean both a Community Health Centre and a clinic. **Primary Health Care Facility** and **Facility** carry the same meaning.
- j. **Sub-depot** means a drug outlet used for distribution of drugs to public health facilities within a **District** or **Region** within a province. **Depot** is the equivalent term at the **provincial level**.
- k. **Independent Sub-depot** is one neither operationally nor administratively attached to another health facility. In this respect, a **hospital pharmacy** that supplies primary health care facilities is a sub-depot attached to a hospital.
- l. **Receiving procedures** are considered adequate when received stock are off-loaded in a secure cage where it is quarantined and checked against the order, invoice and delivery note before placing it in the main store. The delivery note should be in duplicate and both parties must retain a signed copy. Any discrepancies should be formally reported within a stipulated period.

1. INTRODUCTION

1.1. Background Information

Medicines are the second highest expense after staff costs in a country's health care system.² Availability of medicines has been shown to enhance utilisation of health facilities, the reputation of health professionals and the entire health care system in general.³

In many developing countries, a high percentage of medicine losses occur in the State procurement, storage, distribution, and utilisation system. The World Bank estimated that, in Africa, the patient receives only 12 cents out of every dollar spent by the Government on medicines⁴. Table 1.1 below lists the inefficiencies associated with this loss. Inefficiency is the major contributor to these losses.

Table 1.1 Inefficiency and Waste in Supply of Drugs in Africa*

	PRACTICE WHERE LOSS OCCURS	% LOSS
1	Inadequate buying practices	10%
2	Quantification problems	14%
3	Inefficient procurement	27%
4	Inefficient distribution	19%
5	Irrational prescribing	15%
6	Patient non-compliance	3%
	Total loss	88%

*Adopted from World Bank Report: Better Health in Africa, 1994⁴.

All these losses that occur in the supply chain add up to 88% of the original budget allocated⁴.

In South Africa, 80% of the population are dependent on the Government to provide for their health care needs, mainly through the Primary Health Care (PHC) Facilities. It is

thus crucial for the Government to ensure efficient availability of essential medicines for its citizens at the facilities. Currently in South Africa, both Provincial Governments and Local Authorities operate Primary Health Care clinics. It is Government policy that, although Primary Healthcare shall remain a responsibility of the Provincial Government, implementation should be integrated and devolved to the Local Authorities. The process of integration and devolution must be informed by an accurate evaluation of the current status of the facilities and systems operating under the different authorities⁵.

Tshwane is one of the metropolitan municipalities in Gauteng Province and a cross border district with North West Province (Figure 1.1, page 3). It incorporates parts of Odi and Moretele districts from North West Province and former City of Pretoria areas. As a result, Tshwane has a complex drug supply system with Gauteng Provincial Authority (GPA), North West Provincial Authority (NWPA) and City of Tshwane Metropolitan Municipality (CTMM) playing significant roles. This has resulted in duplication of duties, inefficient use of resources, weaknesses in the Drug Supply Management System⁶, and over-expenditure on drugs⁷.

In Tshwane, two processes of integration are taking place, namely: -

- Integration of some clinics formerly under Moretele and Odi districts of North West Province into Tshwane, Gauteng Province.
- Devolving implementation of all Primary Health Care activities at all clinics in Tshwane to the Local Authority, including those currently operated by the Gauteng Provincial Government.

Attempts have been made to assess various aspects of Primary Health Care services in Tshwane to inform the integration process in Tshwane. Stafford *et al* carried out an audit on drug utilisation in Tshwane⁸. This audit focused on control of drugs and expenditure. Its limitations included a limited sample (17 clinics) and standard drug use indicators were not used. It was carried out by the staff of the Department of Health in Tshwane who

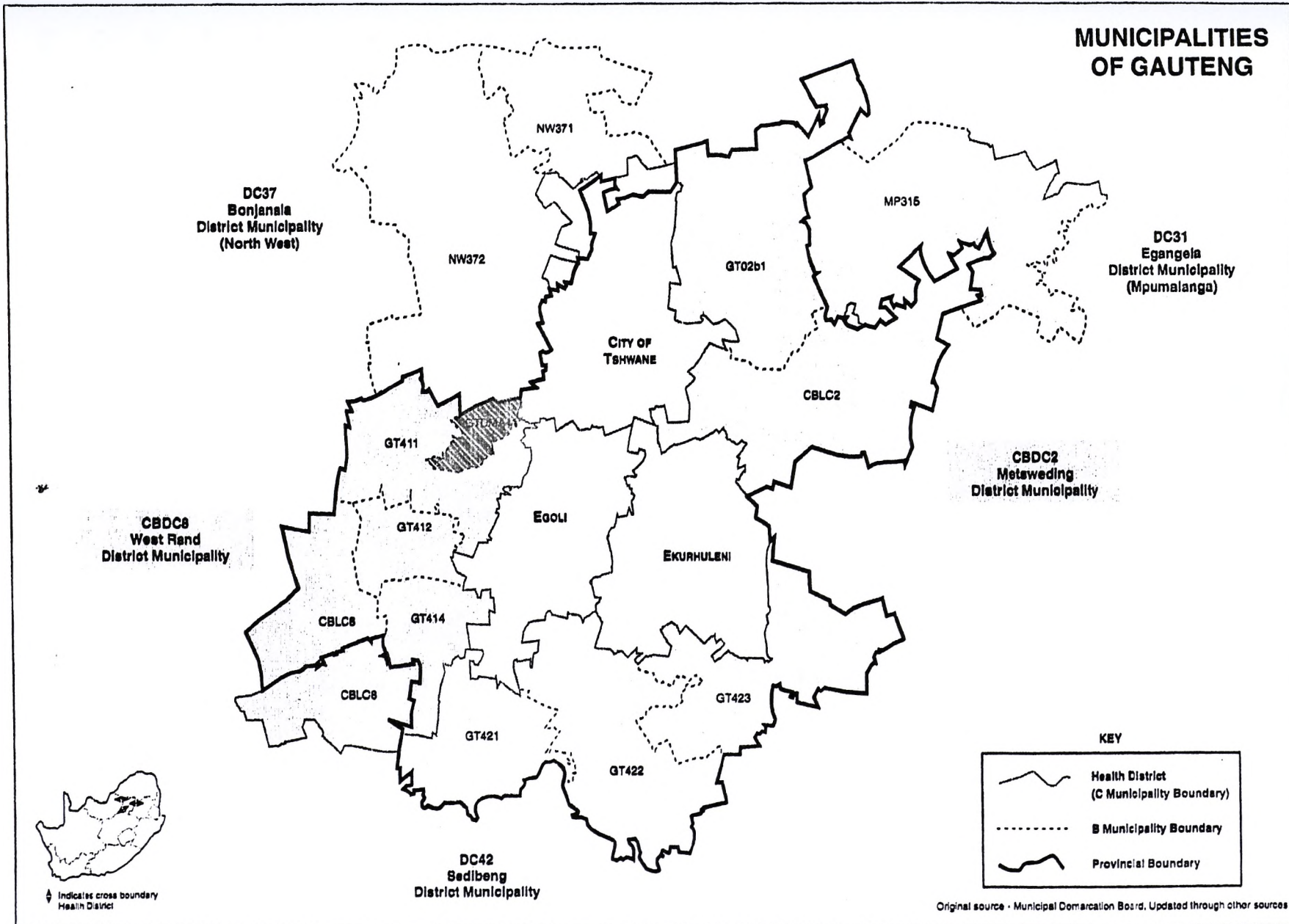


Figure 1.1 Map showing Municipalities of Gauteng and Tshwane as a Cross-border District

are the implementers of Drug Supply Management (DSM), against a background of counter accusations between Provincial and Local Authority staff. This introduced the potential of bias to underestimate the deficiencies for fear of being blamed for observed deficiencies. Despite these limitations, the audit pointed out a number of weaknesses in Drug Supply Management in Tshwane.

Another survey of the Information Infrastructure at all the Primary Health Care clinics and their respective management structures in Tshwane observed that no proper pharmaceutical stock management systems existed⁹. This survey looked generally at all services with a special focus to Information Technology and communication facilities but did not give enough attention to Drug Supply Management facilities. It observed that no proper pharmaceutical stock management systems exist and different ordering, dispensing and stock control systems were in use which was likely to impact negatively on the future consolidation of pharmaceutical systems⁹.

Due to persistent problems in Drug Supply Management in Tshwane, the Joint District Health Management Committee requested Health Systems Trust to assist in improving Drug Supply Management, among other things. A preliminary report produced by the Health Systems Trust facilitator in 2001 noted the following problems¹⁰: -

- Duplication of drug supply systems.
- Inadequate numbers, skills and deployment of staff responsible for Drug Supply Management.
- Inadequate controls for drugs at different levels of supply and use.
- Over expenditure on medicines.

According to the report of the analysis of Phase 1 of the Integrated Development Plan of City of Tshwane Metropolitan Municipality⁷, the actual drug expenditure was projected to be R8 million compared to a budget of R4.12 million. This sparked off a dispute between the Departments of Health of the City of Tshwane Metropolitan Municipality (CTMM)

and the Gauteng Provincial Authority (GPA). Officials from the two authorities could not agree on whether the primary problem was over-expenditure or under-budgeting. A task team including the Health Systems Trust facilitator was set up to look into the alleged over-expenditure. The task team rejected the report compiled in 2000 by Stafford *et al*⁸ because of its limitations, namely inadequate sample size, methodology, and possible bias. They recommended that an independent person be engaged to conduct a situation analysis on Drug Supply Management in Tshwane to confirm the status, identify any possible weaknesses and make recommendation for improvement. This current research report is designed to inform the above process.

1.2. The Drug Management Cycle*

Drug management involves four basic functions as shown in Figure 1.2 below, namely: selection, procurement, distribution and use¹¹.

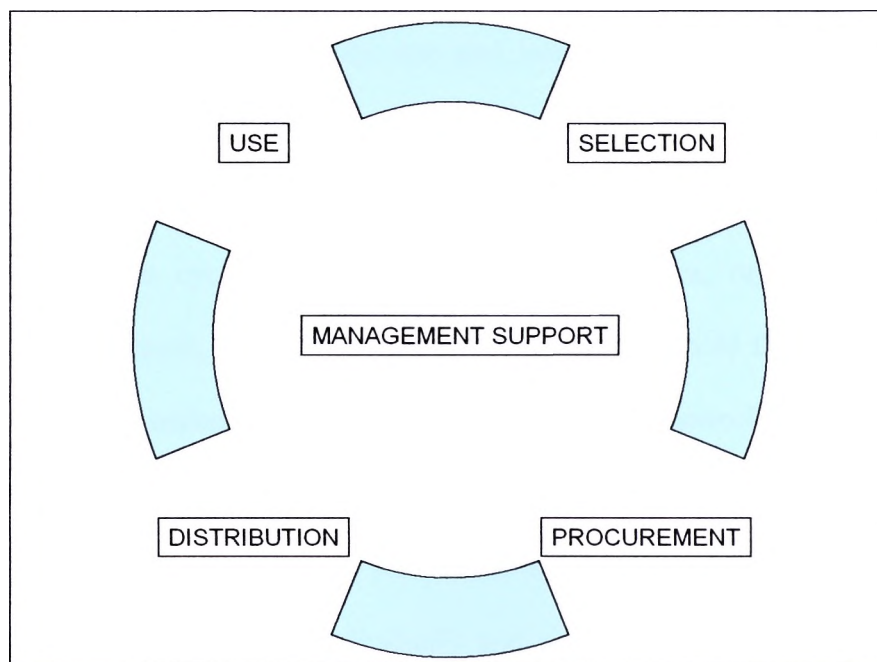


Figure 1.2 The Drug Management Cycle

* Adopted from *Managing Drug Supply*, Second Edition, by Quick JD *et al* MSH and WHO-DAP, p.15, West Hartford, Connecticut, USA: Kumarian Press¹¹.

Selection involves reviewing the prevalent health problems, identifying treatments of choice, choosing individual drugs and dosage forms, and deciding which drugs will be available at each level of health care. This has already been done through the Essential Drug List and the Standard Treatment Guidelines.

Procurement includes quantifying drug requirements, selecting procurement methods, managing tenders, establishing contract terms, assuring drug quality, and ensuring adherence to contract terms. The clinics only participate in quantifying drug requirement. The others are done either at the National, Provincial or Municipality level.

Distribution includes stock control, stores management, delivery to drug depots, sub-depots and health facilities. This is done by the departments of health at the National, Provincial or Municipality level, but sometimes, it is outsourced. The clinic health workers, however, are supposed to control stock and manage stores at the facility.

Use includes diagnosis, prescribing, dispensing and proper consumption by the patient.

Each function builds on the previous one and leads logically to the next. Costs rise, shortages become common, and patients suffer when the separate tasks are performed not as part of a system but independently and disjointedly. The management support systems at the centre of the cycle, which include physical facilities, organisation, financing, information management, and human resource management, hold the drug management cycle together. The entire cycle rests on a policy and framework that establishes and supports the public commitment to essential drug supply.

To ensure an effective Drug Supply Management, all aspects of the drug management cycle must be regularly assessed individually and collectively, using objective indicators and specific performance targets. World Health Organisation (WHO) has come up with such Drug Supply Management Indicators and Performance Targets. These will be discussed in more detail while discussing the methodology.

1.3.Literature Survey

In many parts of the world, studies have been conducted using WHO Drug Supply Management Indicators. Table 1.2 (page 8) is a review of the indicator values, which have been observed in the countries indicated¹². Indicators were used to increase awareness among prescribers in Malawi¹³ and Bangladesh¹⁴; to identify priorities for action (e.g., polypharmacy in Indonesia¹⁴ and Nigeria¹⁵, overuse of injections in Uganda¹⁶, Sudan¹⁷ and Nigeria¹⁵, and low percentage of patients who understood the dosage schedule in Malawi¹³); and to quantify the impact of interventions in Yemen¹⁸, Uganda¹⁶, Sudan¹⁷, and Zimbabwe¹⁹.

In Northwest Ethiopia, drug use indicators for health centres and health stations were found to be similar despite differences in manpower²⁰. In Nigeria, an indicator study was used to describe the current drug use practices at a general hospital and gather baseline data for use in designing an intervention to improve the drug use profile²¹.

In a randomised controlled indicator study in Zimbabwe, while training of health workers throughout the country in drug management (including stock management and rational drug use) resulted significant improvements in a variety of drug supply management indicators; these achievements could not be sustained until a further intervention of support supervision was introduced²².

In Kampong Thom Province of Cambodia an indicator study was used to obtain baseline information for the design of a strategy to address irrational prescribing practices²³. In Niger, an indicator study that was used to evaluate an essential drugs and costs recovery programme, increasing prescription costs were attributed to overuse of injections, polypharmacy and poor compliance with standard treatment guidelines²⁴. In addition, training courses seemed to have a limited impact on prescribing patterns for nurses.

An indicator study was used to assess the proportion of primary care physician offices in four cities in USA²⁵ meeting vaccine storage guidelines, identify factors associated with

Table 1.2 A Review of Drug Use Indicators*

Country	BAN	CAM	ECU	GHA	GUA	IND	MAL	MOZ	NEP	NIG	SUD	SWA	TAN	UGA	UGA	YEM	ZIM
Date (mm/yy)	08/91		10/92		10/92	07/91	06/91		05/92	02/92	05/91		02/92	09/90	03/94	03/88	07/91
No of facilities	20	20	19	20	10	20	72	26	20	20	37	20	20	42	127	19	56
Reference	14	11	29	11	11	14	13	11	28	15	17	11	27	16	26	18	19

INDICATORS

Av. Drugs/Patient	1.4	3.0	1.3	4.3	1.4	3.3	1.8	2.2	2.1	3.8	1.4	3.0	2.2	1.9	2.4	1.5	1.3
% Patients given ABs	31%	51%	27%	47%	27%	43%	34%	43%	43%	48%	63%	54%	39%	56%	53%	46%	29%
%Patients given INJTs	0.2%	41%	17%	56%	13%	17%	19%	18%	5%	37%	36%	38%	29%	48%	36%	25%	11%
%Drugs by Generic name		58%	37%	59%	72%	59%		99%	44%	58%	63%	63%	82%		86%		94%
% drugs on the EDL									86%				88%				
Av. consultation (Min)						3.0	2.3	3.7	3.5	6.3		6.1	3.0				
Av. Dispensing time (Sec)									86.1	12.5			77.8				
%Patients know dosing	63%					82%	27%	82%	56%	81%		87%	75%		29%		
% drugs actually dispensed									83%	70%							
% of tracer drugs in stock			38%				67%	87%	90%	62%		92%	72%				

KEY: BAN = Bangladesh, CAM = Cameroon, ECU = Ecuador, GHA = Ghana, GUA = Guatemala, IND = Indonesia, MAL = Malawi, MOZ = Mozambique, NEP = Nepal, NIG = Nigeria, SUD = Sudan, SWA = Swaziland, TAN = Tanzania, UGA = Uganda, YEM = Yemen, ZIM = Zimbabwe, ABs = Antibiotics, Av. = Average, INJTs = Injectables, Min = Minutes, Sec = Seconds.

* Adopted from *Rational Drug Use in Rural Health Units of Uganda: Effect of National Standard Treatment Guidelines on Rational Drug Use*, Kafuko et al, p.3, Marianum Press, 1996¹⁷; *Managing Drug Supply, Second Edition, MSH and WHO-DAP, p.437, Kumarian Press*¹¹, and *How to investigate drug use in health facilities: Selected drug use indicators, WHO/DAP/93.1*¹.

low compliance, and evaluate whether a quality improvement activity improves compliance. Adherence to guidelines improved after the intervention, especially with respect recording fridge temperature and avoidance of storage of vaccine in the fridge door.

WHO Drug Supply Management Indicators were the basis of the guidelines developed by Andy Gray and David McCoy, on behalf of Health Systems Trust, for performing a situation analysis of Drug Supply Management Systems in South Africa^{30,31}. These guidelines and indicators have also been validated and used to conduct studies in South Africa³²⁻³⁴.

From the above literature review it can be noted that Drug Supply Management Indicators are very versatile and can be used to generate useful information about the entire drug management cycle under a variety of settings.

1.4.Objectives

The specific objectives of this study are: -

- to describe the status of the current Drug Supply Management system(s) in Tshwane using the WHO and Health Systems Trust Drug Supply Management indicators,
- to measure the gap between the current status and target indicators,
- to identify the factors responsible for any observed weaknesses, and
- to formulate recommendations for the improvement of Drug Supply Management systems.

1.5. Structure of the Report

The report is organised in five chapters. The first chapter is dedicated to the description of the study subject, the objectives of the study, justification of the study and literature review.

The second chapter covers a description of the methodology, sampling, data management, the hypotheses tested and the limitations of the study.

Results of the study are reported in the third chapter. It begins with a description of characteristics of the sample evaluated. This is followed by a report on the status of Drug Supply Management and the results of the assessment of the impact of various factors as laid out in the hypotheses.

The fourth chapter covers discussion of results. Results are compared with standard performance targets to identify gaps, if any. The reasons for the gaps are analysed using the null hypotheses.

The fifth chapter includes the recommendations and conclusion. A list of references comes after the fifth chapter. All bulky tables of results and the tools used in the study are included in the appendices.

2. METHODOLOGY

2.1. Introduction to the Indicator-Based Methodology

Given the lack of consensus on the extent of the problems associated with Drug Supply Management in Tshwane and in the absence of independent and reliable information specific to the area, a new situation analysis using the WHO¹ and Health Systems Trust^{30,31} indicator based tools was needed.

The International Network for Rational Use of Drugs (INRUD) and WHO-Drug Action Programme have come up with Drug Supply Management Indicators, which can be adopted in a study of drug use^{1,11}. An indicator is defined as a criterion used to measure changes, directly or indirectly, and to assess the extent to which the targets and objectives of a programme are being attained. Indicators should meet the criteria of clarity, usefulness, measurability, reliability, validity and be acceptable to key stakeholders. These indicators measure key aspects of the Drug Management Cycle. They are reliable, highly standardised and are accompanied by a standard methodology to collect data. Data collected through the indicators can be compared with studies in other facilities, countries, or performance targets.

The purpose of each indicator, which was used in this study, is outlined in Appendix B1 (page 81). The various sub-groups of the indicators cover the different aspects of the drug management cycle

2.2. Study Design

Taking into consideration the background to the study, the study objectives and the resource constraints, a basic cross-sectional study design was used. The guidelines for basic parameters of the different types of drug use studies as recommended by WHO¹ are outline in Table 2.1 (page 12).

Table 2.1 Basic parameters of Different Types of Drug Use Studies[♦]

	Cross-sectional (basic)	Cross-sectional (comparative)	Supervision	Assess impact of intervention
Objectives of the indicators study	To measure drug use indicators in a representative group of facilities	To compare between individual facilities or prescribers, or between groups	To identify whether a facility is above or below a set norm of practice	To assess the impact of an intervention in an intervention and control group
Number of facilities included	20	At least 10 in each group, 20 for more reliable comparisons: for individual comparisons, each facility is considered separately	Each facility sampled separately	At least 20 per group
Number of prescribing encounters per facility	30	30 for comparing groups; 100 for individual facilities or prescribers	About 15 for identifying outliers with poor practices	At least 30, but depends on the need for precision
Type of prescribing data	Retrospective or prospective	Retrospective or prospective	Prospective preferred, but retrospective possible	Retrospective preferred, but depends on objectives and structure of intervention
Time frame of prescribing data	One year, if possible	One year, if possible	One day, or short period if retrospective	At least 4-6 months before and after the intervention
Type of patient care data	Prospective	Prospective	Prospective	Prospective (if necessary)

[♦] Adopted from *How to investigate drug use in health facilities: Selected drug use indicators*, WHO/DAP/93.1¹.

The methodology adopted was an indicator based retrospective and prospective observational study. Qualitative and quantitative assessment was done through the review of historical data, interviews and meetings with key players, and direct observation of current practice.

The tools which were used to collect and analyse data were adapted from those developed by World Health Organisation (WHO) ¹ and Health Systems Trust^{30,31}.

These included the following: -

- A set of drug supply management indicators listed in Appendix B1 (page 81).
- Tracer Standard Operating Procedures (SOPs) listed in Table 2.2 below, which were adopted from the guidelines, developed by Gray³⁰. Their availability was used to indicate existence of written procedures to guide Drug Supply management.
- Tracer drugs/non-drug items listed in Table 2.3 (page 14), which were adopted from WHO¹ and HST^{30,31} guidelines. They represent the key drugs and items needed to render a basic Primary Health Care service. They were used to assess drug logistics indicators as outlined in Appendix B3 (Pages 85-86).

Table 2.2 Tracer Standard Operating Procedures

1. How to maintain a Cold Chain at a PHC facility
2. How to organise the medicine and supplies store
3. How to maintain drug use records
4. How to control Schedule 5,6 & 7 substances
5. How to order supplies from the sub-depot
6. How to receive supplies at the PHC facility
7. How to dispose of expired medicines
8. How to handle a Product Recall
9. How to control Pests from a medicine store

Table 2.3 Tracer Drugs and Non-Drug Items*

Drugs	
Amoxicillin caps 250mg 15s	Glibenclamide tabs 5mg 28s
Amoxicillin caps 250mg 30s	Glibenclamide tabs 5mg 56s
Amoxicillin caps 250mg 100s	Glibenclamide tabs 5mg 500s
Amoxicillin susp 125mg/5ml 100ml	Metronidazole tabs 200mg 28s
Ciprofloxacin tabs 500mg 10s	Metronidazole tabs 200mg 21s
Penelente injection 2.4 mU	Metronidazole tabs 200mg 250s
Paracetamol Syrup 120mg/5ml 50ml	Paracetamol tabs 500mg 10s
Paracetamol Syrup 120mg/5ml 100ml	Paracetamol tabs 500mg 20s
Ibuprofen tabs 200mg 15s	Paracetamol tabs 500mg 500s
Ibuprofen tabs 200mg 28s	Adrenaline injection
Ibuprofen tabs 200mg 42s	ORS Sachets
Ibuprofen tabs 200mg 56s	Salbutamol inhaler
Ibuprofen tabs 200mg 1000s	Tetanus Vaccine
HCTZ tabs 25mg 14s	Ringers Lactate IV
HCTZ tabs 25mg 28s	
HCTZ tabs 25mg 500s	
Non-Drug Items	
IV Admin. Set 10 Drops	Insulin syringe 0.5ml
IV Admin. Set 15 Drops	Syringe 2ml
IV Admin. Set 20 Drops	Blue Needles (EPI)-100s
IV Admin. Set 60 Drops	Gloves non-sterile small-100s
Glucose/Ketones Test Strip	Gloves non-sterile medium-100s
Insulin syringe 1ml	Gloves non-sterile large-10s

* Adopted from WHO and Health Systems Trust guidelines^{1,30}, as well as the NMTTS study³² and adapted to the study with input from the Health staff of Tshwane. The different pack sizes were assessed separately because in most cases, they reflected a different treatment guideline

- Structured questionnaires for the Facility Manager (Appendix B4, page 87) and Sub-depot Manager (Appendix B5, page 93). These were adopted from HST guidelines³⁰ and were used to collect general information about personnel, physical facilities, and routine operations.

These tools have been tested locally³²⁻³⁴ and internationally^{1,11,12,26} and standardised to generate reliable and comparable data. They were adapted to the study through comments by health staff of Tshwane and a pilot study at two clinics in Tshwane. These included considering different pack sizes of different drugs and non-drug tracer items because these represented different indications. Blue needles for immunisation were added since immunisation was one of the main activities of the local authority clinics.

2.3. Sample Size

2.3.1. Selection of Health Facilities

There were four sub-depots (two Independent Sub-depots and two Hospital pharmacies) and fifty-eight Primary Health Care facilities in Tshwane at the time. WHO guidelines for a basic cross-sectional study design require a sample of at least twenty Health facilities. However, at the request of the Tshwane Drug Task Team, all the facilities were included in the study in order to avoid the limitation of inadequate sample size associated with the audit done by Stafford *et al*⁸. Apart from Moretele District, the clinics under other authorities were more than 10 as shown in Table 2.4 (page 16), which would allow comparisons between authorities as recommended under the WHO guidelines¹ (Table 2.1, page 12).

Table 2.4 Distribution of Health Facilities by Type and Authority

Authority	Pharmacy	No. of Clinics	No. of CHC	Total No. of Clinics
Gauteng	PRP	14	3	17
CTMM	CTMM Sub-depot	22	0	22
Moretele	Jubilee Pharmacy	5	3	8
Odi	Odi Pharmacy	8	3	11
Total	4	49	9	58

PRP = Pretoria Regional Pharmacy, CTMM = City of Tshwane Metropolitan Municipality, CHC = Community Health Centre

2.3.2. Selection of Patient Prescribing Encounters

Prescribing encounters were sampled retrospectively by drawing random encounters from historical medical records over a period of one year from date of survey. At least thirty encounters per clinic were randomly selected as follows ¹: -

- a. The chronological listings, by date, of all patient visits made during the past year were identified either from the Clerks' Attendance Registers or Daily Clinic Registers maintained by Prescribers.
- b. The sampling interval was calculated by dividing the number of days in the sample frame (365 days) by the number of encounters to be selected (30). i.e. $365/30=12.2$.
- c. Sampling began at the first day in the chronological sample frame. i.e. 1st day, $(1+12.2=13.2, \text{ rounded up})$ 14th day, $(13.2+12.2=25.4, \text{ rounded up})$ 26th day, and so forth.
- d. From each selected day a single encounter was picked at random by multiplying the total number of encounters listed for that day by a random number between 0.0 and 1.0, and rounded upwards.

Step (b) to (d) were performed quickly using Microsoft Excel computer programme.

2.4.Planning and Field Assessment Methods

A pilot study was done at Laudium Community Health Centre and East Lynne in order to clarify data sources, the suitability of the tools and estimate the time required to collect data per facility. The pilot study indicated that one day per clinic and two days per Community Health Centre (CHC) was optimal for data collection. A schedule of visits, including a proposed programme of the day at the facility, was made available to all the health facilities included in the study (Appendix C, page 101). A telephone call was made to the clinic at least one week prior to the visit to confirm suitability of the scheduled date.

2.4.1. Assessment of Facilities for Drug Supply Management

On the day of the visit to the facility, a questionnaire in Appendix B4 (page 87) was administered to the person in-charge of the health facility. A guided tour of the health facility was made to assess the availability and condition of the facilities for Drug Supply Management. Findings were recorded on the structured questionnaire.

2.4.2. Assessment of Prescribing Indicators

A sample of thirty prescribing encounters from records of patients who attended the facility during the past year was randomly selected and the details per encounter recorded directly on computer in the prescribing indicators form as shown in Appendix B2 (page 84).

2.4.3. Assessment of Logistics Performance Indicators

Stock cards, delivery notes and invoices were reviewed and a physical count was done to collect information on each tracer item as outlined on Logistics Performance Indicators form (Appendix B3, pages 85 - 86). The findings were recorded on the same form.

2.5. Performance Targets

Performance targets as listed in Table 2.5 below were used to assess Drug Supply Management in Tshwane. They were adopted taking into consideration the following:

- Recommendations from WHO¹
- Examples of targets used in earlier studies in South Africa³²⁻³⁴ and other countries^{11,12}
- Principles of the South African National Drug Policy³⁵ (and the Essential Drugs Programme) as interpreted in the Standard Treatment Guidelines (STG) and Essential Drug list (EDL)³⁶.

Table 2.5 Performance Indicators and Performance Targets

Performance Indicator	Performance Target
Average number of drugs prescribed per patient	≤2
% of drugs prescribed by generic name	100%
% of patient-encounters with an antibiotic prescribed	<25%
% of patient-encounters with an injection prescribed	<15%
% of prescribed drugs that are on the EDL	100%
% of ordered items that are supplied within the stipulated schedule	>95%
% of tracer items in stock	>90%
% of tracer items out of stock at least once in a year	<10%
% of tracer items where physical stock = quantity on record	100%

2.6. Null Hypotheses

The following hypotheses were used to identify the factors responsible for the weaknesses observed. These were based on the preliminary discussions by the Tshwane Drug task Team.

- i. The category of staff responsible for Drug Supply Management does not affect the status of Drug Supply Management at the clinic, as measured using WHO and HST Drug Supply Management Indicators
- ii. The number of staff trained in Drug Supply Management, Rational Drug Use (RDU) and Cold Chain Management (CCM) has no impact on the status of Drug Supply Management, as measured using WHO and HST Drug Supply Management Indicators
- iii. Rotation of the person in-charge of Drug Supply Management has no impact on the status of Drug Supply Management, as measured using WHO and HST Drug Supply Management Indicators
- iv. A formal quantification method does not improve availability of drugs at the clinic
- v. There is no difference in availability of drugs between clinics supplied by independent pharmacies (sub-depots) and Hospital pharmacies.

2.7. Data Handling and Analysis

The unit of analysis was the health facility. All filled questionnaires and forms were checked on the day of data collection for accuracy, consistency and adequacy. They were then kept in a dedicated file. All data on the standard indicator forms was entered in similar forms in Microsoft Excel Program on the computer. From these forms, health facility summaries were calculated and entered on the Drug Supply Management Indicators Consolidation form (Appendix B6, page 100). Qualitative and quantitative data from the questionnaires was summarized on the Qualitative Data Summary form as shown in Table A8 (pages 74).

The discussion of results followed indicator groups. First the expected performance standard was briefly described followed by a comparison of results with standard

performance targets and observations from other studies done in South Africa and other countries. The following statistics were used to analyze the data: -

- Descriptive statistics to describe the status of Drug Supply Management³⁷.
- Pearson correlation coefficient, r , to assess whether there was a relationship between the number of staff trained and some quantitative indicators. This indicates the measure of intensity of linear relationship between two variates. It varies from -1 to +1 corresponding to perfect negative correlation and perfect positive correlation³⁷. A positive correlation indicates that the variables increase together, while a negative correlation indicates that as one variable increases, the other decreases³⁸.
- For comparison between groups, the following were used^{37, 39}: -
 - The two-sided F test for a difference between two independent variances.
 - The two-sided t test for a difference between two independent means.
 - The two-sided z test or upper tail $\chi^2(1)$ test for a difference between two independent proportions, as applicable.

Calculations were performed manually and crosschecked using Microsoft Excel Program for those statistics supported by the program. A 5% level of significance (95% confidence level) was used as expected from this WHO methodology¹. The differences were noted in their absolute terms but were only considered significant if $p > 0.05$. However, Utts cautions that a very strong relationship will not necessarily achieve statistical significance if the sample is small³⁸.

There was justification to assume the same level of confidence since the WHO methodology was used and the sample of health facilities and patient encounters evaluated was more than the recommended minimum.

2.8.Constraints and Limitations

- i. Although the target was to cover fifty-eight health facilities in Tshwane, only thirty-nine were covered. Three facilities, though visited, were not included in the analysis because they belong to Metsweding and not Tshwane. Some facilities were not visited either because the key personnel or researcher was not available on the scheduled date. The data collection was terminated prematurely at the request of the sponsor following a presentation of an interim analysis. Nevertheless, data from thirty-six health facilities (62%) was analysed and twenty facilities is the minimum number required for a basic cross-sectional design, which was used in this study¹. Therefore, the accuracy and reliability attained in this study is likely to be better than that anticipated through the WHO recommended sample size and methodology¹. The remaining limitation is that these facilities were not randomly selected. For a comparative cross-sectional analysis, it is recommended that each group should have at least ten facilities (Table 2.1, page 12). This was not the case for Moretele (six) and Odi (five) districts. Therefore, the trends rather than the absolute figures should be considered where comparison between authorities is made. In order to make some group comparison, the option was to consider clinics under Moretele and Odi districts as one group. Although this would make sense (since they all belong to North West Province), the fact that they are supplied from different sources may impart intra-group differences.
- ii. The records of all patients seen on the selected day were not always available. In some cases, the patients were listed in several books and there was no clear chronological order to use in sampling. All the available records of the day were nevertheless used in the sampling. Since the recording by the clerks was random,

absence of one book from one clerk could not have had any significant effect on the sampling plan.

- iii. The actual date of ordering stock could not be ascertained at some facilities. Facilities often ordered early so that their order could reach the sub-depot by the scheduled date. In such incidences, the scheduled order date was used. This would mean that the actual lead time was longer than observed. Since the observed lead time was longer than the ideal target of seven days (five working days), the observations made about lead time are still valid.
- iv. In assessing whether the drug prescribed was on the Essential Drug List (EDL), only the name was considered. The study did not assess whether the prescription complied with the Standard Treatment Guidelines for Primary Health Care facilities in respect to indication, dose and duration of treatment. This is an area for further study.
- v. The study did not assess the linkage between the type of prescriber and the prescribing indicators. The Ugandan study by Kafuko *et al*,²⁶ showed that the type of prescriber had an influence on the observed prescribing indicators. This is an area for further study.
- vi. Data was collected based on the cross-sectional descriptive study as requested by the Tshwane Drug Task Team, without specifically catering for the hypotheses that have been included for the purpose of the research report. The sample size in some comparison groups was too small to allow use of certain statistical tests. Nevertheless, use of appropriate statistical analysis and interpretation with caution has ensured that the conclusions made are valid. Utts states that strong relationship will not necessarily achieve statistical significance if the sample is very small³⁸. This should be borne in mind when interpreting the p values.

3. RESULTS

Prospective data was collected between September and December 2002 while retrospective data covered the period from July 2001 to the day of data collection (approximately one year). Results are reported in three major sections. The first one gives the characteristics of the sample included in the evaluation. The second section gives the status of Drug Supply Management presented according to indicator groups. Each section on indicator group begins with a table of results followed by text highlighting key findings. The third section presents results according to the factors being evaluated under the null hypotheses.

3.1. Sample Characteristics

Table 3.1 below shows the distribution of clinics in the planned sample and those included in the evaluation.

Table 3.1 Distribution of Health Facilities from which Data was Analysed

Authority	Pharmacy	Unit	No. of Clinics		No. of CHCs		Total	
							No	%
Gauteng	PRP	Plan	14		3		17	29.3%
		Actual	8		3		11	30%
CTMM	CTMM Sub-depot	Plan	22		0		22	37.9%
		Actual	14		0		14	38.9%
Moretele	Jubilee Pharmacy	Plan	5		3		8	13.8%
		Actual	4		2		6	16.7%
Odi	Odi Pharmacy	Plan	8		3		11	19.0%
		Actual	2		3		5	13.9%
Total	4	Plan	49	84.5%	9	15.5%	58	100%
		Actual	28	77.8%	8	22.2%	36	62%

Data from all four sub-depots and thirty-six health facilities (62%) was analysed. These are more than the minimum of twenty required for a basic cross-sectional study design as recommended by WHO¹. However, only Gauteng Provincial Authority and

City of Tshwane had more than the minimum ten clinics to allow comparison between the groups¹. The proportion of clinics by type and authority in the analysed sample did not differ significantly from the population ($p > 0.05$) (table 3.1, page 23).

Table A1 (page 66) shows that a total of 1286 patient encounters were analysed in the whole study out of which 965 (75%) were retrospective and 321 (25%) were prospective. This is well above the required 600 patient encounters to achieve sufficiently accurate and reliable estimates¹.

3.2. Status of Drug Supply Management

This section includes indicators for the resources required for effective Drug Supply Management (facility indicators; control of medicine budget indicators; efficiency of suppliers indicators; drug procurement, availability and control indicators; personnel indicators) and the core drug use indicators (Cold Chain Management indicators, Prescribing indicators and Patient Care indicators).

3.2.1. Facility Indicators

The facility indicators are presented in Table A2 (page 67) and summarized in Table 3.2 (page 25). The phrasing of the indicator in the heading shows the expected norm. The following observations have been singled out for mention because they depend on the human factor and were used later to assess the differences between groups.

- In 38.9% of the clinics stock was found placed directly on the floor.
- Restricted access to the drug store was practiced at 44.4% of the clinics.

From qualitative observations, it was noted that most facilities under the City of Tshwane did not have a store separate from the dispensary. Although most facilities under Gauteng Provincial Authority had a drug store, they did not have a central dispensary and so used the consultation room for dispensing.

Table 3.2 Indicators for Storage Facilities

Category	Has off loading cage	Adequate size	Restricted access	Double lock	Burglar proof	Separate store for Flammables	Separate store for Schedule ≥5	Stock off floor	Adequate ventilation	Room Temperature monitored
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Sub-depots

Number, n= 4	2	1	2	3	3	3	4	2	1	1
Percentage (%)	50	25	50	75	75	75	100	50	25	25

PHC Facilities

GPA (n=11)	No	1	2	7	9	8	3	8	6	9	1
	%	9.1	18.2	63.6	81.8	72.7	27.3	72.7	54.5	81.8	9.1
CTMM (n=14)	No	2	10	6	11	12	0	8	8	14	3
	%	14.3	71.4	42.9	78.6	85.7	0.0	57.1	57.1	100	21.4
MORETELE & ODI (n=11)	No	0	3	3	0	3	0	5	8	1	0
	%	0.0	27.3	27.3	0.0	27.3	0.0	45.4	72.7	9.1	0.0
TOTAL (n=36)	No	3	15	16	20	23	3	21	22	24	4
	%	8.3	41.7	44.4	55.6	63.9	8.3	58.3	61.1	66.7	11.1

PRP = Pretoria Regional Pharmacy, CTMM = City of Tshwane Metropolitan Municipality, GPA = Gauteng Provincial Authority, √ = Yes, X = No.

3.2.2. Drug Supply Management Indicators for Sub-depots

The Drug Supply Management indicators for the major suppliers are presented in table 3.3 (page 26). These results show that: -

- the service level (% of drugs ordered that are supplied within the delivery schedule) of the sub-depots that supply Primary Health Care facilities from their respective Provincial Depots was above 94%
- the availability of tracer items ranged from 76% at City of Tshwane Metropolitan Municipality sub-depot to 100% at Jubilee Hospital pharmacy
- the service level of the sub-depots to the Primary Health Care clinics ranged from 67% by Odi Hospital Pharmacy to 85% by Pretoria Regional Pharmacy.

Table 3.3 Summary of Drug Supply management Indicators for the Sub-depots

Indicator		Pretoria Regional Pharmacy	CTMM sub-depot	Jubilee Hospital Pharmacy	Odi Hospital Pharmacy
Current Staffing	Pharmacists	7	1	3	3
	Pharmacist's Assistants	4	5	8	12
	Others	15	13	6	4
Supplier		Auckland Park	Auckland Park/Private Suppliers	Vuna Healthcare Logistics	Vuna Healthcare Logistics
Facilities supplied	Clinics	22	31	26	23
	Other public	32	6	2	1
	Psych drugs scripts/month	~6000	0	0	0
	Private	250	89	0	0
Mean supplier Lead time in days (Range)		37 (7 to 215)	15 (1 to 45)	2 (2 to 3)	4 (4 to 4)
Ordering interval in days (Range)		88 (13 to 378)	97 (7 to 276)	-	8 (7 to 13)
% last order supplied		100	120*	-	94
% Tracer drugs in stock		85	76	100	97
% items o/s in past yr		60	21	-	-
% ROL determined		100	100	100	100
Inventory control		Stock cards	Stock cards	Computer	Computer
Stock/card=Stock/shelf		50%	-	-	-
Storage conditions		Inadequate	Adequate	Inadequate	Fair
Lead time to clinics		8	14	12	8
No of items on supply list		406	627 [♀]	245*	245*
Service level to clinics (%)		85	81	77	67
Prepackaging		Fair	Adequate	Inadequate	Fair
Operate "Back order"		No	Yes	Yes	No
% of Expired/Budget for 2001/2		R24,776,251 [♂]	220%	R8,274,000 [♂]	122%
Value of expired drugs in Rands (%Budget) in 2001/2		~R500,000 (2%) [¥]	Not available	R18,936.02 [£] (0.23%) [£]	R13,584.61 (0.20%)

*These are items on main supply list, which does not include mental health drugs. [♂]Budget figures for 2001/2 not available, figures are for expenditure. [£]Figure for expire drugs from April to October 2002 and % of expenditure over the same period. [♀]Figure includes 75 bulk packs, 16 duplicate factory & pre-packed patient packs, and non-medical items. [¥]As a percentage of expenditure, *Includes back orders because system could not differentiate back-orders from current order, CTMM = City of Tshwane Metropolitan Municipality. Psych = Psychotropic

3.2.3. Drug Procurement, Availability and Control Indicators

The indicators and performance targets for drug procurement, availability and control are presented in Table A3 (page 68) and summarized in Table 3.4 below.

Table 3.4 Summary of Indicators for Drug Procurement, Availability & Control (Summarised from Table A3, page)

Facility	Has all SOPs	Receiving procedures	Lead Time (days)	% Order Supplied	Ordering Interval (days)	%O/S in year	Quantification Method Used	%of items which had ROL	% in Stock on study day	Use stock cards	% Card=Shelf
Mean			11.2	79.0	56.1	33.1		33.8	87.6		55.9
Maximum			23.2	97.7	126.4	83.3		100.0	100.0		100.0
Minimum			3.4	57.7	16.5	0.0		0.0	70.0		8.3
Performance Target	Yes	Adequate	-	≥95	-	≤10	ROL/Min-Max	100	≥90	Yes	100
% of clinics which meet target	47	56	-	4	-	7	53	3	58	67	4

SOPs = Standard operating procedures, O/S = Out of stock, ROL = Re-Order Level, Min-Max = Minimum-Maximum level, Card=Shelf means the balance quantity on the card was equal to the quantity physically on the shelf.

The major findings were: -

- Only 47% of the clinics had the entire tracer Standard Operating Procedures.
- The method of quantification of drugs was found to be adequate at 53% of the clinics.
- Only 56% of the clinics had adequate receiving procedures.
- Out of 36 facilities visited, 24 (67%) used stock cards. On average physical stock on the shelf was found to be equal to the balance quantities on the stock card only in 55.9% (range 8.3% to 100%) of the tracer items.
- On average 33.1% (range 0% to 83.3%) of the tracer items had been out of stock at least once in the past year.
- On the day of the study, on average 87.6% (range 70% to 100%) of the tracer item were in stock.

3.2.4. Personnel for Drug Supply Management and their Training

Once drugs are available at the clinic and there are adequate facilities, professional guidelines require that they should be managed full time by someone with basic training in Pharmacy and/or further training in Drug Supply Management.

Information on personnel responsible for Drug Supply Management and their training is presented in Table 3.5 (page 29). It shows that Pharmacist's Assistants (PAs) were in-charge of Drug Supply Management at seven facilities (19%). Although each Pharmacist's Assistant had a base clinic, most Pharmacist's Assistants were each assigned two to three facilities thereby rotating between them and concentrating on none.

Nursing personnel were in charge of Drug Supply Management at most (81%) of the facilities. These were mainly Registered Nurses (RNs) (66.7%). In some facilities, an Enrolled Nurse (EN) was assigned to work in the drug store and dispensary, under supervision of a Registered Nurse. Nurses who were assigned Drug Supply Management responsibilities also performed clinical duties. They reported that Drug Supply Management was not viewed as a primary function. It was thus attended to last.

Most of the clinics had at least one staff trained in Drug Supply Management (88%), or Rational Drug Use (82%) or Cold Chain Management (79%).

Drug Supply Management was performed on a rotational basis in 18 (50%) of the facilities visited and on a permanent basis in the other 18 (50%) facilities. In most facilities, no person had the full-time responsibility for Drug Supply Management.

Table 3.5 Personnel Indicators Related to Drug Supply Management at Clinics

Facility	Type	Owner	I/C of DSM		No. Trained		
			Qualification	Duration	DSM	RDU	CCM
Boikhutsong	Clinic	GPA	Reg.Nurse	Permanent	4	10	10
Bophelong	Clinic	GPA	Reg.Nurse	Permanent	1	0	1
Eesterust	Clinic	GPA	Reg.Nurse	Permanent	8	7	ND
Laudium	CHC	GPA	Reg.Nurse	Rotation	4	16	16
Mandisa Shiceka	Clinic	GPA	Reg.Nurse	Rotation	5	0	5
Pretoria North	Clinic	GPA	Reg.Nurse	Permanent	1	17	4
Skinner Street	Clinic	GPA	Reg.Nurse	Permanent	10	0	10
Soshanguve 3	CHC	GPA	Reg.Nurse	Rotation	4	ND	3
Soshanguve JJ	Clinic	GPA	Reg.Nurse	Permanent	1	1	7
Stanza Bopape	CHC	GPA	Enrld Nurse	Rotation	3	11	3
Sedibeng HC	Clinic	GPA	Reg.Nurse	Permanent	1	2	0
Jubilee Gateway	Clinic	Moretele	Reg.Nurse	Rotation	1	1	0
New Eersterust	Clinic	Moretele	Reg.Nurse	Rotation	0	1	1
Ramotse	Clinic	Moretele	Enrld Nurse	Rotation	1	1	1
Refentse	CHC	Moretele	Reg.Nurse	Permanent	1	0	0
Suurman	Clinic	Moretele	Enrld Nurse	Permanent	2	2	2
Temba	CHC	Moretele	Enrld Nurse	Rotation	11	11	11
Boekenhout	CHC	ODI	Reg.Nurse	Rotation	6	6	6
Itireleng	Clinic	ODI	Reg.Nurse	Permanent	0	0	0
Kgabo	CHC	ODI	Enrld Nurse	Permanent	16	16	27
Mpho ya Batho	Clinic	ODI	Reg.Nurse	Rotation	2	0	0
Phedison I	CHC	ODI	Reg.Nurse	Rotation	4	1	0
Atteridgeville	Clinic	CTMM	Pharm Asst	Rotation	1	5	6
Danville	Clinic	CTMM	Pharm Asst	Rotation	1	3	1
Folang	Clinic	CTMM	Pharm Asst	Rotation	1	10	1
Gazankulu	Clinic	CTMM	Reg.Nurse	Permanent	ND	1	1
Hercules	Clinic	CTMM	Reg.Nurse	Permanent	3	3	3
Karenpark	Clinic	CTMM	Reg.Nurse	Permanent	1	4	0
Laudium	Clinic	CTMM	Reg.Nurse	Permanent	0	5	5
Lyttelton	Clinic	CTMM	Reg.Nurse	Permanent	1	6	1
Mamelodi West	Clinic	CTMM	Pharm Asst	Permanent	ND	ND	ND
Phahameng	Clinic	CTMM	Pharm Asst	Rotation	1	5	5
Phomolong	Clinic	CTMM	Pharm Asst	Rotation	1	6	2
Rosslyn	Clinic	CTMM	Reg.Nurse	Permanent	1	5	1
Silverton	Clinic	CTMM	Reg.Nurse	Rotation	0	3	1
Stanza Bopape 2	Clinic	CTMM	Pharm Asst	Rotation	2	10	8
Performance Target (@ clinic)			Pharm Asst	Permanent	≥1	≥1	≥1
% of clinics which comply			19%	50%	88%	82%	79%

I/C = In-charge, DSM = Drug Supply Management, RDU = Rational Drug Use, CCM = Cold Chain Management, ND = No data, CTMM = City of Tshwane Metropolitan Municipality, GPA = Gauteng Provincial Authority, Reg = Registered, Enrld = Enrolled, Pharm. Asst = Pharmacist's Assistant

3.2.5. Cold Chain Management Indicators

The ideal way to maintain a vaccine cold chain is to use a standard Expanded Programme for Immunisation (EPI) fridge, record the fridge temperature daily using a Minimum-Maximum thermometer, avoid keeping stock in the fridge door and avoid using the vaccine fridge to store food and drinks.

Result presented in table 3.6 (page 31) show that only 35% (12 out of 34) of fridges were standard Expanded Programme for Immunisation fridges. Most of the clinics (85%) recorded the fridge temperature daily, though only 45% used the Minimum-Maximum thermometer. Other facilities used a normal thermometer and recorded the fridge temperature twice daily to try and capture the coolest and hottest times of the day. In 18% of the clinics with a fridge, stock was found stored in the fridge door while in 9% of the clinics, food or drinks were found stored in the vaccine fridge.

3.2.6. Prescribing Indicators

This group of indicators was evaluated in thirty-three clinics. The prescribing indicators together with their performance targets are shown in table 3.7 (page 32). It shows that: -

- The average number of drugs per patient encounter was 2.27 (range: 1.57 to 3.67).
- On average 51.6% (range 12.5% to 98.0%) of the drugs were prescribed by generic name.
- At least one antibiotic was prescribed in, on average, 35% (range 0% to 65.5%) of all patient encounters.
- On average, 17.2% (range 0% to 46.7%) of all patient encounters received an injection.
- On average 95.6% (range 81.8% to 100%) of drugs prescribed were on the Essential Drug List for Primary Health Care facilities.

Table 3.6 Cold Chain Management Indicators

Facility	Type	Owner	Type of Fridge			Cold Chain Management				
			EPI	Dom	Has fridge	Stock in door	Food in Fridge	Daily	Therm Type	Power Back-up
Boikhutsong	Clinic	GPA			No					
Bophelong	Clinic	GPA		Yes	Yes	No	No	Yes	Normal	Yes
Eesterust	Clinic	GPA		Yes	Yes	Yes	No	No	None	No
Laudium	CHC	GPA	Yes		Yes	No	No	Yes	Min-Max	Yes
Mandisa Shiceka	Clinic	GPA	Yes		Yes	No	No	Yes	Normal	No
Pretoria North	Clinic	GPA	Yes		Yes	No	No	Yes	Normal	No
Skinner Street	Clinic	GPA		Yes	Yes	No	Yes	Yes	Normal	No
Soshanguve 3	CHC	GPA	Yes		Yes	No	No	Yes	Normal	Yes
Soshanguve JJ	Clinic	GPA		Yes	Yes	No	Yes	No	None	No
Stanza Bopape	CHC	GPA		Yes	Yes	No	No	Yes	Min-Max	Yes
Sedibeng HC	Clinic	GPA			No					
Jubilee Gateway	Clinic	Moretele		Yes	Yes	Yes	No	Yes	Normal	Yes
New Eersterust	Clinic	Moretele		Yes	Yes	Yes	No	Yes	Normal	No
Ramotse	Clinic	Moretele		Yes	Yes	No	No	No	Normal	No
Refentse	CHC	Moretele	Yes		Yes	No	No	Yes	Normal	No
Suurman	Clinic	Moretele			No					
Temba	CHC	Moretele		Yes	Yes	Yes	No	Yes	Normal	No
Boekenhout	CHC	ODI	Yes		Yes	No	No	No	Normal	No
Itireleng	Clinic	ODI		Yes	Yes	No	No	No	Normal	No
Kgabo	CHC	ODI	Yes		Yes	No	No	Yes	Normal	No
Mpho ya Batho	Clinic	ODI	Yes		Yes	No	No	Yes	Normal	No
Phedison I	CHC	ODI	Yes		Yes	No	No	Yes	Normal	No
Atteridgeville	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Danville	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Folang	Clinic	CTMM		Yes	Yes	Yes	No	Yes	Min-Max	Yes
Gazankulu	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Hercules	Clinic	CTMM		Yes	Yes	No	Yes	Yes	Min-Max	No
Karenpark	Clinic	CTMM	Yes		Yes	No	No	Yes	Min-Max	No
Laudium	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Lytelton	Clinic	CTMM	Yes	Yes	Yes	No	No	Yes	Min-Max	No
Mamelodi West	Clinic	CTMM		Yes	Yes	Yes	No	Yes	Min-Max	No
Phahameng	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Phomolong	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Rosslyn	Clinic	CTMM	Yes		Yes	No	No	Yes	Normal	No
Silverton	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Stanza Bopape 2	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Performance Target (@ clinic)			Yes		Yes	No	No	Yes	Min-max	Yes
% of clinics which comply			36%		92%	82%	91%	85%	45%	18%

Dom = Domestic, Therm = Thermometer, EPI = Expanded Programme for Immunisation, CTMM = City of Tshwane Metropolitan Municipality, GPA = Gauteng Provincial Authority

Table 3.6 Cold Chain Management Indicators

Facility	Type	Owner	Type of Fridge			Cold Chain Management				
			EPI	Dom	Has fridge	Stock in door	Food in Fridge	Daily	Therm Type	Power Back-up
Boikhutsong	Clinic	GPA			No					
Bophelong	Clinic	GPA		Yes	Yes	No	No	Yes	Normal	Yes
Eesterust	Clinic	GPA		Yes	Yes	Yes	No	No	None	No
Laudium	CHC	GPA	Yes		Yes	No	No	Yes	Min-Max	Yes
Mandisa Shiceka	Clinic	GPA	Yes		Yes	No	No	Yes	Normal	No
Pretoria North	Clinic	GPA	Yes		Yes	No	No	Yes	Normal	No
Skinner Street	Clinic	GPA		Yes	Yes	No	Yes	Yes	Normal	No
Soshanguve 3	CHC	GPA	Yes		Yes	No	No	Yes	Normal	Yes
Soshanguve JJ	Clinic	GPA		Yes	Yes	No	Yes	No	None	No
Stanza Bopape	CHC	GPA		Yes	Yes	No	No	Yes	Min-Max	Yes
Sedibeng HC	Clinic	GPA			No					
Jubilee Gateway	Clinic	Moretele		Yes	Yes	Yes	No	Yes	Normal	Yes
New Eersterust	Clinic	Moretele		Yes	Yes	Yes	No	Yes	Normal	No
Ramotse	Clinic	Moretele		Yes	Yes	No	No	No	Normal	No
Refentse	CHC	Moretele	Yes		Yes	No	No	Yes	Normal	No
Suurman	Clinic	Moretele			No					
Temba	CHC	Moretele		Yes	Yes	Yes	No	Yes	Normal	No
Boekenhout	CHC	ODI	Yes		Yes	No	No	No	Normal	No
Itireleng	Clinic	ODI		Yes	Yes	No	No	No	Normal	No
Kgabo	CHC	ODI	Yes		Yes	No	No	Yes	Normal	No
Mpho ya Batho	Clinic	ODI	Yes		Yes	No	No	Yes	Normal	No
Phedison I	CHC	ODI	Yes		Yes	No	No	Yes	Normal	No
Atteridgeville	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Danville	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Folang	Clinic	CTMM		Yes	Yes	Yes	No	Yes	Min-Max	Yes
Gazankulu	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Hercules	Clinic	CTMM		Yes	Yes	No	Yes	Yes	Min-Max	No
Karenpark	Clinic	CTMM	Yes		Yes	No	No	Yes	Min-Max	No
Laudium	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Lyttelton	Clinic	CTMM	Yes	Yes	Yes	No	No	Yes	Min-Max	No
Mamelodi West	Clinic	CTMM		Yes	Yes	Yes	No	Yes	Min-Max	No
Phahameng	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Phomolong	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Roslyn	Clinic	CTMM	Yes		Yes	No	No	Yes	Normal	No
Silverton	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Stanza Bopape 2	Clinic	CTMM		Yes	Yes	No	No	Yes	Min-Max	No
Performance Target (@ clinic)			Yes		Yes	No	No	Yes	Min-max	Yes
% of clinics which comply			36%		92%	82%	91%	85%	45%	18%

Dom = Domestic, Therm = Thermometer, EPI = Expanded Programme for Immunisation, CTMM = City of Tshwane Metropolitan Municipality, GPA = Gauteng Provincial Authority

Table 3.7 Prescribing Indicators for Clinics in Tshwane

Ser.No	Facility	Type	Owner	Drugs/Pt	%Generics	%ABs	% Injections	%on EDL
1	Boikhutsong	Clinic	GPA	2.59	64.0	65.5	6.9	98.7
2	Bophelong	Clinic	GPA	2.83	52.9	24.1	10.3	100.0
3	Eesterust	Clinic	GPA	2.00	12.5	0.0	25.0	100.0
4	Laudium	CHC	GPA	3.63	52.0	48.1	22.2	92.9
5	Mandisa Shiceka	Clinic	GPA	-	-	-	-	-
6	Pretoria North	Clinic	GPA	2.62	46.1	17.2	3.4	94.7
7	Skinner Street	Clinic	GPA	3.07	38.0	33.3	10.0	100.0
8	Soshanguve 3	CHC	GPA	2.07	45.2	44.8	34.5	100.0
9	Soshanguve JJ	Clinic	GPA	1.87	37.5	53.6	3.6	96.4
10	Stanza Bopape	CHC	GPA	2.13	39.1	33.3	13.3	100.0
11	Sedibeng HC	Clinic	GPA	3.67	39.1	50.0	0.0	100.0
12	Jubilee Gateway	Clinic	Moretele	2.00	66.7	33.3	6.7	86.7
13	New Eersterust	Clinic	Moretele	2.87	47.7	56.7	10.0	98.8
14	Ramotse	Clinic	Moretele	2.03	62.3	26.7	23.3	98.4
15	Refentse	CHC	Moretele	2.03	82.0	36.7	6.7	98.4
16	Suurman	Clinic	Moretele	1.57	80.9	20.0	0.0	100.0
17	Temba	CHC	Moretele	1.67	52.0	30.0	33.3	96.0
18	Boekenhout	CHC	Odi	1.87	69.6	33.3	10.0	98.0
19	Itireleng	Clinic	Odi	2.83	42.4	46.7	6.7	89.4
20	Kgabo	CHC	Odi	1.83	58.2	30.0	16.7	98.2
21	Mpho Ya Batho	Clinic	Odi	1.80	42.6	10.0	13.3	90.7
22	Phedisong 1	CHC	Odi	1.83	47.3	40.0	6.7	94.5
23	Atteridgeville	Clinic	CTMM	1.83	32.7	50.0	33.3	81.8
24	Danville	Clinic	CTMM	2.36	56.1	29.6	37.0	98.5
25	Folang	Clinic	CTMM	2.33	38.6	64.3	7.1	98.6
26	Gazankulu	Clinic	CTMM	1.85	60.4	15.4	42.3	93.6
27	Hercules	Clinic	CTMM	2.50	50.7	16.7	40.0	93.3
28	Karenpark	Clinic	CTMM	1.97	96.6	39.3	17.9	100.0
29	Laudium	Clinic	CTMM	2.20	22.7	40.0	10.0	93.9
30	Lyttelton	Clinic	CTMM	-	-	-	-	-
31	Mamelodi West	Clinic	CTMM	2.40	40.0	25.0	25.0	91.7
32	Phahameng	Clinic	CTMM	2.57	29.9	43.3	26.7	93.5
33	Phomolong	Clinic	CTMM	2.23	55.2	13.3	46.7	91.0
34	Roslyn	Clinic	CTMM	1.63	98.0	57.7	7.7	89.8
35	Silverton	Clinic	CTMM	2.13	43.8	26.7	10.0	98.4
36	Stanza Bopape 2	Clinic	CTMM	-	-	-	-	-
Mean				2.27	51.6	35.0	17.2	95.6
Maximum				3.67	98.0	65.5	46.7	100.0
Minimum				1.57	12.5	0.0	0.0	81.8
Performance target				≤2	100	≤25	≤15	100
% of Clinics which meet the target				39%	0%	27%	58%	24%

3.3. Impact of Various Factors on the Status of Drug Supply Management in Tshwane

In order to assess the impact of various factors on the status of Drug Supply Management in Tshwane, several hypotheses were used.

3.3.1. Effect of Category of Staff (Pharmacist's Assistant versus Nurse) on Drug Supply Management Indicators

Table 3.8 (derived from Table A5 [page 71] and Table A8 [pages 74-79]) below shows that a Pharmacist's Assistant was in charge of Drug Supply Management at seven clinics and a nurse was in charge at twenty-nine clinics.

Table 3.8 Effect of type of staff in charge (Pharmacist's Assistant versus Nurse) on Drug Supply Management Indicators

Indicator	Staff in charge of DSM				p value
	PA, n = 7		Nurse, n = 29		
	No	%	No	%	
Restricted access	2	28.6	14	48.3	0.6045
All stock off the floor	5	71.4	17	58.6	0.8485
Adequate receiving procedures	1	14.3	19	65.5	0.9521
Has all SOPs	0	0.0	17	58.6	0.0180
Use formal quantification method	6	85.7	13	44.8	0.1277
Use stock cards	0	0	24	82.8	0.0002
Av. % items stock on card = shelf	-	-	-	57.8	-
Record fridge temperature daily	7	100.0	21	80.8*	0.5056
No stock in fridge door	5	71.4	22	84.6*	0.8019
No food/drink in vaccine fridge	7	100	23	88.5*	0.8399
Av. % of items O/S at least once	-	22.9	-	36.2	0.1826
Av. % in stock on day of study	-	90.1	-	86.9	0.4288

SOPs = Standard Operating Procedures, Av = Average, PA = Pharmacist's Assistant,

DSM = Drug Supply Management, O/S = Out of stock, *n=26

The indicators of the two categories were as follows: -

- Only 28.6% of the clinics run by a Pharmacist's Assistant controlled access to the drug store, compared to 48.3% run by a nurse.
- All stock was off the floor at 71.4% of the clinics run by Pharmacist's Assistants, compared to 58.6% run by nurses.
- Receiving procedures were adequate at 14.3% of the clinics run by a Pharmacist's Assistant, compared to 65.5% run by a nurse.
- There was no clinic run by a Pharmacist's Assistant that had the entire tracer Standard Operating Procedures compared to 58.6% of the clinics run by a nurse.
- The majority (85.7%) of the clinics run by a Pharmacist's Assistant used a formal quantification method, compared to 44.8% of the clinics run by a nurse.
- None of the clinics run by a Pharmacist's Assistant had a standard stock card, compared to 82.8% of the clinics run by a nurse.
- At all the clinics run by a Pharmacist's Assistant the fridge temperature was monitored daily, compared to 80.8% of the clinics run by a nurse.
- No stock was found in the fridge door at 71.4% of the clinics run by a Pharmacist's Assistant, and at 84.6% of those run by a nurse.
- No food or drink was found in the vaccine fridge at all clinics run by a Pharmacist Assistant, and at 88.5% of those run by a nurse.

3.3.2. Effect of Rotation of Staff In-charge on Drug Supply Management Indicators

Table 3.9 (page 35) shows that the number of clinics at which the staff in charge of the Drug Supply Management was rotated was equal to that where the staff in-charge was permanent.

Table 3.9 Effect of Rotation of Staff In-charge on Drug Supply Management Indicators

Indicator	Nature of Deployment				p value
	Permanent, n=18		Rotation, n = 18		
	No	%	No	%	
Restricted access	10	55.6	6	33.3	0.3143
All stock off the floor	10	55.6	12	66.7	0.7324
Adequate receiving procedures	12	66.7	8	44.4	0.3143
Has all SOPs	9	50.0	8	44.4	0.6318
Use formal quantification method	9	50.0	10	55.6	0.3682
Use stock cards	13	72.2	11	61.1	0.7237
Av. %items stock on card = shelf	-	61.6	-	50.5	0.3492
Record fridge temperature daily	12	80.0**	16	88.9	0.8246
No stock in fridge door	13	86.7**	14	77.8	0.8368
No food/drink in vaccine fridge	12	80.0**	18	100	0.1670
Av. % of items O/S at least once	-	35.1	-	31.7	0.6948
Av. % in stock on day of study	-	86.2	-	88.7	0.4549

SOPs = Standard Operating Procedures, Av = Average, **n=15, O/S = Out of stock

The indicators of the two categories were as follows: -

- Access to the drug store was controlled at 33.3% of the clinics where the in-charge was rotated, compared to 55.6% where the in-charge was permanent.
- All the stock was off the floor at 66.7% of the clinics where the in-charge was rotated compared to 55.6% where the in-charge was permanent.
- Receiving procedures were adequate at 44.4% of the clinics where the in-charge was rotated, compared to 66.7% where the in-charge was permanent.
- A formal quantification method was used at 55.6% of the clinics where the in-charge was rotated, compared to 50% where the in-charge was permanent.
- Standard stock cards were used at 61.1% of the clinics where the in-charge was rotated, compared to 72.2% where the in-charge was permanent.

- The fridge temperature was recorded daily at 88.9% of the clinics where the in-charge was rotated, compared to 80% where the in-charge was permanent.

3.3.3. Impact of Training in Drug Supply Management

Table 3.10 below (derived from Table A6 [page 72] and Table A8 [pages 74-79]) shows that thirty clinics had at least one staff trained in Drug Supply Management while four clinics had none. Data on training in Drug Supply Management at two clinics was not available as there was no record.

Table 3.10 Impact of Training in Drug Supply Management

Indicator	Number of staff trained in DSM				p value
	At least one, n = 30		None, n = 4		
	No	%	No	%	
Restricted access	13	43.3	2	50.0	0.7766
All stock off the floor	19	63.3	2	50.0	0.9743
Adequate receiving procedures	19	63.3	1	25.0	0.3563
Has all SOPs	3	10.0	1	25.0	0.9612
Use formal quantification method	16	53.3	1	25.0	0.5945
Use stock cards	22	73.3	2	50.0	0.7055
Av. %items stock on card = shelf	-	57.6	-	37.5	0.3390
Record fridge temperature daily	23	85.2***	3	75.0	0.8325
No stock in fridge door	23	85.2***	3	75.0	0.8325
No food/drink in vaccine fridge	24	88.9***	4	100	0.8379
Av. % of items O/S at least once	-	33.0	-	50.9	0.3026
Av. % in stock on day of study	-	86.8	-	95.6	0.0683

SOPs = Standard Operating Procedures, Av = Average, **n=15, O/S = Out of stock,

DSM = Drug Supply Management

The indicators of the two categories were as follows: -

- Access to the drug store was controlled at 43.3% of the clinics where at least one staff was trained, compared to 50% where no staff was trained.

- All the stock was off the floor at 63.3% of the clinics where at least one staff was trained compared to 50% of the clinics where no staff was trained.
- Receiving procedures were adequate at 63.3% of the clinics where at least one staff was trained compared to 25% where no staff was trained.
- The entire tracer Standard Operating Procedures were available at 10% of the clinics where at least one staff was trained, compared to 25% where no staff was trained.
- A formal quantification method was used at 53.3% of the clinics where at least one staff was trained, compared to 25% where no staff was trained.
- Standard stock cards were used at 73.3% of the clinics where at least one staff was trained, compared to 50% where no staff was trained.

3.3.4. Impact of Training in Rational Drug Use

Training in Rational Drug Use is more likely to influence prescription and patient care indicators. Table 3.11 (derived from Table A8 page 74-79) below shows indicators of a group of clinics with at least one person trained in Rational Drug Use and the other group with nobody trained in Rational Drug Use.

Table 3.11 Impact of training in Rational Drug Use on some Drug Supply Management Indicators

Indicator	Number of staff trained in Rational Drug Use		Target	p value
	At least one n = 26	None n = 5		
Average Number of Drugs per Patient	2.22	2.51	≤2	0.2799
Av.% Drugs Prescribed by Generic name	52.3	51.6	100	0.9412
Av. % of Encounters given an Antibiotic	35.9	30.2	≤25	0.4778
Av. % of Encounters given an Injection	17.7	9.4	≤15	0.0099
Av. % Prescribed drugs on the EDL	95.6	95.7	100	0.9664

Av. = Average, EDL = Essential Drug List

The average number of drugs per patient encounter among clinics with at least one person trained was 2.22 compared to 2.51 in the group with nobody trained. Generic names were used in 52.3% of all the prescribed drugs among the group with trained personnel compared to 51.6% among the group with nobody trained. On average, 35.9% of the patient encounters among clinics with at least one trained person received an antibiotic compared to 30.2% in the group with no one trained. On average, 17.7% of the patient encounters in the group with at least one trained person received an injection compared to 9.4% among the group with no one trained. On average, 95.6% of the drugs prescribed at the clinics with at least one trained person were on the Essential Drugs List for Primary Health Care facilities compared to 95.7% at the clinics with no one trained.

3.3.5. Impact of Training in Cold Chain Management

Table 3.12 below (derived from Table A8 page 74-79) shows the indicators of the twenty-five clinics with at least one person trained in Cold Chain Management and six with nobody trained.

Table 3.12 Variation of Indicators According to number of Personnel Trained in Cold Chain Management

Indicator Affected	Number Trained in Cold Chain Management				p value
	At least one (n=25)		None (n=6)		
	No	%	No	%	
Record fridge temperature daily	22	88.0	5	83.3	0.08544
No stock in fridge door	22	88.0	5	83.3	0.08544
No food/drink in vaccine fridge	22	88.0	6	100	0.37346

The clinics with at least one person trained in Cold Chain Management performed better in recording the fridge temperature and avoiding storage of stock in the fridge door compared to those with no one trained. No food or drink was found in the fridge

at all the clinics with no one trained compared to 88% of those with at least one person trained.

3.3.6. Effect of the Method of Quantification on Availability of Drugs

An adequate quantification method is expected to enhance drug availability at the facility. Table 3.13 below (derived from Table A7, page 73) shows drug availability indicators according to the method of quantification and their correlation with the percentage of tracer items whose re-order level had been determined (%ROL).

On average, 23.7% of the tracer items had been out of stock at least once in the past year among clinics with a good quantification method compared to 43.8% at the clinics without a good quantification method. Among the clinics with a good quantification method, 88.2% of the tracer items were in stock on the day of the study compared to 86.6% at the clinics that used only experience.

Table 3.13 The Impact of Quantification Method on Drug Availability Indicators.

Indicator	Quantification Method		p value	r of %ROL versus availability indicator
	ROL/Min-Max	Experience		
% of tracer items O/S in the past year	23.7	43.8	0.0138	r = -0.299
% of tracer items in stock on day of study	88.2	86.2	0.6778	r = +0.104

r = Correlation coefficient, ROL = Re-Order Level, Min-Max = Minimum- Maximum Levels, %ROL = % of items whose ROL had been determined

3.3.7. Effect of Supply from Independent Sub-depot or Hospital Pharmacy on Some Drug Supply Management indicators

The drug supply indicators for the two categories of suppliers are presented in Table 3.14 below (derived from Table A4, page 70).

Table 3.14 Drug Supply Indicators at the Clinic According to Type of Supplier

Type of supplier	Lead time (days)	% of order supplied	% O/S in past year	% in stock on study day
Average for all Sub-depots	11.2	79.0	33.1	87.6
Independent sub-depots	11.7	82.5	24.6	88.8
Hospital pharmacies	10.3	70.9	50.0	85.0
p values	0.4521	0.0069	0.0024	0.2813

O/S = Out of stock

Independent Sub-depots and Hospital Pharmacies had practically similar lead times but the former had a better service level. Clinics supplied by independent Sub-depots had better availability and less stock out of key drugs compared to those supplied by Hospital Pharmacies.

3.3.8. Effect of Availability of Standard Operating Procedures on Status of Drug Supply Management

Table 3.15 below shows indicators according to availability of standard operating procedures.

Table 3.15 Distribution of clinics and variation of Indicators According to Availability of Standard Operating Procedures

	Receiving Procedures adequate		Stock Off the floor		Good Quantification Method		% ROL determined
	Yes	No	Yes	No	Yes	No	Average
Has all SOPs	12	5	12	5	8	9	66.5
No SOPs	8	11	10	9	11	8	81.3
p values	0.1673		0.4467		0.7522		0.5098

ROL = Re-Order Level

In the next chapter, the above results are discussed in comparison with standard performance targets and results from other studies carried out in South Africa and other countries.

4. DISCUSSION

4.1. Status of Drug Supply Management

4.1.1. Facility Indicators

The status of facilities has an impact on the quality of Drug Supply Management. Table 3.2 (page 25) shows that the proportion of clinics with adequate storage facilities was generally low, although clinics under City of Tshwane Metropolitan Municipality had generally better facility indicators than those under Gauteng Provincial Authority, Moretele and Odi Districts. The status of facilities for Drug Supply Management was similar to what was observed by Summers *et al* in NMTTS District of Northern Province³².

4.1.2. Performance of the Main Suppliers of Primary Health Care Clinics in Tshwane

Table 3.3 (page 26) shows that all the sub-depots received a good service level (>94%) from the provincial depots compared to the WHO recommended standard (95%). However, their average service level (79%) to the Primary Health Care clinics was below this standard performance target. Only a few clinics (4%) received a level of service above the standard. Nevertheless, this service level was better than what was observed in NMTTS District of Northern Province (66.7%)³².

Table 3.14 (page 40) shows that clinics supplied by independent sub-depots (Pretoria Regional Pharmacy and Tshwane Metro Pharmacy) had better drug availability and less out of stock of tracer items compared to those supplied by hospital pharmacies (Jubilee and Odi). The differences between the two groups were significant with respect to average service level ($p = 0.0069$) and average percentage of items that had been out of stock at least once in the past year ($p = 0.0024$), but the data could not

prove the difference with respect to average lead time ($p = 0.452$) and percentage of tracer items in stock on the day of the study ($p = 0.281$).

This data shows that drugs were less likely to be out of stock and hence more available at clinics supplied by an independent sub-depot compared to those supplied by a hospital pharmacy. It is likely that a hospital pharmacy gave priority to the hospital in case of drug shortage thus causing shortages at the clinics supplied.

Stafford *et al*⁸ did not perform this assessment during the pharmaceutical audit in Tshwane.

4.1.3. Procurement, Availability and Control of Drugs

4.1.3.1. Availability of Standard Operating Procedures

Availability and use of standard operating procedures ensures consistency in carrying out operations. All clinics were expected to have all the tracer standard operating procedures but only 47% of the clinics had all of them (Table 3.15, page 40). However, the differences between indicators of the group of clinics with standard operating procedures and the group without were not statistically significant ($p > 0.05$). This confirms the observation that in most cases where the standard operating procedures were available, they were filed away and not available to the staff performing the duties.

4.1.3.2. Receiving Procedures

The standard way to receive stock is for received stock to be off-loaded in a secure cage where it is quarantined and checked against the order, invoice and delivery note before placing it in the main store. The delivery note should be in duplicate and both parties must retain a signed copy. Any discrepancies should be formally reported within a stipulated period⁴⁰. These measures are meant to enhance control of and accountability for drugs throughout the supply chain. This was practised at only 56%

of the clinics. This points to poor accountability for drugs since one cannot account for drugs for which there is no confirmation of receipt.

4.1.3.3. Availability and Use of Stock Cards.

A Stock card is an important tool for drug management. According to Gray⁴¹, stock cards serve four basic functions:

- They allow staff to account for and monitor the movement of drugs over a period of time. By comparing physical stock with record of stock balance on the card (stocktaking) one is able to identify stock losses or disappearance of drugs.
- They are used to calculate the quantities of drugs that need to be ordered. If correctly maintained, one is able to calculate consumption and hence quantities to order.
- They can be used to monitor the efficiency of the Drug Management System. If well maintained, one can calculate Lead Time, Ordering Frequency and stock out levels from stock cards.
- They aid proper storage of drugs and stock rotation by alerting staff to the expiry dates.

For effective drug control, there should be one stock card per item. A separate stock card is created for each item, in each pack size and strength. The necessary information must be recorded at the time of each stock movement (receipts, issues and write-offs)⁴¹.

The maintenance of stock cards was studied using the tracer drugs and non-drug items. Out of 36 facilities evaluated, 24 (67%) used stock cards (Table 3.4, page 27). On average physical stock on the shelf was found to be equal to the balance quantities on the stock card only for 55.9% (range 8.3% to 100%) of the tracer items, compared

to the performance standard of 100%. Errors in management of stock cards arose because of reasons similar to those identified by Gray ⁴¹:

- Stores were disorganised so that stock could not be linked to the correct card.
- “Closed” stock was accessible without restrictions.
- Stocktaking was not done and discrepancies not traced and corrected.
- Stock was received or issued but not recorded.
- No one was made responsible for stock management.
- Personnel were not well trained.
- Different facilities used different systems making monitoring difficult.
- Stock cards were poorly designed or did not record all the information needed.

The availability of stock cards was better than what was observed earlier in Tshwane by Stafford *et al* (47%)⁸ in 2000, and in Northern Province by Summers *et al*, (42.9%)³². Balancing of stock was more accurate than what Stafford *et al* found earlier (41%)⁸, but less accurate than what Summers *et al* found in Northern Province (95%)³². This further points to poor control and accountability for drugs.

4.1.3.4. Quantification Method

A good quantification method is important to avoid stock-outs and ensure continuous availability of essential drugs and supplies; to avoid wastage due to overstocking; to make the best use of scarce resources, and; to provide accurate data to lobby for adequate funding.

All clinics were therefore expected to have a formal quantification method to determine the quantities of drugs to order. During this study, both the Re-Order Level (ROL) and Minimum-Maximum Level (Min-Max) methods were considered adequate, but use of only experience was not considered adequate. Therefore, the Re-Order Levels of all tracer items were expected to have been determined.

Table 3.4 (page 27) shows that the method of quantification was found adequate at 53% of the clinics. This was worse than what was found earlier (88%)⁸, but better than what was observed in Northern Province (0%)³². On average, the Re-Order Levels of only 33.8% of the tracer items had been determined, compared to the standard target of 100%. It is possible that poor quantification methods may have contributed to the dispute over the actual drug budget requirements and the observed stock outs.

4.1.3.5. Availability of Tracer Drugs

Drug availability is the litmus test for the status of Drug Supply Management. Table 3.4 (page 27) shows that on average 33.1% (range 0% to 83.3%) of the tracer items had been out of stock at least once in the past year, compared to the standard of $\leq 10\%$. Only 7% of the clinics met this standard. On the day of the study, on average 87.6% (range 70% to 100%) of the tracer item were in stock, compared to the standard target of 90%. Slightly more than half (58%) of the clinics met the target. Drug availability was similar to what was observed in Kampong Thom Province in Cambodia (86.6%)²³, but better than what was observed in NMTTS District of Northern Province (75.2%)³². Data obtained by Stafford *et al*⁸ could not be compared because different indicators were used. Nevertheless, these results point to weaknesses in Drug Supply Management in Tshwane.

4.1.4. Cold Chain Management Indicators

The ideal way to maintain a vaccine cold chain is to use a standard Expanded Programme for Immunisation fridge, record the fridge temperature daily using a Minimum-Maximum thermometer, avoid keeping stock in the fridge door and avoid using the vaccine fridge to store food and drinks^{11,42}. The cold chain indicators are presented in table 3.6 (page 31). These observations show that cold chain

management was generally adequate, although there was great variation between the clinics. The majority of the clinics (92%) had a fridge, although only 35% (12 out of 34) of the fridges were of the Expanded Programme for Immunisation standard type. Most of these clinics (85%) complied with the standard of recording the fridge temperature daily, though only a few (45%) used the ideal Minimum-Maximum thermometer. Other clinics used a normal thermometer and recorded the fridge temperature twice daily to try and capture the coolest and hottest parts of the day. This practice has limitations given the fluctuation of weather in Gauteng. Some incidences of poor practice were found; stock was found stored in the fridge door in six (18%) of the clinics with a fridge and food or drinks were found stored in the vaccine fridge in three (9%) the clinics. The level of cold chain management was comparable to that observed by Summers *et al* in Northern Province³² and Gazmararrian *et al* at primary care offices in four cities in USA²⁵.

4.1.5. Prescribing Indicators

Table 3.7 (page 32) shows that prescribing was generally below the performance targets. Only 13 clinics (39%) scored within the performance target of not more than an average of 2 drugs per patient encounter. The average number of drugs per patient encounter was 2.27 (range of 1.57 to 3.67). This is similar to what was observed by Stafford *et al* (2.43)⁸ in Tshwane, but higher than what was observed by Summer *et al* (1.85) in NMTTS District of Northern Province³². It is also similar to what was observed in Mozambique (2.2)¹¹, Tanzania (2.2)²⁷ and Cambodia (2.35)²³, but lower than what was found in Indonesia (3.3)¹⁴, Swaziland (3.0)¹¹, Cameroon (3.0)¹¹, Nigeria (3.8)¹⁵, and Ghana (4.3)¹¹.

None of the clinics had all the drugs prescribed by generic name, as recommended. On average, 51.6% (range 12.5% to 98.0%) of the drugs were prescribed by generic

name. This is below what was observed in Northern Province (60.4)³² and most studies cited earlier from other countries¹² (Table 1.2, page 8), except Nepal (44%)²⁸ and Ecuador (37%)²⁹.

On average 35% (range 0% to 65.5%) of all patient encounters received at least one antibiotic. This is higher than the target upper limit of 25% patient encounters, but similar to what was observed in Northern Province (37.8%)³² and Malawi (34%)¹³. The use of antibiotics was higher in most of the other studies earlier cited¹² (Table 1.2, page 8). Nevertheless, 75% of the clinics were within the target of not more than 25%.

On average, 17.2% (range 0% to 46.7%) of all patient encounters received an injection. This was slightly higher than the target upper limit of 15% patient encounters, and higher than what was observed in Northern Province (9.8%)³². It is similar to what was observed in Malawi (19%)¹³, Indonesia (17%)¹⁴, Mozambique (18%)¹¹ and Ecuador (17%)²⁹, but lower than what was observed in Uganda (36%)²⁶, Sudan (36%)¹⁷, Swaziland (38%)¹¹, Tanzania (29%)²⁷, Nigeria (37%)¹⁵, Ghana (56%)¹¹ and Cameroon (41%)¹¹. Less than a half (42%) of the clinics were within the target of not more than 15%.

Although the average percentage of drugs prescribed that were on the Essential Drug List for Primary Health Care Facilities (95.6%) was below the 100% target⁴³, it was higher than what was observed in Northern Province (83.9%)³², Tanzania (88%)²⁷ and Nepal (86%)²⁸. It is however similar to what was observed in Cambodia (99.7%)²³. Only 24% of the clinics met the target of 100%.

Although the prescription indicators for most clinics were below the performance target the overall performance was reasonable. Nevertheless, the use of antibiotics was high and needs further investigation.

4.2. Evaluations of the Gaps Observed in Drug Supply

Management in Tshwane

The discussion in the previous section shows that the status of Drug Supply Management in Tshwane was generally inadequate compared to the WHO recommended performance standards. The following is an evaluation of some of the possible reasons for the observed gaps. It is based on the hypotheses set up for the study.

4.2.1. Effect of Quantification Method on Drug Availability

An adequate quantification method is expected to enhance drug availability at the facility. Table 3.13 (page 39) shows that on average, 23.7% of the tracer items had been out of stock at least once in the past year among clinics with a good quantification method compared to 43.8% at the clinics without a good quantification method. Among the clinics with a good quantification method, 88.2% of the tracer items were in stock on the day of the study compared to 86.6% at the clinics that used only experience. There was a slightly positive correlation between the percentages of tracer items whose re-order level had been determined and both the percentage of tracer items in stock on the day of the study ($r = +0.104$). There was a slightly negative correlation between the percentage of tracer items whose re-order level had been determined and the percentage of items that had been out of stock at least once in the past year ($r = -0.299$). The differences between the two groups were significant with respect to the average percentage of items that had been out of stock at least once in the past year ($p = 0.01381$). However, the data could not prove the difference between the two groups with respect to the average percentage of tracer items in stock on the day of the study ($p = 0.6778$).

This data shows that determination of the Re-Order Levels facilitated drug quantification, which in turn enhanced drug availability and reduced stock outs. It can therefore be concluded that a good quantification method was associated with better drug availability and less stock outs.

Stafford *et al*⁸ did not perform this assessment during the pharmaceutical audit in Tshwane.

4.2.2. Effect of Category of Staff (Pharmacist's Assistant versus Nurse) on Drug Supply Management Indicators

Once drugs are available at the clinic and there are adequate facilities, professional guidelines require that drugs should be managed full time by someone with basic training in Pharmacy and/or further training in Drug Supply Management. Table 3.5 (page 29) shows that staffing for Drug Supply Management was not adequate in terms of appropriate cadre and nature of deployment. Pharmacist's Assistants (PAs) were in-charge of Drug Supply Management at seven facilities (19%), all belonging to the City of Tshwane, compared to twenty-nine (81%) by nurses.

Table 3.8 (page 33) shows that 28.6% of the clinics where a Pharmacist's Assistant was in charge practised restricted access to the store compared to 48.3% of those where a nurse was in charge ($p = 0.6045$). Receiving procedures were adequate at 14.3% of the clinics where a Pharmacist's Assistant was in charge compared to 65.5% of those where a nurse was in charge ($p = 0.9521$). Although these differences were insignificant, they were also contrary to expectations. A possible explanation for the differences was that Pharmacist's Assistants actually only used these seven clinics as base stations but were assigned more than one clinic. In their absence, nurses took charge of Drug Supply Management, thus having unrestricted access. Often, drugs were delivered in the absence of the Pharmacist's Assistant and no one took

responsibility for the receiving procedures because this was seen as the responsibility of the Pharmacist's Assistant.

The average percentage of tracer items that had been out of stock at least once in the past year was 22.9% in clinics where the person in charge was a Pharmacist's Assistant compared to 36.2% in clinics where the person in charge was a nurse ($p = 0.1826$). The average percentage of tracer items found in stock on the day of the study was 90.1% in clinics where the person in charge was a Pharmacist's Assistant compared to 86.9% in clinics where the person in charge was a nurse ($p = 0.4288$). The differences too were not significant.

The only significant differences between the two groups were with respect to availability of standard operating procedures (SOPs) ($p = 0.0180$) and use of stock cards ($p = 0.0002$), where the clinics at which the person in charge was a nurse performed better. A possible explanation to these differences lies in the fact that SOPs and stock cards are policy documents, which are normally developed at the departmental level. All the clinics where the person in charge was a Pharmacist's Assistant belonged to the City of Tshwane, which had not developed these documents.

Therefore, the data from this study did not prove that the type of health worker (Pharmacist's Assistant versus nurse) in charge of Drug Supply Management at the clinic had a significant impact on drug availability. The possible effect of the small number of clinics where the Pharmacist's Assistant was in charge (seven), on the level of significance should be borne in mind³⁸. The rotation of the Pharmacist's Assistant between several clinics made them ineffective. Drug Supply Management was effectively in the hands of nurses at all clinics, hence, the lack of significant difference. In fact lack of responsibility was likely to result in poor controls and lack

of accountability for drugs at the clinics among which the Pharmacist's Assistants rotated. There is also a possibility that more factors influence the level of Drug Supply Management, than the category of health worker in charge. An assessment of rational drug use and prescribing in primary health care facilities in Northwest Ethiopia showed that, apart from a few exceptions, the drug use indicators in health centres and health stations and between retrospective and prospective studies were similar despite differences in manpower and facilities²⁰.

4.2.3. Effect of Rotation of Personnel in Charge of Drug Supply Management Indicators

Table 3.5 (page 29) shows that the clinics at which the person in charge of Drug Supply Management was permanent were equal in number to those where the person in charge was rotated.

Table 3.9 (page 35) shows that clinics with a permanent person in charge had better indicators for practising restricted access to the store, receiving procedures, availability of SOPs and use of stock cards, compared to those where the person in charge was rotated. This further clarifies the observations at clinics where the Pharmacist's Assistants were in charge but rotated among several clinics. Nevertheless, the differences between the indicators for the two groups were not significant ($p > 0.05$).

Also differences in drugs availability were noted between the groups. Also the differences between the two groups were found not to be significant for percentage of tracer items that had been out of stock at least once in the past year ($p = 0.6948$); percentage of tracer items that were found in stock on the day of the study ($p = 0.4549$), and; the percentage of tracer items whose physical stock was equal to the balance as shown on the card ($p = 0.3492$).

Therefore, although a permanent person in charge was associated with better Drug Supply Management indicators, the data did not prove that rotation of the person in charge had a significant impact on the status of Drug Supply Management.

4.2.4. Effect of Training in Drug Supply Management on the Status of Drug Supply management

Professional guidelines require that drugs should be managed full time by someone with basic training in Pharmacy and/or further training in Drug Supply Management. This implies that clinics that have at least one person trained in Drug Supply Management are expected to manage drugs better.

Table 3.5 (page 29) shows that the majority (30 out of 34) of the clinics evaluated had at least one staff trained in Drug Supply Management. Table 3.10 (page 36) shows that this group had better indicators for keeping stock off the floor, adequate receiving procedures, good quantification method, use of stock cards and balance of physical stock with record on the card. However, the differences were found not to be significant ($p > 0.05$).

The small sample in the comparison group (4 clinics without anybody trained) could have contributed to this unexpected observation³⁸. In addition, the study observed that, in most cases, the skills acquired from the training were not passed on to other staff and the person trained was not always the one in charge of Drug Supply Management. The study also observed that health managers did not effectively supervise the personnel in charge of drugs at most of the clinics. Under such circumstances, any improvements could not be sustained. This view is supported by the observations by Trap *et al*, in a randomised controlled indicator study in Zimbabwe, to assess the impact of supervision on stock management and adherence to treatment guidelines²². It was observed that, while training of health workers

throughout the country in drug management (including stock management and rational drug use) resulted in significant improvements in a variety of drug supply management indicators; these achievements could not be sustained until a further intervention of support supervision was introduced.

Therefore, the skills acquired from training were not properly deployed to influence quality Drug Supply Management.

4.2.5. Effect of Training in Rational Drug Use on the Status of Drug Supply Management

Training in Rational Drug Use is more likely to influence prescription indicators. Table 3.11 (page 37) shows that the clinics with at least one person trained in Rational Drug Use performed better with respect to the number of drugs per patient encounter ($p = 0.2799$), use of generic names ($p = 0.9412$) and percentage of patient encounters with an antibiotic prescribed ($p = 0.4778$) compared to the clinics with nobody trained. On the other hand, the clinics with at least one person trained in Rational Drug Use performed worse with respect to the percentage of patient encounters with an injection prescribed ($p = 0.0099$) and the percentage of drugs prescribed that was on the Essential Drug List for Primary Health Care facilities (0.9664) compared to the Clinics with no one trained. However, only the difference between the percentages of encounters that received an injection was significant. Otherwise, training in Rational Drug Use seemed to have had no significant impact on prescribing indicators. This is similar to what Mallet *et al* observed in their evaluation of prescription practices and the rational use of medicines, as part of evaluating an essential drugs and costs recovery program in Niger²⁴. It was observed that training nurses in using National Standard Treatment Guidelines seemed to have a limited impact on their prescribing patterns.

Various factors influence the magnitude of impact of Rational Drug Use training. These include the content of the training and support supervision, among others. Health Systems Trust observed that the content of the Rational Drug Use Training Project in South Africa was limited and was not a solution in itself, particularly if there was no continuous support supervision⁴⁴. This observation is consistent with the findings of Kafuko *et al*²⁶ and Trap *et al*²² who concluded that availability of Standard Treatment Guidelines and training without effective support supervision will not lead to sustained improvements in drug use.

The personnel in the clinics evaluated were trained under the Rational Drug Use Project referred to above and support supervision in the clinics studied was inadequate. These factors may be responsible for lack of significant differences between the indicators of the two groups. The possible effect of the small number of clinics with no one trained in Rational Drug Use (five), on the level of significance should also be borne in mind³⁸.

4.2.6. Effect of Training in Cold Chain Management

Table 3.12 (page 38) shows that the clinics with at least one person trained in Cold Chain Management had better indicators in recording the fridge temperature ($p = 0.08544$) and avoiding storage of stock in the fridge door ($p = 0.08544$) compared to those with no one trained. No food or drink was found in the fridge at 100% of the clinics with no one trained compared to 88% of those with at least one person trained ($p = 0.37346$).

However, the differences between the two groups were found not to be significant ($p > 0.05$). This data did not show that training had a significant impact on Cold Chain Management indicators in Tshwane. The possible effect of the small number of clinics with no one trained in Cold Chain Management (six), on the level of

significance should also be borne in mind³⁸. Gazmararian *et al* observed that several factors influenced compliance of primary care physician offices, in four cities in USA, with vaccine storage guidelines²⁵. Practice location, type of physician, participation in vaccine programmes, and using guidelines were associated with compliance. Therefore, factors beyond training may have influenced the level of cold chain management in Tshwane.

5. CONCLUSION

The results of a situation analysis into Drug Supply management in Tshwane show that Drug Supply Management was generally below the WHO recommended performance indicators^{1,11}. It was below what Stafford *et al* observed in 2000⁸, but better than what Summers *et al* observed in NMTTS District of Northern Province³². The status was comparable with, and in some instances better than, what was observed in other countries^{11,12,17}. Inadequate control of and accountability for drugs at all levels was the main shortcoming observed.

The study proved that in Tshwane, the type of staff, staff training and rotation of the staff in charge of Drug Supply Management did not have a significant impact on the status of Drug Supply Management. The main reasons for this observation were that there was no one given full time responsibility for Drug Supply Management. The trained personnel were neither appropriately deployed nor effectively supervised and there was no effective cascading of information after training. The adequacy of the content of some of the training received by the staff was questionable, according to the literature surveyed⁴¹. The possible effect of the small sample size in some of the comparison groups, on the level of significance should also be borne in mind when interpreting the p values³⁸.

Availability of standard operating procedures was not associated with better Drug Supply Management. This was due to the fact that in most cases where the standard operating procedures were available, they were filed away and not available to the staff performing the duties. However, a formal quantification method was associated with better availability and less drug stock out incidences. Clinics supplied by independent Sub-depots received a better service level and had less stock out incidences of key drugs compared with those supplied by Hospital Pharmacies.

6. RECOMMENDATIONS

There is need to improve accountability for and control of drugs and consequently improving the status of Drug Supply Management in Tshwane by:

- ensuring that there is someone at each clinic with full-time responsibility for Drug Supply Management, who should be effectively trained, appropriately deployed and well supervised. This will ensure focused attention to all Drug Supply Management issues
- ensuring that all clinics are supplied from an independent Sub-depot, as opposed to a hospital pharmacy. Consideration should be made to merge operations of Pretoria Regional Pharmacy and the City of Tshwane Sub-depot in order to eliminate duplication and improve efficiency through cost-effective use of available resources
- ensuring all clinics have and use standard operating procedures. This will standardise operations thereby facilitating control of and accountability for drugs
- ensuring that all clinics adopt a formal method of quantifying drugs. This will facilitate budgeting for drugs, improve drug availability and reduce drug stock outs
- increasing accountability for drugs up to the dispensing level by promoting, and training staff in, the use of stock cards
- improving information flow about the budget plus the budgeting process and encouraging use of the budget when ordering drugs.

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APPENDICES

APPENDIX A: TABLES OF RESULTS

Table A1 Distribution of Patient Encounters in the Evaluated Clinics

Facility	Type	Owner	Prospective	Retrospective	Total Encounters
Atteridgeville	Clinic	CTMM	22	30	52
Danville	Clinic	CTMM	12	28	40
Folang	Clinic	CTMM	23	30	53
Gazankulu	Clinic	CTMM	-	26	26
Hercules	Clinic	CTMM	7	30	37
Karenpark	Clinic	CTMM	-	30	30
Laudium	Clinic	CTMM	-	30	30
Lyttelton	Clinic	CTMM	-	-	0
Mamelodi West	Clinic	CTMM	30	25	55
Phahameng	Clinic	CTMM	30	30	60
Phomolong	Clinic	CTMM	26	30	56
Rossllyn	Clinic	CTMM	-	30	30
Silverton	Clinic	CTMM	22	30	52
Stanza Bopape 2	Clinic	CTMM	30	-	30
Laudium	CHC	GPA	-	27	27
Soshanguve 3	CHC	GPA	-	30	30
Stanza Bopape	CHC	GPA	-	30	30
Boikhutsong	Clinic	GPA	-	29	29
Bophelong	Clinic	GPA	30	30	60
Eesterust	Clinic	GPA	2	20	22
Mandisa Shiceka	Clinic	GPA	30	1	31
Pretoria North	Clinic	GPA	11	29	40
Skinner Street	Clinic	GPA	-	30	30
Soshanguve JJ	Clinic	GPA	-	30	30
Sedibeng HC	Clinic	GPA	15	30	45
Refentse	CHC	Moretele	7	30	37
Temba	CHC	Moretele	-	30	30
Jubilee Gateway	Clinic	Moretele	-	30	30
New Eersterust	Clinic	Moretele	-	30	30
Ramotse	Clinic	Moretele	24	30	54
Suurman	Clinic	Moretele	-	30	30
Boekenhout	CHC	ODI	-	30	30
Kgabo	CHC	ODI	-	30	30
Phedison I	CHC	ODI	-	30	30
Itireleng	Clinic	ODI	-	30	30
Mpho ya Batho	Clinic	ODI	-	30	30
TOTAL			321	965	1286

CTMM = City of Tshwane Metropolitan Municipality, GPA = Gauteng Provincial Authority,

CHC = Community Health Centre

Table A2 Facility Indicators for Primary Health Care Facilities in Tshwane

Category	Off loading cage	Adequate size	Restricted access	Double lock	Burglar proof	Separate store for Flammables	Separate store for Schedule ≥5	Has telephone	Has facsimile machine	Has e-mail connection	Stock off floor	Adequate ventilation	Room Temperature monitored	
PHC FACILITIES														
BOIKHUTSONG	X	√	√	√	√	N/A	√	√	√	X	√	√	√	
BOPHELONG	X	X	√	√	√	N/A	√	√	√	X	X	√	X	
EESTERUST	X	X	√	X	X	√	√	√	√	X	X	X	X	
LAUDIUM	√	X	X	√	√	√	√	√	√	X	X		X	
MANDISA SHICEKA	X	√	√	√	√	X	X	√	√	X	√	√	X	
PRETORIA NORTH	X	X	√	√	X	X	√	√	√	X	X	√	X	
SKINNER STREET	X	X	√	√	√	√	√	√	√	X	X	√	X	
SOSHANGUVE 3	X	X	√	√	√	X	√	√	√	X	√	√	X	
SOSHANGUVE JJ	X	X	X	X	X	N/A	X	√	X	X	√	X	X	
STANZA BOPAPE	X	X	X	√	√	N/A	√	√	√	X	√	√	X	
SEDIBENG HC	X	X	X	√	√	X	N/A	√	√	X	√	√	X	
JUBILEE GATEWAY	X	X	X	X	X	N/A	No	√	X	X	√	X	X	
NEW EERSTERUST	X	X	X	X	X	N/A	N/A	X	X	X	√	X	X	
RAMOTSE	X	X	X	X		N/A	N/A	√	X	X	X	X	X	
REFENTSE	X	X		X	X	N/A	√	√	X	X	X	X	X	
SUURMAN	X	X	X	X	√	N/A	√	X	X	X	√	√	X	
TEMBA	X	√	√	X	√	N/A	√	√	X	X	√	X	X	
BOEKENHOUT	X	X	X	X	X	X	N/A	√	X	X	√	X	X	
ITIRELENG	X	X	X	X	X	N/A	N/A	√	√	X	√	X	X	
KGABO	X	√	√	X	X	N/A	√	√	√	X	√	X	X	
MPHO YA BATHO	X	X	X	X	X	N/A	N/A	√	X	X	X	X	X	
PHEDISON I	X	√	X	X	X	N/A	√	√	X	X	√	X	X	
ATTERIDGEVILLE	X	√	X	√	√	N/A	N/A	√	√	√	X	√	X	
DANVILLE	X	X	X	√	√	N/A	√	√	X	X	X	√	X	
FOLANG	X	X	√	√	√	N/A	N/A	√	X	√	√	√	X	
GAZANKULU	X	X	√	X	X	N/A	N/A	√	X	X	X	√	X	
HERCULES	√	√	X	√	√	X	√	√	X	X	X	√	X	
KARENPAK	X	√	X	X	√	X	N/A	√	√	√	√	√	√	
LAUDIUM	X	√	√	√	√	N/A	N/A	√	√	X	X	√	X	
LYTTELTON	X	√	X	√	√	X	√	√	√	√	√	√	√	
MAMELODI WEST	X	√	X	√	√	N/A	√	√	X	X	√	√	X	
PHAHAMENG	X	X	X	√	√	X	√	√	X	X	√	√	X	
PHOMOLONG	√	√	√	√	√	N/A	√	√	X	X	√	√	X	
ROSSLYN	X	√	√	X	√	N/A	N/A	√	√	√	√	√	X	
SILVERTON	X	√	√	√	X	X	√	√	X	X	X	√	√	
STANZA BOPAPE 2	X	√	X	√	√	X	√	√	X	X	√	√	X	
TOTAL	No	3	15	16	20	23	3	21	34	17	5	22	24	4
	%	8.3	41.7	44.4	55.6	63.9	8.3	58.3	94.4	47.2	13.8	61.1	66.7	11.1

√ = YES, X = NO, N/A = Not applicable, CTMM = City of Tshwane Metropolitan Municipality,

GPA = Gauteng Provincial Authority, CHC = Community Health Centre

Table A3 Indicators for Drug Procurement, Availability and Control

No	Facility	Type	Owner	Has all SOPs	Receiving procedures	Lead Time (days)	% Order Supplied	Ordering Interval (days)	% O/S in year	Quant. Method	% has ROL	% in Stock	Use stock cards	% Card=Shelf
1	Boikhutsong	Clinic	GPA	Yes	Adequate	-	-	-	-	Max-Min	0.0	82.4	Yes	61.1
2	Bophelong	Clinic	GPA	Yes	Inadequate	3.4	90.0	40.5	20.0	ROL	50.0	81.0	Yes	54.5
3	Eesterust	Clinic	GPA	No	Adequate	14.1	82.1	52.6	39.1	Experience	0.0	95.7	No	46.2
4	Laudium	CHC	GPA	Yes	Adequate	7.0	78.8	51.3	12.5	ROL	100.0	90.6	Yes	28.1
5	Mandisa Shiceka	Clinic	GPA	No	Adequate	9.1	77.2	16.5	11.1	ROL	88.9	92.6	Yes	55.6
6	Pretoria North	Clinic	GPA	No	Adequate	3.7	86.5	20.0	0.0	Experience	0.0	89.5	Yes	26.3
7	Skinner Street	Clinic	GPA	No	Adequate	-	-	-	-	ROL	-	-	Yes	-
8	Soshanguve 3	CHC	GPA	Yes	Inadequate	10.6	-	36.2	26.3	ROL	63.2	94.7	Yes	31.6
9	Soshanguve JJ	Clinic	GPA	No	Inadequate	-	-	-	-	Experience	-	-	Yes	-
10	Stanza Bopape	CHC	GPA	Yes	Inadequate	9.5	83.8	34.3	0.0	ROL	87.5	93.8	Yes	62.5
11	Sedibeng HC	Clinic	GPA	No	Adequate	3.6	97.7	83.2	59.1	Experience	0.0	78.3	Yes	100.0
12	Jubilee Gateway	Clinic	Moretele	Yes	Inadequate	17.1	-	39.4	83.3	Experience	0.0	83.3	Yes	54.5
13	New Eersterust	Clinic	Moretele	No	Inadequate	9.3	-	52.8	40.9	Experience	0.0	90.9	Yes	66.7
14	Ramotse	Clinic	Moretele	No	Inadequate	15.8	-	62.2	33.3	Experience	0.0	70.8	Yes	85.7
15	Refentse	CHC	Moretele	Yes	Adequate	9.8	86.7	58.4	46.2	Experience	0.0	88.0	Yes	64.0
16	Suurman	Clinic	Moretele	Yes	Adequate	9.3	74.7	57.2	70.0	Experience	60.0	75.0	Yes	90.9
17	Temba	CHC	Moretele	Yes	Adequate	11.4	70.1	45.3	73.9	Experience	43.5	91.3	Yes	87.0
18	Boekenhout	CHC	Odi	Yes	Adequate	7.5	61.9	37.3	42.9	Experience	0.0	90.0	Yes	16.7
19	Itireleng	Clinic	Odi	No	Inadequate	12.6	57.9	57.7	-	Experience	0.0	100.0	Yes	8.3
20	Kgabo	CHC	Odi	Yes	Adequate	8.8	69.5	27.4	66.7	Experience	0.0	76.2	Yes	83.3
21	Mpho Ya Batho	Clinic	Odi	Yes	Adequate	4.6	57.7	65.8	18.2	Experience	0.0	100.0	Yes	20.0
22	Phedisong 1	CHC	Odi	Yes	Adequate	6.7	88.9	41.0	25.0	Experience	0.0	70.0	Yes	85.7
23	Atteridgeville	Clinic	CTMM	No	Inadequate	9.6	77.6	85.7	14.3	Experience	0.0	90.5	NO	-
24	Danville	Clinic	CTMM	No	Inadequate	5.6	-	53.5	50.0	Max-Min	91.7	87.5	NO	12.5

Table A3 Indicators for Drug Procurement, Availability and Control														
No	Facility	Type	Owner	Has all SOPs	Receiving procedures	Lead Time (days)	% Order Supplied	Ordering Interval (days)	%O/S in year	Quant. Method	% has ROL	% in Stock	Use stock cards	% Card=Shelf
25	Folang	Clinic	CTMM	No	Inadequate	16.2	74.2	86.0	16.0	Max-Min	80.0	96.0.	NO	-
26	Gazankulu	Clinic	CTMM	No	Inadequate	-	93.8	-	15.0	Max-Min	80.0	70.0	NO	-
27	Hercules	Clinic	CTMM	No	Adequate	10.6	73.7	126.4	26.9	ROL	0.0	92.3	NO	-
28	Karenpark	Clinic	CTMM	Yes	Adequate	18.0	-	95.5	50.0	ROL	0.0	70.8	Yes	81.0
29	Laudium	Clinic	CTMM	Yes	Inadequate	12.7	92.9	61.4	-	Experience	0.0	100.0	NO	-
30	Lyttelton	Clinic	CTMM	Yes	Adequate	14.8	78.3	71.5	-	Max-Min	-	-	Yes	-
31	Mamelodi West	Clinic	CTMM	No	Inadequate	23.2	-	84.5	17.6	Max-Min	0.0	93.8	NO	-
32	Phahameng	Clinic	CTMM	No	Adequate	19.1	75.6	87.9	16.7	Max-Min	75.0	78.3	NO	-
33	Phomolong	Clinic	CTMM	No	Inadequate	12.7	76.9	52.6	10.5	Max-Min	84.2	94.7	NO	-
34	Rossllyn	Clinic	CTMM	Yes	Adequate	10.2	93.3	51.4	11.1	ROL	61.1	100.0	Yes	62.5
35	Silverton	Clinic	CTMM	No	Adequate	22.5	78.3	56.3	60.9	Max-Min	60.9	91.3	NO	-
36	Stanza Bopape 2	Clinic	CTMM	No	Inadequate	10.0	75.0	98.6	35.0	Max-Min	90.0	90.0	NO	-
	Mean					11.2	79.0	56.1	33.1		33.8	87.6		55.9
	Maximum					23.2	97.7	126.4	83.3		100.0	100.0		100.0
	Minimum					3.4	57.7	16.5	0.0		0.0	70.0		8.3
	PERFORMANCE TARGET			Yes	Adequate	-	95	-	<10	ROL/Min-Max	100	90	Yes	100
	% of clinics which meet target			47	56	-	4	-	7	53	3	58	67	4

SOPs = Standard operating procedures, O/S = Out of stock, ROL = Re-Order Level, % has ROL = Percentage of tracer items whose Re-Order Level had been determined, Min-Max = Minimum-Maximum level, Card=Shelf means the balance quantity on the card was equal to the quantity physically on the shelf.

Table A4 Supplying Primary Health Care Facilities from Sub-depots Compared to Hospital Pharmacies

Facility	Type	Owner	Lead Time/days		% Order	Out of Stock/days		% in Stock
			Average	Range	Supplied	Max	%last year	
Atteridgeville	Clinic	CTMM	9.6	6 to 13	77.6	40	14.3	90.5
Danville	Clinic	CTMM	5.6	5 to 7		127	50.0	87.5
Folang	Clinic	CTMM	16.2	5 to 46	74.2	33	16.0	96.0
Gazankulu	Clinic	CTMM	-	-	93.8	149	15.0	70.0
Hercules	Clinic	CTMM	10.6	1 to 12	73.7	337	26.9	92.3
Karenpark	Clinic	CTMM	18.0	6 to 55	-	8	50.0	70.8
Laudium	Clinic	CTMM	12.7	1 to 26	92.9	-	-	100.0
Lyttelton	Clinic	CTMM	14.8	1 to 34	78.3	-	-	-
Mamelodi West	Clinic	CTMM	23.2	12 to 77	-	132	17.6	93.8
Phahameng	Clinic	CTMM	19.1	1 to 53	75.6	69	16.7	78.3
Phomolong	Clinic	CTMM	12.7	9 to 25	76.9	26	10.5	94.7
Rosslyn	Clinic	CTMM	10.2	7 to 20	93.3	14	11.1	100.0
Silverton	Clinic	CTMM	22.5	7 to 41	78.3	51	60.9	91.3
Stanza Bopape 2	Clinic	CTMM	10.0	4 to 34	75.0	295	35.0	90.0
Boikhutsong	Clinic	GPA	-	-	-	-	-	82.4
Bophelong	Clinic	GPA	3.4	1 to 5	90.0	21	20.0	81.0
Eesterust	Clinic	GPA	14.1	13 to 27	82.1	54	39.1	95.7
Laudium	CHC	GPA	7.0	5 to 18	78.8	70	12.5	90.6
Mandisa Shiceka	Clinic	GPA	9.1	9 to 10	77.2	14	11.1	92.6
Pretoria North	Clinic	GPA	3.7	1 to 14	86.5	0	0.0	89.5
Skinner Street	Clinic	GPA	-	-	-	-	-	-
Soshanguve 3	CHC	GPA	10.6	1 to 39		28	26.3	94.7
Soshanguve JJ	Clinic	GPA	-	-	-	-	-	-
Stanza Bopape	CHC	GPA	9.5	2 to 13	83.8	0	0.0	93.8
Sedibeng HC	Clinic	GPA	3.6	1 to 9	97.7	45	59.1	78.3
Jubilee Gateway	Clinic	Moretele	17.1	17 to 18	-	39	83.3	83.3
New Eersterust	Clinic	Moretele	9.3	8 to 11	-	56	40.9	90.9
Ramotse	Clinic	Moretele	15.8	3 to 18	-	95	33.3	70.8
Refentse	CHC	Moretele	9.8	8 to 17	86.7	72	46.2	88.0
Suurman	Clinic	Moretele	9.3	4 to 15	74.7	58	70.0	75.0
Temba	CHC	Moretele	11.4	8 to 24	70.1	71	73.9	91.3
Boekenhout	CHC	ODI	7.5	4 to 13	61.9	81	42.9	90.0
Itireleng	Clinic	ODI	12.6	7 to 19	57.9			100.0
Kgabo	CHC	ODI	8.8	7 to 9	69.5	89	66.7	76.2
Mpho ya Batho	Clinic	ODI	4.6	2 to 8	57.7	129	18.2	100.0
Phedison I	CHC	ODI	6.7	6 to 9	88.9	18	25.0	70.0
Overall Average								
			11.2		79.0		33.1	87.6
Average(*CTMM+GPA)			11.7		82.5		24.6	88.8
Average(**Moretele+Odi)			10.3		70.9		50.0	85.0

*Sub-depots. **Hospital pharmacies. CTMM = City of Tshwane Metropolitan Municipality. GPA = Gauteng Provincial Authority, CHC = Community Health Centre

**Table A5 Relationship between Staff in-charge of Drug Supply Management,
Nature of Deployment and some Drug Supply Management Indicators**

Facility	Type	Owner	In charge of DSM		Restrict access	Adequate Receiving procedures	Stock off the floor
			Qualification	Duration			
Suurman	Clinic	Moretele	Nurse (Enrld)	Permanent	X	√	√
Kgabo	CHC	ODI	Nurse (Enrld)	Permanent	√	√	√
Stanza Bopape	CHC	GPA	Nurse (Enrld)	Rotation	X	X	√
Ramotse	Clinic	Moretele	Nurse (Enrld)	Rotation	X	X	X
Temba	CHC	Moretele	Nurse (Enrld)	Rotation	√	√	√
Gazankulu	Clinic	CTMM	Nurse (Reg)	Permanent	√	X	X
Hercules	Clinic	CTMM	Nurse (Reg)	Permanent	X	√	X
Karenpark	Clinic	CTMM	Nurse (Reg)	Permanent	X	√	√
Laudium	Clinic	CTMM	Nurse (Reg)	Permanent	√	X	X
Lyttelton	Clinic	CTMM	Nurse (Reg)	Permanent	X	√	√
Rosslyn	Clinic	CTMM	Nurse (Reg)	Permanent	√	√	√
Boikhutsong	Clinic	GPA	Nurse (Reg)	Permanent	√	√	√
Bophelong	Clinic	GPA	Nurse (Reg)	Permanent	√	X	X
Eesterust	Clinic	GPA	Nurse (Reg)	Permanent	√	√	X
Pretoria North	Clinic	GPA	Nurse (Reg)	Permanent	√	√	X
Skinner Street	Clinic	GPA	Nurse (Reg)	Permanent	√	√	X
Soshanguve JJ	Clinic	GPA	Nurse (Reg)	Permanent	X	X	√
Sedibeng HC	Clinic	GPA	Nurse (Reg)	Permanent	X	√	√
Refentse	CHC	Moretele	Nurse (Reg)	Permanent	√	√	X
Itireleng	Clinic	ODI	Nurse (Reg)	Permanent	X	X	√
Silverton	Clinic	CTMM	Nurse (Reg)	Rotation	√	√	X
Laudium	CHC	GPA	Nurse (Reg)	Rotation	X	√	X
Mandisa Shiceka	Clinic	GPA	Nurse (Reg)	Rotation	√	√	√
Soshanguve 3	CHC	GPA	Nurse (Reg)	Rotation	√	X	√
Jubilee Gateway	Clinic	Moretele	Nurse (Reg)	Rotation	X	X	√
New Eersterust	Clinic	Moretele	Nurse (Reg)	Rotation	X	X	√
Boekenhout	CHC	ODI	Nurse (Reg)	Rotation	X	√	√
Mpho ya Batho	Clinic	ODI	Nurse (Reg)	Rotation	X	√	X
Phedisong I	CHC	ODI	Nurse (Reg)	Rotation	X	√	√
Mamelodi West	Clinic	CTMM	Pharm Asst	Permanent	X	X	√
Atteridgeville	Clinic	CTMM	Pharm Asst	Rotation	X	X	X
Danville	Clinic	CTMM	Pharm Asst	Rotation	X	X	X
Folang	Clinic	CTMM	Pharm Asst	Rotation	√	X	√
Phahameng	Clinic	CTMM	Pharm Asst	Rotation	X	√	√
Phomolong	Clinic	CTMM	Pharm Asst	Rotation	√	X	√
Stanza Bopape 2	Clinic	CTMM	Pharm Asst	Rotation	X	X	√
Odd Ratio : PA versus Nurse (Reg+Enrld)			OR		0.429	0.088	1.765
Odd Ratio : Permanent versus Rotation				OR	2.500	2.500	0.625

√ = Yes, X = No, Reg = Registered, CTMM = City of Tshwane Metropolitan Municipality, GPA =

Gauteng Provincial Authority, CHC = Community Health Centre

Table A6 Effect of the Number of Staff Trained in Drug Supply Management on some Drug Supply Management Indicators

Facility	Type	Owner	No Trained in DSM	% Items Stock=card	Restrict access	Adequate Receiving procedures	Stock off the floor
Kgabo	CHC	ODI	16	83.3	√	√	√
Temba	CHC	Moretele	11	87.0	√	√	√
Skinner Street	Clinic	GPA	10	-	√	√	X
Eesterust	Clinic	GPA	8	46.2	√	√	X
Boekenhout	CHC	ODI	6	16.7	X	√	√
Mandisa Shiceka	Clinic	GPA	5	55.6	√	√	√
Boikhutsong	Clinic	GPA	4	61.1	√	√	√
Laudium	CHC	GPA	4	28.1	X	√	X
Phedisong I	CHC	ODI	4	85.7	X	√	√
Soshanguve 3	CHC	GPA	4	31.6	√	X	√
Hercules	Clinic	CTMM	3	-	X	√	X
Stanza Bopape	CHC	GPA	3	62.5	X	X	√
Mpho ya Batho	Clinic	ODI	2	20.0	X	√	X
Stanza Bopape 2	Clinic	CTMM	2	-	X	X	√
Suurman	Clinic	Moretele	2	90.9	X	√	√
Atteridgeville	Clinic	CTMM	1	-	X	X	X
Bophelong	Clinic	GPA	1	54.5	√	X	X
Danville	Clinic	CTMM	1	12.5	X	X	X
Folang	Clinic	CTMM	1	-	√	X	√
Jubilee Gateway	Clinic	Moretele	1	54.5	X	X	√
Karenpark	Clinic	CTMM	1	81.0	X	√	√
Lyttelton	Clinic	CTMM	1	-	X	√	√
Phahameng	Clinic	CTMM	1	-	X	√	√
Phomolong	Clinic	CTMM	1	-	√	X	√
Pretoria North	Clinic	GPA	1	26.3	√	√	X
Ramotse	Clinic	Moretele	1	85.7	X	X	X
Refentse	CHC	Moretele	1	64.0	√	√	X
Rosslyn	Clinic	CTMM	1	62.5	√	√	√
Sedibeng HC	Clinic	GPA	1	100.0	X	√	√
Soshanguve JJ	Clinic	GPA	1	-	X	X	√
Itireleng	Clinic	ODI	0	8.3	X	X	√
Laudium	Clinic	CTMM	0	-	√	X	X
New Eersterust	Clinic	Moretele	0	66.7	X	X	√
Silverton	Clinic	CTMM	0	-	√	√	X
Gazankulu	Clinic	CTMM	-	-	√	X	X
Mamelodi West	Clinic	CTMM	-	-	X	X	√
Odd Ratio: 1 Vs 0 trained in DSM			OR		0.765	5.182	1.727
Correlation with No. trained in DSM			r	+0.194			

√ = YES, X = NO, CTMM = City of Tshwane Metropolitan Municipality, GPA = Gauteng Provincial Authority, CHC = Community Health Centre, DSM = Drug Supply Management

Table A7 Impact of Determining Re-Order Level/Minimum-Maximum Levels on Drug Availability Indicators

Facility	Type	Owner	% Items with ROL/Max	% Out of Stock last year	% in Stock	% Prescribed drugs dispensed
Laudium	CHC	GPA	100.0	12.5	90.6	
Danville	Clinic	CTMM	91.7	50.0	87.5	100.0
Stanza Bopape 2	Clinic	CTMM	90.0	35.0	90.0	100.0
Mandisa Shiceka	Clinic	GPA	88.9	11.1	92.6	100.0
Stanza Bopape	CHC	GPA	87.5	0.0	93.8	-
Phomolong	Clinic	CTMM	84.2	10.5	94.7	96.5
Folang	Clinic	CTMM	80.0	16.0	96.0	-
Gazankulu	Clinic	CTMM	80.0	15.0	70.0	-
Phahameng	Clinic	CTMM	75.0	16.7	78.3	100.0
Soshanguve 3	CHC	GPA	63.2	26.3	94.7	-
Rossllyn	Clinic	CTMM	61.1	11.1	100.0	-
Silverton	Clinic	CTMM	60.9	60.9	91.3	100.0
Suurman	Clinic	Moretele	60.0	70.0	75.0	-
Bophelong	Clinic	GPA	50.0	20.0	81.0	100.0
Temba	CHC	Moretele	43.5	73.9	91.3	-
Atteridgeville	Clinic	CTMM	0.0	14.3	90.5	-
Boekenhout	CHC	ODI	0.0	42.9	90.0	-
Boikhutsong	Clinic	GPA	0.0	-	82.4	-
Eesterust	Clinic	GPA	0.0	39.1	95.7	100.0
Hercules	Clinic	CTMM	0.0	26.9	92.3	100.0
Itireleng	Clinic	ODI	0.0	-	100.0	-
Jubilee Gateway	Clinic	Moretele	0.0	83.3	83.3	-
Karenpark	Clinic	CTMM	0.0	50.0	70.8	-
Kgabo	CHC	ODI	0.0	66.7	76.2	-
Laudium	Clinic	CTMM	0.0	-	100.0	-
Mamelodi West	Clinic	CTMM	0.0	17.6	93.8	100.0
Mpho ya Batho	Clinic	ODI	0.0	18.2	100.0	-
New Eersterust	Clinic	Moretele	0.0	40.9	90.9	-
Phedison I	CHC	ODI	0.0	25.0	70.0	-
Pretoria North	Clinic	GPA	0.0	0.0	89.5	100.0
Ramotse	Clinic	Moretele	0.0	33.3	70.8	93.6
Refentse	CHC	Moretele	0.0	46.2	88.0	-
Sedibeng HC	Clinic	GPA	0.0	59.1	78.3	98.1
Lyttelton	Clinic	CTMM	-	-	-	-
Skinner Street	Clinic	GPA	-	-	-	-
Soshanguve JJ	Clinic	GPA	-	-	-	-
Correl. with % of Items with ROL			r	-0.299	0.104	0.200

ROL/Max = Re-Order Level and Minimum-Maximum Level, CTMM = City of Tshwane Metropolitan Municipality, GPA = Gauteng Provincial Authority, CHC = Community Health Centre, Correl = Correlation

Facility	Type	Owner	In charge of DSM		Number Trained			Access Policy	Storage Facilities					
			Qualification	Duration	DSM	RDU	CCM	Restricted	Size	Burg.proof	Off the floor	Ventilation	Room Temp	Rec.Cage
Boikhutsong	Clinic	GPA	Reg.Nurse	Permanent	4	10	10	Yes	Adequate	Yes	Yes	AC	Yes	No
Bophelong	Clinic	GPA	Reg.Nurse	Permanent	1	0	1	Yes	Inadequate	Yes	No	AC	No	No
Eesterust	Clinic	GPA	Reg.Nurse	Permanent	8	7	-	Yes	Inadequate	No	No	Ceiling	No	No
Laudium	CHC	GPA	Reg.Nurse	Rotation	4	16	16	No	Inadequate	Yes	No	AC	No	Yes
Mandisa Shiceka	Clinic	GPA	Reg.Nurse	Rotation	5	0	5	Yes	Adequate	Yes	Yes	AC	No	No
Pretoria North	Clinic	GPA	Reg.Nurse	Permanent	1	17	4	Yes	Inadequate	No	No	AC	No	No
Skinner Street	Clinic	GPA	Reg.Nurse	Permanent	10	0	10	Yes	Inadequate	Yes	No	AC	No	No
Soshanguve 3	CHC	GPA	Reg.Nurse	Rotation	4	-	3	Yes	Inadequate	Yes	Yes	AC	No	No
Soshanguve JJ	Clinic	GPA	Reg.Nurse	Permanent	1	1	7	No	Inadequate	No	Yes	Ceiling	No	No
Stanza Bopape	CHC	GPA	Enrld Nurse	Rotation	3	11	3	No	Inadequate	Yes	Yes	AC	No	No
Sedibeng HC	Clinic	GPA	Reg.Nurse	Permanent	1	2	0	No	Inadequate	Yes	Yes	Desk fan	No	No
Jubilee Gateway	Clinic	Moretele	Reg.Nurse	Rotation	1	1	0	No	Inadequate	No	Yes	Ceiling	No	No
New Eersterust	Clinic	Moretele	Reg.Nurse	Rotation	0	1	1	No	Inadequate	No	Yes	Ceiling	No	No
Ramotse	Clinic	Moretele	Enrld Nurse	Rotation	1	1	1	No	Inadequate	Yes	No	Ceiling	No	No
Refentse	CHC	Moretele	Reg.Nurse	Permanent	1	0	0	Yes	Inadequate	No	No	Ceiling	No	No
Suurman	Clinic	Moretele	Enrld Nurse	Permanent	2	2	2	No	Inadequate	Yes	Yes	Desk fan	No	No
Temba	CHC	Moretele	Enrld Nurse	Rotation	11	11	11	Yes	Adequate	Yes	Yes	Ceiling	No	No
Boekenhout	CHC	ODI	Reg.Nurse	Rotation	6	6	6	No	Inadequate	No	Yes	Ceiling	No	No
Itireleng	Clinic	ODI	Reg.Nurse	Permanent	0	0	0	NO	Inadequate	No	Yes	Ceiling	No	No

* DSM = Drug Supply Management, RDU = Rational Drug Use, CCM = Cold Chain Management, CTMM = City of Tshwane Metropolitan Municipality, GPA = Gauteng Provincial Authority, CHC = Community Health Centre, Burg. = Burglar, Rec.= Receiving, AC = Air Conditioner.

Table A8 Summary of Qualitative Observations*

Facility	Type	Owner	In charge of DSM		Number Trained			Access Policy	Storage Facilities					
			Qualification	Duration	DSM	RDU	CCM	Restricted	Size	Burg.proof	Off the floor	Ventilation	Room Temp	Rec.Cage
Kgabo	CHC	ODI	Enrld Nurse	Permanent	16	16	27	Yes	Adequate	No	Yes	Ceiling	No	No
Mpho ya Batho	Clinic	ODI	Reg.Nurse	Rotation	2	0	0	No	Inadequate	No	No	Ceiling	No	No
Phedison I	CHC	ODI	Reg.Nurse	Rotation	4	1	0	No	Adequate	No	Yes	Ceiling	No	No
Atteridgeville	Clinic	CTMM	Pharm Asst	Rotation	1	5	6	No	Adequate	Yes	No	AC	No	No
Danville	Clinic	CTMM	Pharm Asst	Rotation	1	3	1	No	Inadequate	Yes	No	AC	No	No
Folang	Clinic	CTMM	Pharm Asst	Rotation	1	10	1	Yes	Adequate	Yes	Yes	AC	No	No
Gazankulu	Clinic	CTMM	Reg.Nurse	Permanent	-	1	1	Yes	Inadequate	No	No	Desk fan	No	No
Hercules	Clinic	CTMM	Reg.Nurse	Permanent	3	3	3	No	Inadequate	Yes	No	AC	No	Yes
Karenpark	Clinic	CTMM	Reg.Nurse	Permanent	1	4	0	No	Adequate	Yes	Yes	AC	Yes	No
Laudium	Clinic	CTMM	Reg.Nurse	Permanent	0	5	5	Yes	Adequate	Yes	No	AC	No	No
Lyttelton	Clinic	CTMM	Reg.Nurse	Permanent	1	6	1	No	Adequate	Yes	Yes	AC	Yes	No
Mamelodi West	Clinic	CTMM	Pharm Asst	Permanent	-	-	-	No	Adequate	Yes	Yes	AC	No	No
Phahameng	Clinic	CTMM	Pharm Asst	Rotation	1	5	5	No	Inadequate	Yes	Yes	AC	No	No
Phomolong	Clinic	CTMM	Pharm Asst	Rotation	1	6	2	Yes	Adequate	Yes	Yes	AC	No	Yes
Rossllyn	Clinic	CTMM	Reg.Nurse	Permanent	1	5	1	Yes	Adequate	Yes	Yes	AC	No	No
Silverton	Clinic	CTMM	Reg.Nurse	Rotation	0	3	1	Yes	Adequate	No	No	AC	Yes	No
Stanza Bopape 2	Clinic	CTMM	Pharm Asst	Rotation	2	10	8	No	Adequate	Yes	Yes	AC	No	No
TARGET			Pharm Asst	Permane nt	1	1	1	Yes	Adequate	Yes	Yes	AC/Fan	Yes	Yes
% who comply			19%	50%	88%	82%	79%	44%	42%	64%	61%	67%	11%	8%

Table A8 Summary of Qualitative Observations [♦]														
Facility	Type	Owner	Separate storage for		Has Phone	Has Fax	Type of Fridge			Cold Chain Management				
			Flammables	Schedule 5			EPI	Domestic	Has fridge	Stock in door	Food in Fridge	Daily	Therm Type	Back-up
Boikhutsong	Clinic	GPA	N/A	Yes	Yes	Yes	-	-	No	-	-	-	-	-
Bophelong	Clinic	GPA	N/A	Yes	Yes	Yes	-	Yes	Yes	No	No	Yes	Actual	Yes
Eesterust	Clinic	GPA	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes	No	No	None	No
Laudium	CHC	GPA	Yes	Yes	Yes	Yes	Yes	-	Yes	No	No	Yes	Min-Max	Yes
Mandisa Shiceka	Clinic	GPA	No	No	Yes	Yes	Yes	-	Yes	No	No	Yes	Actual	No
Pretoria North	Clinic	GPA	No	Yes	Yes	Yes	Yes	-	Yes	No	No	Yes	Actual	No
Skinner Street	Clinic	GPA	Yes	Yes	Yes	Yes	-	Yes	Yes	No	Yes	Yes	Actual	No
Soshanguve 3	CHC	GPA	No	Yes	Yes	Yes	Yes	--	Yes	No	No	Yes	Actual	Yes
Soshanguve JJ	Clinic	GPA	N/A	No	Yes	No	-	Yes	Yes	No	Yes	No	None	No
Stanza Bopape	CHC	GPA	N/A	Yes	Yes	Yes	-	Yes	Yes	No	No	Yes	Min-Max	Yes
Sedibeng HC	Clinic	GPA	No	N/A	Yes	Yes	-	-	No	-	-	-	-	-
Jubilee Gateway	Clinic	Moretele	N/A	No	Yes	No	-	Yes	Yes	Yes	No	Yes	Actual	Yes
New Eersterust	Clinic	Moretele	N/A	N/A	No	No	-	Yes	Yes	Yes	No	Yes	Actual	No
Ramotse	Clinic	Moretele	N/A	N/A	Yes	No	-	Yes	Yes	No	No	No	Actual	No
Refentse	CHC	Moretele	N/A	Yes	Yes	No	Yes	-	Yes	No	No	Yes	Actual	No
Suurman	Clinic	Moretele	N/A	Yes	No	No	-	-	No	-	-	-	-	-
Temba	CHC	Moretele	N/A	Yes	Yes	No	-	Yes	Yes	Yes	No	Yes	Actual	No
Boekenhout	CHC	ODI	No	N/A	Yes	No	Yes	-	Yes	No	No	No	Actual	No
Itireleng	Clinic	ODI	N/A	N/A	Yes	Yes	-	Yes	Yes	No	No	No	Actual	No
Kgabo	CHC	ODI	N/A	Yes	Yes	Yes	Yes	-	Yes	No	No	Yes	Actual	No

[♦] CTMM = City of Tshwane Metropolitan Municipality, GPA = Gauteng Provincial Authority, CHC = Community Health Centre, EPI = Expanded Programme of Immunisation, Min-Max = Minimum- Maximum, Therm. = Thermometer.

Table A8 Summary of Qualitative Observations*

Facility	Type	Owner	Separate storage for		Has Phone	Has Fax	Type of Fridge			Cold Chain Management				
			Flammables	Schedule 5			EPI	Domestic	Has fridge	Stock in door	Food in Fridge	Daily	Therm Type	Back-up
Mpho ya Batho	Clinic	ODI	N/A	N/A	Yes	No	Yes	-	Yes	No	No	Yes	Actual	No
Phedison I	CHC	ODI	N/A	Yes	Yes	No	Yes	-	Yes	No	No	Yes	Actual	No
Atteridgeville	Clinic	CTMM	N/A	N/A	Yes	Yes	-	Yes	Yes	No	No	Yes	Min-Max	No
Danville	Clinic	CTMM	N/A	Yes	Yes	No	-	Yes	Yes	No	No	Yes	Min-Max	No
Folang	Clinic	CTMM	N/A	N/A	Yes	No	-	Yes	Yes	Yes	No	Yes	Min-Max	Yes
Gazankulu	Clinic	CTMM	N/A	N/A	Yes	No	-	Yes	Yes	No	No	Yes	Min-Max	No
Hercules	Clinic	CTMM	No	Yes	Yes	No	-	Yes	Yes	No	Yes	Yes	Min-Max	No
Karenpark	Clinic	CTMM	No	N/A	Yes	Yes	Yes	-	Yes	No	No	Yes	Min-Max	No
Laudium	Clinic	CTMM	N/A	N/A	Yes	Yes		Yes	Yes	No	No	Yes	Min-Max	No
Lyttelton	Clinic	CTMM	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Min-Max	No
Mamelodi West	Clinic	CTMM	N/A	Yes	Yes	No	-	Yes	Yes	Yes	No	Yes	Min-Max	No
Phahameng	Clinic	CTMM	No	Yes	Yes	No	-	Yes	Yes	No	No	Yes	Min-Max	No
Phomolong	Clinic	CTMM	N/A	Yes	Yes	No	-	Yes	Yes	No	No	Yes	Min-Max	No
Rosslyn	Clinic	CTMM	N/A	N/A	Yes	Yes	Yes	-	Yes	No	No	Yes	Actual	No
Silverton	Clinic	CTMM	No	Yes	Yes	No	-	Yes	Yes	No	No	Yes	Min-Max	No
Stanza Bopape 2	Clinic	CTMM	No	Yes	Yes	No	-	Yes	Yes	No	No	Yes	Min-Max	No
TARGET			Yes	Yes	Yes	Yes	Yes		Yes	No	No	Yes	Min-Max	Yes
% who comply			8%	58%	94%	47%	36%		92%	82%	91%	85%	45%	18%

Table A8 Summary of Qualitative Observations [^]										
Facility	Type	Owner	PROCEDURES				MEDICINE BUDGET			
			All SOPs	Quantification	Receiving	Stock cards	Knows	% Last year	% This year	Control
Boikhutsong	Clinic	GPA	Yes	Max-Min	Adequate	Yes	Yes	74	31.1	Yes
Bophelong	Clinic	GPA	Yes	ROL	Inadequate	Yes	Yes	No figure	45.6	No
Eesterust	Clinic	GPA	No	Experience	Adequate	NO	No	145.2	Not calc	No
Laudium	CHC	GPA	Yes	ROL	Adequate	Yes	Yes	Only exp	Only exp	Yes
Mandisa Shiceka	Clinic	GPA	No	ROL	Adequate	Yes	Yes	Don't know	Not calc	No
Pretoria North	Clinic	GPA	No	Experience	Adequate	Yes	No	Don't know	Don't know	No
Skinner Street	Clinic	GPA	No	ROL	Adequate	Yes	Yes	Disputed	30.3	Yes
Soshanguve 3	CHC	GPA	Yes	ROL	Inadequate	Yes	Yes	139.1	96.8	No
Soshanguve JJ	Clinic	GPA	No	Experience	Inadequate	Yes	No	None	None	No
Stanza Bopape	CHC	GPA	Yes	ROL	Inadequate	Yes	Yes	94.1	Not calc	No
Sedibeng HC	Clinic	GPA	No	Experience	Adequate	Yes	No	116.5	Only exp	No
Jubilee Gateway	Clinic	Moretele	Yes	Experience	Inadequate	Yes	No	None	None	No
New Eersterust	Clinic	Moretele	No	Experience	Inadequate	Yes	No	Only exp	Only exp	No
Ramotse	Clinic	Moretele	No	Experience	Inadequate	Yes	No	Don't know	Not calc	No
Refentse	CHC	Moretele	Yes	Experience	Adequate	Yes	No	Don't know	Not calc	No
Suurman	Clinic	Moretele	Yes	Experience	Adequate	Yes	No	Don't know	Not calc	No
Temba	CHC	Moretele	Yes	Experience	Adequate	Yes	Yes	R 221,369	R 117,670	No
Boekenhout	CHC	ODI	Yes	Experience	Adequate	Yes	No	Don't know	Not calc	No
Itireleng	Clinic	ODI	No	Experience	Inadequate	Yes	No	Don't know	Not calc	No
Kgabo	CHC	ODI	Yes	Experience	Adequate	Yes	No	Don't know	Not calc	No

[^] CTMM = City of Tshwane Metropolitan Municipality, GPA = Gauteng Provincial Authority, CHC = Community Health Centre, SOPs = Standard Operating Procedures, ROL = Re-Order Level, calc. = calculated, Min-Max = Minimum-Maximum Level.

Table A8 Summary of Qualitative Observations [♦]										
Facility	Type	Owner	PROCEDURES				MEDICINE BUDGET			
			All SOPs	Quantification	Receiving	Stock cards	Knows	% Last year	% This year	Control
Mpho ya Batho	Clinic	ODI	Yes	Experience	Adequate	Yes	No	Don't know	Not calc	No
Phedison I	CHC	ODI	Yes	Experience	Adequate	Yes	No	Don't know	Not calc	No
Atteridgeville	Clinic	CTMM	No	Experience	Inadequate	NO	No	Don't know	Not calc	No
Danville	Clinic	CTMM	No	Max-Min	Inadequate	NO	No	Don't know	Not calc	No
Folang	Clinic	CTMM	No	Max-Min	Inadequate	NO	No	Don't know	Not calc	No
Gazankulu	Clinic	CTMM	No	Max-Min	Inadequate	NO	Yes	Don't know	Not calc	No
Hercules	Clinic	CTMM	No	ROL	Adequate	NO	No	Don't know	Not calc	No
Karenpark	Clinic	CTMM	Yes	ROL	Adequate	Yes	Yes	Only exp	47.7	No
Laudium	Clinic	CTMM	Yes	Experience	Inadequate	NO	Yes	Don't know	Not calc	Yes
Lyttelton	Clinic	CTMM	Yes	Max-Min	Adequate	Yes	Yes	Don't know	Not calc	Yes
Mamelodi West	Clinic	CTMM	No	Max-Min	Inadequate	NO	No	Don't know	Not calc	No
Phahameng	Clinic	CTMM	No	Max-Min	Adequate	NO	Yes	Don't know	Not calc	Yes
Phomolong	Clinic	CTMM	No	Max-Min	Inadequate	NO	No	Don't know	Don't know	No
Rosslyn	Clinic	CTMM	Yes	ROL	Adequate	Yes	Yes	Don't know	Not calc	No
Silverton	Clinic	CTMM	No	Max-Min	Adequate	NO	No	Don't know	32.1	Yes
Stanza Bopape 2	Clinic	CTMM	No	Max-Min	Inadequate	NO	Yes	Don't know	45.4	Yes
TARGET			Yes	ROL/Min-Max	Adequate	Yes	Yes			Yes
% who comply			47%	53%	56%	67%	42%			22%

APPENDIX B:
TOOLS USED IN DATA COLLECTION

**APPENDIX B1 Description of the WHO and HST Drug Supply Management
Indicators, their Purpose and Method of Calculation**

	INDICATOR	PURPOSE	CALCULATION
Prescribing Indicators			
1	Average number of drugs per encounter.	To measure the degree of polypharmacy.	Divide total number of drugs prescribed by the number of encounters surveyed.
2	% of drugs prescribed by generic name	To measure the tendency to prescribe by generic name to allow generic substitution as a cost-minimisation strategy.	Divide the number of drugs prescribed by generic name by the total number of drugs prescribed, multiplied by 100%.
3	% of encounters with an antibiotic prescribed.	To measure the overall level of use of two important, but commonly overused and costly forms of drug therapy.	Divide the number of patient encounters with an antibiotic or injection prescribed, by the total number of encounters surveyed, multiplied by 100%.
4	% of encounters with an injection prescribed.		
5	% of drugs prescribed from the EDL.	To measure the degree to which practices conform to a national drug policy as indicated by prescribing from the national EDL for the type of facility.	Divide the number of products prescribed which are listed on the EDL, by the total number of products prescribed, multiplied by 100%.
Drug Procurement, Availability and Control Indicators			
6	Availability of key drugs.	To measure the availability at health facilities of key drugs recommended for treatment of some common health problems.	Divide the number of specified products actually in stock by total number of drugs on the checklist, multiplied by 100%
7	% of drugs ordered that are supplied within the delivery schedule	To measure the service level of the supplier to the health facility.	Divide the total number of drugs issued, by the total number of drugs ordered, multiplied by 100%
8	Adequate receiving procedure.	To identify measures that support drug control and accountability in the supply chain.	Identify where received drugs were checked against orders and invoices before use, and any discrepancies formally reported within a stipulated period, as adequate.
9	Lead Time.	To measure how long the supplier takes to deliver ordered items.	Measure the duration in days it takes from date a tracer item is ordered to the time it is received.
10	Ordering Interval.	To measure the frequency of ordering whether it is in line with the schedule and safety levels.	Measure the duration in days between two most recent consecutive ordering dates for each tracer item.
11	% of Tracer items that had been out of stock at least once in	To measure the extent to which key drugs are not available.	Divide the number of tracer items out of stock at least once in the past year, by the total number of tracer

	INDICATOR	PURPOSE	CALCULATION
	the past year.		items checked, multiplied by 100%.
11	Quantification method used.	To identify whether there is an adequate method of quantifying drug requirements.	Record the method used out of Re-Order Level method, Minimum-Maximum Level Method or mere reliance on working experience.
12	% of items with ROL or Min-max levels.	To identify the extent to which a formal quantification method is used.	Divide the number of tracer items with ROL or Min-max levels, by the total number of tracer items checked, multiplied by 100%
13	Use of stock card.	To identify the method used to control and account for drugs used.	Record whether a standard stock card was in use or not.
14	% of items where physical stock balanced with the record.	To measure the effectiveness of drug control and accountability.	Divide the number of tracer items where stock balanced with the record, by the total number of tracer items checked, multiplied by 100%.
Cold Chain Management Indicators			
15	Type of fridge available.	To measure availability of adequate storage facilities for vaccines.	Record availability of a fridge and they type of fridge available
16	Stock found stored in the fridge door	To identify existence of some of the common poor cold chain management practices.	Record the presence or not of stock in the fridge door or food or drinks in the fridge.
17	Food/drinks found stored in the fridge.		
18	Recording fridge temperature daily and the type of thermometer used.	To measure the extent to which the cold chain is monitored effectively.	Check the type of thermometer used and the temperature chart and note whether the fridge temperature is monitored daily, including weekends and public holidays, or not.
19	Existent of a power back-up system.	To measure the ability to maintain the cold chain in case there is a power failure.	Record existence or not of an alternative source of power or of a system to protect vaccines from damage in cases of power failure.
Facility Indicators			
20	Availability of an off loading cage.	To identify the availability of facilities to facilitate adequate receiving of drugs and ensure they are not used before they are checked	Record whether there was a secure place where received drugs are physically separate and inaccessible for use, until they are checked, or not.
21	Availability of a store of adequate size.	To identify existent of a store to support good storage practices	Record whether the store had the size and shelves to hold the maximum available stock without congestion and placing stock on the floor, or not.
22	No stock found placed directly on the floor.	To identify the adequacy of the storage facilities and practices.	Record whether any stock was found on the floor or not.
23	Adequate store	To measure the conditions	Record whether a fan or Air

	INDICATOR	PURPOSE	CALCULATION
	ventilation.	under which storage of drugs.	conditioning system used or not.
24	Monitoring of room temperature.	To identify whether storage conditions were regularly monitored.	Record whether there was a temperature chart, which showed that room temperature in the store was regularly monitored.
25	Practice of restricted access to the store.	To identify the extent of drug control measures in place.	Record whether access to the store was restricted to only one or two persons working there, or not.
26	Use of a double lock System	To identify the security measures in place for drugs.	Record the existence or not of either two padlocks or two doors on the same entrance to the drug store, and controlled by two different people.
27	Availability of Burglar proofing	To identify the security measures in place for drugs.	Record whether or not <u>all</u> doors and windows (even those not opened frequently) were protected by burglarproof bars or any other system.
28	Existence of a separate store for flammable items	To identify extent to which special requirements for these categories of items are complied with.	Record whether or not a separate secure storage area for each of these categories of items was available and being used properly.
29	Existence of a separate store for schedule ≥ 5 items		
Personnel Indicators			
30	Category of staff in charge of Drug Supply Management.	To identify the professional appropriateness of the person in charge of Drug Supply Management.	Record the professional training of the person usually or found in charge of Drug Supply Management.
31	The nature of deployment of staff for Drug Supply Management	To measure whether there is continuous accountability for drugs.	Record whether the person in charge of Drug Supply Management is permanent or there is rotation between several health workers.
32	Number of staff trained in DSM, RDU or CCM	To measure to what extent the personnel are trained in their specific areas of their work.	Record the number of health workers who have received specific training in DSM, RDU and CCM.

DSM = Drug Supply Management, RDU = Rational Drug Use, CCM = Cold Chain Management

APPENDIX B2: PRESCRIBING INDICATORS FORM

Ser. No	Date of Rx	Patients/day	Position in day	Patient No	Age(yrs)	No of drugs	No of Generics	Antib(0/1)	Inject(0/1)	No on EDL	Diagnosis
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
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19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
	Count										
	Total										
	Average										
	Percentage										

APPENDIX B3: DRUG SUPPLY MANAGEMENT LOGISTICS PERFORMANCE INDICATORS FORM

Drug	Average lead time			Order interval		Duration O/S			Max stock	Quantity of stock		Expiry		FIFO/FEFO
	Order date	Receipt date	Lead time	2ndlast order	Order interval	Start	End	O/S	ROL	On card	On shelf	1 not expired	Any expired	
Amoxy caps 250mg 15s														
Amoxy caps 250mg 30s														
Amoxy caps 250mg 100s														
Amoxy susp 125mg/5ml 100ml														
Ciprofloxacin tabs 500mg 10s														
Penelente inj 2.4 mU														
Paracet Svr 120mg 5ml 50ml														
Paracet Svr 120mg 5ml 100ml														
Ibuprofen tabs 200mg 15s														
Ibuprofen tabs 200mg 28s														
Ibuprofen tabs 200mg 42s														
Ibuprofen tabs 200mg 56s														
Ibuprofen tabs 200mg 1000s														
HCTZ tabs 25mg 14s														
HCTZ tabs 25mg 28s														
HCTZ tabs 25mg 500s														
Glibenclamide tabs 5mg 28s														
Glibenclamide tabs 5mg 56s														
Glibenclamide tabs 5mg 500s														
Metronidazole tabs 200mg 28s														
Metronidazole tabs 200mg 21s														
Metronidazole tabs 200mg 250s														
Paracetamol tabs 500mg 10s														
Paracetamol tabs 500mg 20s														
Paracetamol tabs 500mg 500s														

APPENDIX B4: HEALTH FACILITY QUESTIONNAIRE

**DRUG MANAGEMENT SITUATION ANALYSIS
FACILITY EVALUATION FORM**

Facility Name: _____

Location: _____

Type of Facility (tick appropriate box):

Clinic Community Health Centre Hospital Mobile
Other _____

Date: _____

Investigators: _____

A: Personnel and organisational structure

QUESTION	RESULTS												
Position of person interviewed													
Postal address	----- ----- ----- -----												
Contact details	Tel:----- Fax:----- e-mail:-----												
Pharmaceutical staff establishment	No of filled pharmacist posts:----- No of vacant pharmacist posts:----- No of assistant posts filled:----- Basic level: ----- Post-basic level: ----- Trainee basic level: ----- Trainee post-basic level: ----- No of vacant assistant posts:-----												
Location and Position of Pharmacist in-charge													
What is the Qualification of person responsible for drug supply management (ordering stock, control over storage and issue)?	Qualification: Dedicate/Permanent <input type="checkbox"/> Rotational: <input type="checkbox"/>												
Who are the other staff working in the Pharmacy or Dispensary?	<table border="1"> <thead> <tr> <th align="center">Title</th> <th align="center">Role</th> <th align="center">Number</th> </tr> </thead> <tbody> <tr> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>-----</td> <td>-----</td> <td>-----</td> </tr> </tbody> </table>	Title	Role	Number	-----	-----	-----	-----	-----	-----	-----	-----	-----
Title	Role	Number											
-----	-----	-----											
-----	-----	-----											
-----	-----	-----											
Position of person in a supervisory position (e.g. district pharmacist, regional pharmacist, clinic supervisor)													
How often does the supervisor visit	Weekly <input type="checkbox"/> Monthly <input type="checkbox"/>												

the facility?	Less often <input type="checkbox"/> Specify-----
No of personnel in the facility who have completed the following courses, in addition to their basic training.	Drug Supply Management:----- Rational Drug Use/Effective Prescribing:----- Cold Chain Management:-----
Does the facility have a written policy that restricts access to the key of the pharmacy?	Yes <input type="checkbox"/> No <input type="checkbox"/>
How many people have a key for the pharmacy? Please indicate rank.	No: Super of hosp: Matron on duty: Casualty staff: Pharmacist: Pharmacist Asst.: Other:

B: Physical status of the facility

QUESTION	RESULT
Entry and exit- is access to the pharmacy/clinic adequate for delivery of medicine from depot?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Is there a secure (caged) delivery and dispatch area?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Is there burglar proofing on <u>ALL</u> windows of the facility, not only ones that open?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are flammables stored in a separate and secure area? e.g. Ether	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are potentially abused substances and items of schedule 5 and higher stored in a secure place?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Is there a separate store from where medicines are issued to the pharmacy/dispensing points?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are ALL medicines stored OFF the floor on shelves or pallets?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Mark the option that best describes the ventilation process in the medicine store	Air conditioned: Fans: Air bricks: Insulation/ceilings in roof: Other:
What type of fridge is used to store vaccines?	EPI: Commercial: Domestic gas/electric :
Indicate whether the following are present(tick if present, cross if absent)	Thermometer in/on fridge: Temperature recorded daily: (Record actual fridge temp:-----°C) Stock packed in door: Food in fridge (applies to drinking water): Ice packs separate : Back-up generators working:

	VVM indicators:		
Rate the performance of the equipment used by the facility to communicate with the hospital/deport (only rate what is available)	Excellent	Adequate	Poor
	Telephones:-----	-----	-----
	Fax :-----	-----	-----
	Radio :-----	-----	-----
	E-mail :-----	-----	-----
	Comment:-----	-----	-----

C: Drug selection

QUESTION	RESULTS
Total No of drugs available in the pharmacy. Include all dosage forms and pack sizes	
No of drugs listed by generic name on the stock sheet/list.	
No of drugs on the stock sheet/list which appear on the EDL	
Availability of the Essential Drug List/Standard Treatment Guidelines.	Total No of prescribers and dispensers: No of these staff who have a personal copy of the EDL/STG:
Do prescribers have direct access to a Provincial Formulary?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Do prescribers have direct access to a list of drugs available at this facility? Elaborate.	Yes <input type="checkbox"/> No <input type="checkbox"/>
Indicate which of the following drug information resources are available in the facility:	SA Medicines Formulary: Primary Health Care Medicines Formulary: Computer-based resource (e.g. Micromedex CD-ROM)
If prescribers require additional information about medicines, where can they obtain it?	Drug Information Centre: "Mother" hospital: Visiting Doctor: Regional Pharmacist: Other (specify):-----

C: Procurement

QUESTION	RESULTS
Where are the medicine supplies obtained from?	Regional Pharmacy: Local Authority Depot: "Mother " hospital: Private supplier:
Who prepares the order for medicines?	Name:----- Position:-----
Who authorises the orders for medicines?	Pharmacy/dispensary in-charge: Facility Manager: Area supervisor: Regional Pharmacist:
How are the quantities to be ordered	Re-order level & state ROF:

determined? Have ROL &/or Max-Min levels been determined for each drug?	Maximum/minimum order levels: Automated system: Based on experience:
How are orders for drugs placed with the supplier?	Requisition book: Order forms: By phone; fax; e-mail; post; personal delivery Other, specify:
How often are routine orders placed with the supplier? Indicate the No of routine orders in the past 3 months	
How often are emergency orders placed with the supplier? Indicate the No of unscheduled orders in the past 3 months	
Is there written policy on how non-EDL drug is obtained for a patient or added to the facility's list? Specify.	Yes <input type="checkbox"/> No <input type="checkbox"/>
Where are patients from your facility referred to (Referral Route)?	
How are drug supplies transported to the facility?	Provincial transport: Courier company: Dedicated Transport (used only for delivering drug supplies):
If repackaging is performed at the facility, how may lines are packaged? Are the conditions adequate?	Tablets/Capsules: Liquids/Syrups: External/Ointments: Antiseptic Solutions:

E1: Distribution and storage

QUESTION	RESULTS																																	
Are there <u>written</u> SOPs/Guidelines for: <ul style="list-style-type: none"> • Cold Chain Management • Organisation of the store • Record-keeping • Schedule 5,6 & 7 subst. control • Ordering Supplies • Receiving Supplies • Disposal of expired medicines • Product Recall • Pest control 	<table border="0"> <thead> <tr> <th>Yes</th> <th>No</th> <th>Date of publication</th> </tr> </thead> <tbody> <tr><td>-----</td><td>-----</td><td>-----</td></tr> <tr><td>-----</td><td>-----</td><td>-----</td></tr> <tr><td>-----</td><td>-----</td><td>-----</td></tr> <tr><td>-----</td><td>-----</td><td>-----</td></tr> <tr><td>-----</td><td>-----</td><td>-----</td></tr> <tr><td>-----</td><td>-----</td><td>-----</td></tr> <tr><td>-----</td><td>-----</td><td>-----</td></tr> <tr><td>-----</td><td>-----</td><td>-----</td></tr> <tr><td>-----</td><td>-----</td><td>-----</td></tr> <tr><td>-----</td><td>-----</td><td>-----</td></tr> </tbody> </table>	Yes	No	Date of publication	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
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Indicate which of the following receiving procedures are followed:	Check No of boxes and sign driver's note: Check stock received against delivery note: Discrepancy reports submitted to supplier:																																	
Indicate which of the following inventory control procedures are used in the store:	Computerised stock control system: Stock cards on shelf: Stock cards in office: Ordering cards only: Maximum/minimum stock levels:																																	

	Reorder levels: Quantity at time of stocktaking only: None:
What system is used to record medicines that are dispensed to patients, including injectables?	Prescription book: ----- Tally for @ medicine: ----- Tally for total No. dispensed: ----- Quantity to Dispensary/Cupboard: ----- Other, specify: ----- None: -----
When last was a stock-take done in the facility? How often is it done?	Date: _____ % Deviation: _____ Frequency: _____
Are there any overstocked or obsolete or redundant items on the shelves?	Yes <input type="checkbox"/> No <input type="checkbox"/>

Budgeting and Finance Management

QUESTION	RESULTS
Who determines the Drug Budget for the Facility?	Pharmacy In-charge: Facility Manager: Local Authority: Provincial Authority: Don't know:
What criterion is used to determine the drug budget for the facility?	Quantification of needs: Rough estimate: Previous year's budget: Don't know:
What is the facility's budget for drugs for the current financial year:	R _____ Don't know:
How much of the budget has been consumed to date?	R _____ Don't know:
Is the facility budget considered when authorising orders?	Yes <input type="checkbox"/> No <input type="checkbox"/>
What was the expenditure in the last financial year and how did it relate to the budget for that year?	R _____ (_____ %) Don't know:
What was the cost of expired stock last financial year?	R _____ Not Valued:
What is the source of funding for drugs for your facility?	Local Authority: Provincial Gov't: User fees: Don't know:

What are some of the problems that are encountered in drug management in this facility?

In your opinion what would you recommend as possible solutions to the problems that were mentioned above?

Thank you for your time and patience.

APPENDIX B5: SUB-DEPOT/PHARMACY QUESTIONNAIRE

DRUG MANAGEMENT SITUATION ANALYSIS PHARMACY EVALUATION FORM

Pharmacy Name: _____

Location: _____

Date: _____

Investigators: _____

A: Personnel and organisational structure

QUESTION	RESULTS																					
Position of person interviewed																						
Postal address	----- ----- ----- -----																					
Contact details	Tel:----- Fax:----- e-mail:-----																					
Pharmaceutical staff establishment	No of filled pharmacist posts:----- No of vacant pharmacist posts:----- No of assistant posts filled:----- No of vacant assistant posts:----- No of assistants trained and registered: Basic level:----- Post-basic level:----- No of assistants in training: Trainee basic level:----- Trainee post-basic level:-----																					
Location and Position of Pharmacist in-charge																						
Are there non-pharmaceutical Personnel involved in handling drugs? If YES, state qualification and number.	Yes <input type="checkbox"/> No <input type="checkbox"/> <u>Qualification/Position</u> <input type="checkbox"/> <u>Number</u> ----- -----																					
To whom does the Pharmacy Manager report? State Position and qualification only.	Position: _____ Qualification: _____																					
How often does the supervisor visit the Pharmacy?	Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Less often <input type="checkbox"/> Specify-----																					
Outline the main duties of pharmacy staff. State duty, cadre & no involved.	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Duty description</u></th> <th style="text-align: center;"><u>Cadre</u></th> <th style="text-align: center;"><u>Number</u></th> </tr> </thead> <tbody> <tr> <td>Quantification</td> <td style="text-align: center;">-----</td> <td style="text-align: center;">-----</td> </tr> <tr> <td>Ordering</td> <td style="text-align: center;">-----</td> <td style="text-align: center;">-----</td> </tr> <tr> <td>Receiving</td> <td style="text-align: center;">-----</td> <td style="text-align: center;">-----</td> </tr> <tr> <td>Storage</td> <td style="text-align: center;">-----</td> <td style="text-align: center;">-----</td> </tr> <tr> <td>Repackaging</td> <td style="text-align: center;">-----</td> <td style="text-align: center;">-----</td> </tr> <tr> <td>Pricing</td> <td style="text-align: center;">-----</td> <td style="text-align: center;">-----</td> </tr> </tbody> </table>	<u>Duty description</u>	<u>Cadre</u>	<u>Number</u>	Quantification	-----	-----	Ordering	-----	-----	Receiving	-----	-----	Storage	-----	-----	Repackaging	-----	-----	Pricing	-----	-----
<u>Duty description</u>	<u>Cadre</u>	<u>Number</u>																				
Quantification	-----	-----																				
Ordering	-----	-----																				
Receiving	-----	-----																				
Storage	-----	-----																				
Repackaging	-----	-----																				
Pricing	-----	-----																				

	Issuing ----- Picking ----- Dispatch ----- Preparing Voucher ----- Discrepancies -----
No of personnel in the Pharmacy who have completed the following courses(indicate No next to @ course title)	Drug Supply Management:----- Rational Drug Use::----- Cold Chain Management:-----
Does the Pharmacy have a policy that restricts access to the key of the pharmacy?	Yes <input type="checkbox"/> No <input type="checkbox"/>
How many people have a key for the pharmacy? Please indicate rank.	No: Pharmacist: Pharmacist Asst.: Other:

B: Physical status of the Pharmacy

QUESTION	RESULT
Entry and exit- is access to the pharmacy adequate for the largest vehicle used for delivery?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Is there a secure (caged) delivery and dispatch area?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Is there burglar proofing on <u>ALL</u> windows of the Pharmacy, not only ones that open?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are flammables stored in a separate and secure area?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are potentially abused substances and items of schedule 5 and higher stored in a secure place?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Is there a separate dispatch area from where medicines are issued to the facilities?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are ALL medicines stored OFF the floor?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Mark the option that best describes the ventilation process in the medicine store. Is room temperature monitored and recorded on daily basis?	Air conditioned: Yes <input type="checkbox"/> No <input type="checkbox"/> Fans: Airbricks: Insulation/ceilings in roof: Temp:-----°C Other:
What type of fridge is used to store vaccines?	EPI: Commercial: Domestic gas/electric : Walk-in fridge:
Indicate whether the following are present(tick if present, cross if absent)	Thermometer in/on fridge: Temperature recorded daily: (Record actual fridge temp:-----°C) Stock packed in door:

	Food in fridge (applies to drinking water): Ice packs separate : Back-up generators working: VVM indicators:																												
Rate the performance of the equipment used by the Pharmacy to communicate with the facilities and suppliers (only rate what is available)	<table border="0"> <tr> <td></td> <td style="text-align: center;">Excellent</td> <td style="text-align: center;">Adequate</td> <td style="text-align: center;">Poor</td> </tr> <tr> <td>Telephones:-----</td> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>Fax :-----</td> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>Radio :-----</td> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>E-mail :-----</td> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>Comment:-----</td> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>-----</td> <td>-----</td> <td>-----</td> <td>-----</td> </tr> </table>		Excellent	Adequate	Poor	Telephones:-----	-----	-----	-----	Fax :-----	-----	-----	-----	Radio :-----	-----	-----	-----	E-mail :-----	-----	-----	-----	Comment:-----	-----	-----	-----	-----	-----	-----	-----
	Excellent	Adequate	Poor																										
Telephones:-----	-----	-----	-----																										
Fax :-----	-----	-----	-----																										
Radio :-----	-----	-----	-----																										
E-mail :-----	-----	-----	-----																										
Comment:-----	-----	-----	-----																										
-----	-----	-----	-----																										

C: Drug selection

QUESTION	RESULTS
Total No of drugs available in the pharmacy. Include all dosage forms and pack sizes	
No of drugs listed by generic name on the stock sheet/list.	
How are the No and type of drugs to be stocked determined?	
No of non-EDL drugs which appear on the PHC stock sheet/list.	
Do facilities have access to a list of drugs available at this Pharmacy?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Indicate which of the following drug information resources are available in the Pharmacy:	SA Medicines Formulary: Primary Health Care Medicines Formulary: Provincial Formulary: PHC EDL/STG: Computer-based resource (e.g. Micromedex CD-ROM)

C: Procurement

QUESTION	RESULTS
Where are the drug supplies obtained from?	National Medical Stores: Provincial Pharmacy: Wholesaler: Manufacturer:
What procurement system is used by the Pharmacy?	Competitive tender: Selective bidding from pre-selected suppliers: Direct purchase: Government Central Depot:
How are orders for drugs placed with the supplier?	Requisition book: Order forms: By phone; fax; e-mail; computer link: Other, specify:
How are orders for drugs placed by the facilities?	Requisition book: Order forms: By phone; fax; e-mail; computer link: Other, specify:

Does the sub-depot have authority to determine the type and quantity of medicine issued to a PHC facility? Explain.																										
How are the quantities to be ordered determined? Have ROL &/or Max-Min levels been determined for each drug?	Re-order level & state ROF: Maximum/minimum order levels: Automated system: Based on experience:																									
How often are routine orders placed with the supplier? Indicate the No of routine orders in the past 3 months																										
How often are emergency orders placed with the supplier? Indicate the No of unscheduled orders in the past 3 months																										
Is there written policy on how non-EDL drugs or any drug not on the pharmacy list is obtained for a patient or added to the Pharmacy's list? Explain.	Yes <input type="checkbox"/> No <input type="checkbox"/>																									
What facilities are supplied by your Pharmacy? Specify number of each type of Pharmacy.	Hospitals: Community Health Centres: Clinics: Other Public Pharmacies: Private Practitioners: Private Pharmacies: Other, specify:																									
Is there a fixed schedule of ordering and delivery? What is the average lead time?	<input type="checkbox"/> No Lead time: -----days.																									
How are drug supplies delivered to your pharmacy?	Supplier Transport: Sub-depot dedicated Transport: Institution Pool transport: Courier company:																									
Indicate which of the following receiving procedures are followed:	Check No of boxes and sign driver's note + retain copy: Check stock received against delivery note: Discrepancy reports submitted to supplier: Specified limit for reporting discrepancies:																									
Is there a back order system? Describe.																										
If repackaging is performed at the Pharmacy, how many lines are packaged? Rate the facilities as excellent, Good, Poor.	<table border="0"> <thead> <tr> <th></th> <th><u>Yes/No</u></th> <th><u>Excellent</u></th> <th><u>Good</u></th> <th><u>Poor</u></th> </tr> </thead> <tbody> <tr> <td>Tablets/Capsules:</td> <td>-----</td> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>Liquids/Syrups:</td> <td>-----</td> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>External/Ointments:</td> <td>-----</td> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>Antiseptic Solutions:</td> <td>-----</td> <td>-----</td> <td>-----</td> <td>-----</td> </tr> </tbody> </table>		<u>Yes/No</u>	<u>Excellent</u>	<u>Good</u>	<u>Poor</u>	Tablets/Capsules:	-----	-----	-----	-----	Liquids/Syrups:	-----	-----	-----	-----	External/Ointments:	-----	-----	-----	-----	Antiseptic Solutions:	-----	-----	-----	-----
	<u>Yes/No</u>	<u>Excellent</u>	<u>Good</u>	<u>Poor</u>																						
Tablets/Capsules:	-----	-----	-----	-----																						
Liquids/Syrups:	-----	-----	-----	-----																						
External/Ointments:	-----	-----	-----	-----																						
Antiseptic Solutions:	-----	-----	-----	-----																						
Are there guidelines, SOPs and BPRs for repackaging? Rate them.																										
Describe policy on batch numbering and expiry dating of repackaged medicine in relation to bulk.																										

Are facilities supplied bulk medicines for repackaging? Rate the guidelines/SOPs given to facilities.	Yes/No	Excellent	Good	Poor
	Tablets/Capsules: -----	-----	-----	-----
	Liquids/Syrups: -----	-----	-----	-----
	External/Ointments: -----	-----	-----	-----
Antiseptic Solutions: -----	-----	-----	-----	

E1: Distribution and storage

QUESTION	RESULTS
How are drug supplies transported to the facilities?	Provincial/District pool transport: Dedicated sub-depot Transport: Courier company: Clinic Transport:
Which of the following dispatch procedures are followed?	Final contents check: Sealing/locking of parcels: Dispatch note signed by Pharmacist: Delivery note to be signed by recipient: Invoice accompanying consignment:
Are <input type="checkbox"/> facilities require <input type="checkbox"/> submit discrepancy reports within a specified period of receipt? How many have been received in the last 3 months? Specify.	Yes No -----Days. Description Number Action taken ----- ----- ----- -----
Are there <u>written</u> SOPs/Guidelines for: • Cold Chain Management • Organisation of the store • Record-keeping • Schedule 5,6 & 7 subst. control • Ordering Supplies • Receiving Supplies • Disposal of expired medicines • Product Recall • Pest control	Yes No Date of publication ----- ----- ----- ----- ----- ----- ----- ----- ----- -----
Are these or similar guidelines availed to the clinics?	
Does the pharmacy conduct support supervision to the facilities? Who does it and at what is the frequency? Is there a checklist? Is there written feedback?	Yes No Support supervision: ----- Checklist: ----- Written feedback: ----- Cadre: ----- Frequency:-----
Is FEFO/FIFO practiced in the store?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Indicate which of the following inventory control procedures are used:	Computerised stock control system: Stock cards on shelf: Stock cards in office: Ordering cards only: Maximum/minimum stock levels:

	Reorder levels: Other, specify:
When last was a stock-take done in the Pharmacy? How often is it done?	Date: _____ Frequency: _____ % Deviation: _____
Are there any overstocked or obsolete or redundant items on the shelves?	Yes <input type="checkbox"/> No <input type="checkbox"/>

Budgeting and Finance Management

QUESTION	RESULTS
Who determines the Drug Budget for the Pharmacy?	Pharmacist In-charge: Regional Director: District Manager: Don't know:
What criterion is used to determine the drug budget for the Pharmacy?	Quantification of needs: Rough estimate: Previous year's budget: Don't know:
What is the Pharmacy's budget for drugs for the current financial year:	R _____ Don't know:
How much of the budget has been consumed to date?	R _____ Don't know:
What was the expenditure in the last financial year and how did it relate to the budget for that year?	R _____ (_____ %) Don't know:
What was the cost of expired stock last financial year?	R _____ Not Valued:
What is the source of funding for drugs for your Pharmacy?	Provincial Gov't: Local Authority: Revenue from sales: Don't know:
How are drugs supplied to facilities paid for?	Directly by the facility: By the Region/District after presentation of a signed invoice/delivery note: Debiting facility deposit accounts:
Who controls to ensure facilities are supplied within budget? Is the control based on the budget?	Based on budget? <u>YES</u> <u>NO</u> Facility Manager: ----- Area/Cluster Manager: ----- Area Pharmacist: ----- Other, specify: ----- No control: -----
How are facilities informed of the cost of the drugs supplied?	Invoice at time of delivery: Invoice of total monthly supplies: At the end of the financial year: Never informed:

What are some of the problems that are encountered in drug management in this Pharmacy and supplying the facilities?

In your opinion what would you recommend as possible solutions to the problems that were mentioned above?

Thank you for your time and patience

APPENDIX B6

DRUG USE INDICATORS CONSOLIDATION FORM

Location: _____

Date: _____

<i>Date</i>	Facility	Av.drugs prescribed	% generics	% antibiotics	% injections	% on EDL	Consult time	Disp time	% drugs disp	% adequate label	% adequate knowledge	Impartial informat'n	% drugs in stock
Mean													
Maximum													
Minimum													

APPENDIX C: SCHEDULE AND PROGRAMME FOR FIELD VISITS TO HEALTH FACILITIES

	NAME OF FACILITY	OWNER	ADDRESS	DISTRICT	CONTACT PERSON & TEL. NO	DATE OF VISIT
1.	Pretoria Regional Pharm	Gauteng Pr. Aut	Cnr. Bossman and Pretorius, Pretoria	Central	Marla-Twe 0834528955	
2.	CTMM Sub-depot	Local Authority	Cnr. Prinsloo and Vermuelen Street	Central	Vuka Butelezi, 3088804	
3.	Adelaide Tambo Clinic	Gauteng Pr. Aut	Fanic Van Rensburg Str PYRAMID	Central	Ms. Julies, 5459937	
4.	Atteridgeville Clinic	Local Authority	Mokobane Street, Atteridgeville	Central	Sr. Makola, 3085111	
5.	Danville Clinic	Local Authority	Lucas van der Berg, Transoranje Rd. PTA WEST	Central	Sr. Maqubela, 3866052	
6.	Eastlynne Clinic	Local Authority	Pieter Krynauw Centre, Cnr. Meeu & Stegman Street. EAST LYNNE	Central	Sr. A. Fisher, 8001419	
7.	Eersterust Clinic	Gauteng Pr. Aut	214 Willie Swarts Ave, EESTERUST	Central	Sr. L. Leyds, 8067000	
8.	Eersterust Clinic	Local Authority	Willie Swartlaan	Central	Sr. N. Roberts, 8069571	
9.	Folang Clinic	Local Authority	D.F. Malan Rylaan, C.De Wet Build.175	Central	Sr. M. Mofokeng, 3080480	
10.	Gazankulu Clinic	Local Authority	Mphalane & Makhaza Street	Central	Sr. V Ngobene, 3757392	
11.	Hercules Clinic	Local Authority	Cnr Ribbens & Taljaar street. HERCULES	Central	Sr. T. Ndlovu 3792039	
12.	Mamelodi East Clinic	Local Authority	11043 Cnr. Lodwaba & Tlou street.	Central	Sr. Mononyane, 8011041	
13.	Mamelodi West Clinic	Local Authority	Cnr. Schabangu & Ntshabeleng	Central	Sr. Sema, 8054170	
14.	Mandisa Shiceka Clinic	Gauteng Pr. Aut	Portion 60 Mandela Village, HAMMANSKRAAL	Central	Ms. M. Koma, 7113906	
15.	Nelmapius Clinic	Local Authority	494 Lorie Fontein Str. Nelmapius	Central	Sr. M. Hausler, 8035994	
16.	Phahameng Clinic	Local Authority	19619 Hinterland Ave, Ext. 17, MAMELODI	Central	Sr. J. Mokale, 8401012	
17.	Phomolong Clinic	Local Authority	Cnr. Ndlovu & Dubazana Str, Extension 7	Central	Sr. Sibiya, 3756419	
18.	Pretoria North Clinic	Gauteng Pr. Aut	376 Jack Ibodon Str. PRETORIA NORTH	Central	Ms. R.Mtimkulu, 5656667	
19.	Pretoria North Clinic	Local Authority	City Hall, Brits Rd & Emily Hobhou	Central	Sr. T. Ndlovu, 5466151	

20.	Pretorius Park Clinic	Local Authority	Cnr. Bulge & Loris Street, Pretorius Park	Central	Sr. M. Haulser, 9986416	
21.	Sammy Marks Clinic	Local Authority	Cnr Prinsloo & Vermeulen Street	Central	Sr. R. De Klerk, 3088770	
22.	Saulsville Clinic	Local Authority	33 Sekhu Street, Saulsville	Central	Sr. M. Matsei, 3755946	
23.	Silverton Clinic	Local Authority	City Hall, Pretoria Road, Silverton	Central	Sr. Fisher, 8048958	
24.	Skinner Str Clinic	Gauteng Pr. Aut	357 Skinner Str. PRETORIA	Central	Ms. A. Roux, 3200346	
25.	Stanza Bopape 2	Local Authority	255905 Hector Petersen, Extension 8	Central	Sr. J. Makole, 8401012	
26.	Stanza Bopape CHC	Gauteng Pr. Aut	Stand No 2 Shilovhane Str. X5 Mamelodi East	Central	Ms. J. Mogoboya, 8120336	
27.	Bophelong Clinic	Gauteng Pr. Aut	66 Masokha Str. SAULSVILLE	Southern	Ms. M. Senosha, 3755955	
28.	Laudium CHC	Gauteng Pr. Aut	Cnr. Bengal & 25 th Ave, LAUDIUM	Southern	Ms. S. Kolapan, 3744022/23	
29.	Laudium Clinic	Local Authority	Cnr. 6 th Str. & Tangerian Ave, LAUDIUM	Southern	Mrs. D.Venter, 3742070	
30.	Lyttelton Clinic	Local Authority	Cnr. Cantonments & Clifton	Southern	Sr. A. Hide, 6717289	
31.	Sedibeng Clinic	Gauteng Pr. Aut	No.30 Mokobane Str. ATTERIDGEVILLE	Southern	Sr. S. Slabbert 3736699	
32.	Boikhutsong Clinic	Gauteng Pr. Aut	1266 Block T SOSHANGUVE	Northern	Ms. M. Mekgbe, 7900091	
33.	Bronkhorstspuit Clinic	Gauteng Pr. Aut	Cnr. Kruger & Botha Str, Muni Forum Building, BRONKHORSTSTSPRUIT	Northern	Sr. E. Mashia & Sr. A. Strydom, 9326200	
34.	Karenpark Clinic	Local Authority	Akasia Medical Centre, Hendrik Ave	Northern	Sr. De Villiers, 5218149	
35.	Rayton Clinic	Gauteng Pr. Aut	Cnr. Montey Rose & Oakley Str, RAYTON	Northern	Ms. C. Broedt, 7344274	
36.	Refilwe Clinic	Gauteng Pr. Aut	1165 Masina Drive COLLINAN	Northern	Ms. T. Mbeletsi, 7320671	
37.	Rossllyn Clinic	Local Authority	91 Piet Rautenbauch street. ROSSLYN	Northern	Sr.S.Van der Walt, 5218312	
38.	Soshanguve 1 Clinic	Gauteng Pr. Aut	30 Block II SOSHANGUVE	Northern	Ms. Amangeipo, 7972233	
39.	Soshanguve 2 Clinic	Gauteng Pr. Aut	1850 Block G SOSHANGUVE	Northern	Ms. N. Sibulela, 7972714	
40.	Soshanguve Block JJ	Gauteng Pr. Aut	1834 Block BB, SOSHANGUVE	Northern	Mrs. K.E. Sithole, 7903304	
41.	Soshanguve CHC (3)	Gauteng Pr. Aut	1834 Block BB SOSHANGUVE	Northern	Ms. L. Sithole, 7903304	
42.	Dilopye Clinic	NWP- Moretele	Stinkwater cluster, next to Primary school	Stinkwater	c/oSr.Mnguni, 0721897355	
43.	Jubilee Gateway Clinic	NWP- Moretele	Hammanskraal, Entrance of Jubilee Hospital	Moretele	Sr. M. Mosetlha, 7172011	
44.	New Earsterust Clinic	NWP-Moretele	Stinkwater cluster, next to beer hall	Stinkwater	Sr.D.K Chabangu	
45.	Kekanastat/Majaneng CHC	NWP-Moretele	Temba cluster, next to post office	Temba	Sr. Maleka, 7100016	

46.	Ramotse Clinic	NWP-Moretele	Temba cluster, next to Primary school	Temba	Sr.J.Makhetha, 7196073	
47.	Stinkwater/Refentse CHC	NWP-Moretele	Stinkwater cluster, next to Fuel Filling station	Stinkwater	Sr.M.Disemelo, 7155178	
48.	Suurman Clinic	NWP-Moretele	Temba cluster, next to Primary school	Temba	Sr.Ratlabala,0831094893	
49.	Jubilee Hospital Pharmacy	NWP-Moretele	Hammanskraal, Entrance of Jubilee Hospital	Moretele	Mr.Peter Dreyer 7172011	
50.	Temba CHC	NWP-Moretele	Temba cluster, next to Temba shopping centre	Temba	Sr.W.Selomo, 7173357	
51.	Boekenhout Clinic	NWP- ODI	Block A, Mabopane	Mabopane	Sr.D.Makhudu, 7021495	
52.	Odi Hospital Pharmacy	NWP- ODI	Mabopane. Inside Odi Hospital	Odi	Mr.A.K.Leballo, 7013460	
53.	Itireleng Clinic	NWP-ODI	Zone 2, Ga-Rankuwa	Ga-Rankuwa	Sr. N.Kwapeng, 7039014/5	
54.	Kgabo CHC	NWP-ODI	Wintervelt	Wintervelt	Sr.M.Loroke, 7040128	
55.	Mpho ya Batho Clinic	NWP-ODI	Kromkuil, Wintervelt	Wintervelt	Sr.M. Ntsie, 0831093212	
56.	Phedisong 1 Clinic	NWP-ODI	Zone 1, Ga-Rankuwa	Ga-Rankuwa	Sr.E.Kawesa, 7033978	
57.	Phedisong 4 Clinic	NWP-ODI	Zone 4, Ga-Rankuwa	Ga-Rankuwa	012-703 2993	
58.	Phedisong 6 Clinic	NWP-ODI	Zone 6, Ga-Rankuwa	Ga-Rankuwa	012-703 4700	
59.	Sedilega Clinic	NWP- ODI	Block U, Mabopane	Mabopane	012-702 2300	
60.	Tlamelong Clinic	NWP- ODI	Block B, Mabopane	Mabopane	012-702 1101	
61.	Winterveld (Dube) Clinic	NWP-ODI		Wintervelt	012-704 0135	
62.	Pabalelo Place of Safety	NWP-ODI	Zone 2, Ga-Rankuwa	Ga-Rankuwa	012-7031766	

CHH = Community Health Centre. Pr. Aut. = Provincial Authority. NWP = North West Province. Blue Font = Belong to Metsweding. Red Font = Sub-depots. Yellow Fill = Not visited

The plan is to spend one day at a clinic and 2 days at Community Health Centre. Preferably, the facilities covered in one week should be equally distributed between the Province and the Local Authority. This will facilitate periodical analysis, comparison and reporting.

The following should be available on that day:

- The person in-charge of the facility.
- The person in-charge of the pharmacy, dispensary and store.
- Records showing daily attendance of patients and monthly totals since 1st July 2001 to date.
- Stock cards
- Ordering cards or record of orders made since 1st July 2001 to date.
- Budget and expenditure on medicines and medical supplies for the financial years 2001/02 and 2002/03.

PROGRAMME AT THE COMMUNITY HEALTH CENTRE

DAY ONE

09 00 hours	Arrival at the Facility
09 15 hours	Interview with the Facility Manager.
09 45 hours	Introduction to staff.
10 00 hours	Sampling of prescription encounters.
11 30 hours	Monitoring Prescription practices/consultation time.
12 45 hours	Lunch break.
13 30 hours	Monitoring dispensing practices, time and patient knowledge.
15 00 hours	Evaluating Prescribing indicators data.
16 00 hours	Leave Facility

DAY TWO

09 00 hours	Arrival at the Facility.
09 15 hours	Interview with in-charge of pharmacy, dispensary, store.
09 45 hours	Inspection of physical facilities of the pharmacy/dispensary/store.
10 30 hours	Examination of stock cards and stocktaking.
12 45 hours	Lunch break.
13 30 hours	Examination of ordering cards/forms/records.
15 00 hours	Miscellaneous data collection and observation.
15 30 hours	Wrap up.
16 00 hours	Leave Facility.

PROGRAMME FOR THE CLINIC

09 00 hours	Arrival at the Facility, and interview with the Facility Manager.
09 20 hours	Introduction to staff.
09 30 hours	Sampling and evaluation of prescription encounters
10 15 hours	Monitoring Prescription practices/consultation time
11 00 hours	Monitoring dispensing practices, time and patient knowledge
12 30 hours	Lunch break.
13 00 hours	Inspection of physical facilities of the pharmacy/dispensary/store.
15 00 hours	Examination of stock cards, ordering cards and stocktaking
14 30 hours	Wrap up
16 00 hours	Leave Facility