ASSESSMENT OF MEDICINE SUPPLY MANAGEMENT AT PRIMARY HEALTH CARE FACILITIES IN A RURAL DISTRICT OF KWAZULU-NATAL, SOUTH AFRICA

SHINGIRAI TRYMORE MATEMA

A mini-thesis submitted in partial fulfilment of the requirements for the degree of Master of Public Health at the School of Public Health, University of the Western Cape

Supervisor: Dr Hazel Bradley

April 2020

KEY WORDS

Medicine Supply Management

Primary Health Care

Standard Operating Procedures

Pharmacist's Assistant

Inventory Management

Stock-outs

Human resources

Ordering and receiving processes

Rural

South Africa

ABBREVIATIONS

AMC	Average Monthly Consumption
BMREC	Bio-Medical Research Ethics Committee
DoH	Department of Health
EN	Enrolled Nurse
FM	Facility Manager
GPP	Good Pharmacy Practice
HIC	High-Income Countries
HR	Human Resources
HRH	Human Resources for Health
LMICs	Low and Middle-Income Countries
MSM	Medicine Supply Management
OHSC	Office of the Health Standards Compliance
NDoH	National Department of Health
PA	Pharmacist's Assistant
PHC	Primary Health Care
PMPU	Provincial Medicine Procurement Unit
PN	Professional Nurse
ROL	Re-Order Level
SAPC	South African Pharmacy Council
SN	Staff Nurse
SOP	Standard Operation Procedure
WHO	World Health Organization

ACKNOWLEDGEMENTS

I would like to extend my heartfelt gratitude to my supervisor Dr H. Bradley for her expert and patient guidance throughout this research.

I acknowledge my wife Lynette and daughter Michaela for their unconditional love, support, patience and understanding during the course of my studies.

DECLARATION

I declare that **Assessment of medicine supply management at primary health care facilities in a rural district of KwaZulu-Natal, South Africa** is my own work that it has not been submitted before for any degree or examination in any University or College, and that all the sources I have quoted or used haven indicated and acknowledged as complete references.

Shingirai Trymore Matema

Signed: Date: 30 April 2020

ABSTRACT

Background

The introduction of National Health Insurance (NHI) and the Ideal Clinic Monitoring System have highlighted gaps and challenges with regard to medicine supply management (MSM) at primary health care (PHC) facilities. PHC facilities are the first point of contact communities have for their health needs, however, frequent stock-outs of medicines at PHC facilities in uMkhanyakude district, a rural district in KwaZulu-Natal, and have raised questions as to how medicine stock is managed at these facilities.

Study Aim

The aim of the study was to assess medicine supply management at PHC facilities in uMkhanyakude district, KwaZulu-Natal.

Methodology

The study was a cross-sectional descriptive study using a standardized research methodology, with tools and indicators adapted from the Ideal Clinic Programme and the South African Pharmacy Council (SAPC) checklist. The study sample comprised 20 purposively selected PHC facilities (out of total of 55) across the four sub-districts, in uMkhanyakude district, five from each sub-district. The questionnaire was structured into five domains to assess the following: human resources involved in MSM, storage of medicines, ordering and receiving processes, inventory management and stock-out reporting systems at PHC facilities. For each domain several key indicators were used to assess current PHC facility performance and a scoring system used to rate facility performance as poor (<50%), fair (50-79%) or excellent (≥80%). Verified data from the questionnaires was captured on a Microsoft Excel® spread sheet and analysed descriptively using Microsoft Excel®. Ethical clearance and permission for the study was obtained from the relevant bodies and signed informed consent from the PHC facility managers.

Results

The study found the overall MSM performance for the 20 PHC facilities investigated was 59.4% (fair). Four of the assessed domains were categorised as fair: HR practices (60%), storage management (55%), ordering and receiving processes (66%), and stock out reporting systems (71%); whilst inventory management (45%) was categorised as poor. The overall

performance for sub-districts B, J, M and U was 60% (fair), 74% (fair), 50% (fair) and 55% (fair) respectively, with sub-district J the top performing (74%) and sub-district M the least performing (50%). Most of the facilities, 60%, designated the responsibility of MSM to an enrolled nurse whilst 40% of the facilities designated responsibility to a pharmacist's assistant. In this study, 70% of the facilities had a staff member who had attended the MSM workshops conducted at the mother hospitals, although this was not always the person involved in MSM at the facility at the time of the study.

Conclusions and Recommendations

The findings of this study affirmed the shortage of adequate and qualified pharmacist's assistants at PHC facilities in uMkhanyakude district. Most of the facilities had insufficient storage space which negatively impacted proficiency in medicine supply management. The most proficient component of MSM in uMkhanyakude district was stock out reporting systems, followed by ordering and receiving processes. Key recommendations include: staff members involved in MSM should attend regular training on relevant aspects of MSM at mother hospitals; PHC facilities should improve their medicine storage rooms; facility managers should ensure that signed and updated MSM SOP's are always available at their respective facilities; and the district should promote sharing of best practices amongst PHC facilities.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1: INTRODUCTION

1.1. Introduction

Access to healthcare, including essential medicines, is a fundamental human right (Management Sciences for Health (MSH), 2012). Essential medicines are defined as those that are intended to be available within the context of functioning health systems at all times, in adequate amounts, in the appropriate dosage forms, with assured quality and adequate information and at a cost that individuals and the community can afford (World Health Organization (WHO), 2019). Recent recognition of the importance of expanding access to good quality health products is demonstrated by its inclusion as one of WHO's thirteen urgent health challenges for the next decade (WHO 2019).

Therefore, there should be systems in place to ensure that individuals have access to good quality essential medicines whenever they are needed. These systems fall under Medicine Supply Management (MSM) procedures. According to WHO, access to essential medicines and health products is critical to reach universal health coverage and these items are important to address health problems and improve quality of lives. They form an indispensable component of all health systems in the prevention, diagnosis and treatment of disease and in alleviating disability and functional deficiency (WHO, 2011). However, many districts in South Africa have reported that Primary Health Care (PHC) facilities do not have essential medicines in stock (Munedzimwe, 2017).

The benefits of good medicine supply management include: avoiding wastage, ensuring availability of medicines at all times and avoiding dangers associated with improper usage (Mohamed *et al.*, 2007). However, weak management systems, unskilled staffing, lack of up-to-date knowledge and training of personnel involved, all present a real challenge to finding lasting solutions to good medicine supply management (Mohamed *et al.*, 2007). According to Mohamed *et al.*, (2007), funding of medicine supplies by government alone is sometimes inadequate to ensure availability with sustainability. New trends in the managing of medicine supplies that will provide effective and efficient set of practices aimed at ensuring the timely availability and appropriate use of safe, quality medicines and services must come into play (Mohamed *et al.*, 2007).

In recent years South Africa has made some significant strides in improving the public health system and addressing current inequalities, with the right to health a constitutional provision in South Africa (Meyer *et al.*, 2017). According to the WHO (2009) the uneven distribution of the health workforce between urban and rural areas and the absence of a well-trained and supported staff constitute major problems in delivering services to meet the needs of communities in Low and Medium Income Countries (LMICs). According to Mburu *et al.*, (2017) the shortage of human resources for health (HRH) in the rural areas is largely because of the inability to attract sufficient health personnel to these communities and further because of migration from the rural to urban areas as part of urbanization. This is the case in South Africa where a mal-distribution of the health personnel between urban and rural districts and private and public sectors has resulted in the failure of a sufficient health personnel to meet the health care needs of the entire citizenry (Lehmann, 2008).

The National Department of Health (NDoH) of South Africa embarked on several initiatives to support PHC and these included the introduction of pharmacist's assistants in the pharmacy profession (Government Gazette, 2000). The South African Pharmacy Council (SAPC) envisaged that these assistants would work at PHC level and developed competency standards that included their roles at this level. This set competency skills included performance of duties such as: stock control, ordering and issuing of medicines and packaging and/or pre-packing of pharmaceuticals making use of standard operating procedures (SOPs) (SAPC, 2010).

In addition to these initiatives, the National Health Insurance (NHI), programme has also been introduced to enhance access to medicines for patients with chronic diseases, as well as activities to improve care in hospitals, including improving pharmacovigilance (Meyer *et al.*, 2017). To support access to medicines, a programme of intervention called the Central Chronic Medicine Dispensing and Distribution programme (CCMDD) has been implemented in South Africa to address the issues of medicine stock outs and long waiting times, particularly for stable patients with chronic conditions (Meyer *et al.*, 2017). The aim of this programme is to decongest the PHC facilities through transferring the collection of medicines by stable chronic patients to conveniently located and appropriately resourced Pick up Points (PuPs) (Meyer *et al.*, 2017).

1.2. Research Setting

UMkhanyakude district is situated in the far northern region of KwaZulu-Natal province in South Africa. The district is bordered by Mozambique to the north and eSwatini to the north-western part, as well as, Zululand district to the west and King Cetshwayo district to the south ('UMkhanyakude District Health Plan', 2016/2017). The district is counted amongst the most deprived districts in KwaZulu-Natal (Day *et al.*, 2007). According to Day *et al.*, (2009), the poverty rate of people living in the district is high with between 63% and 82% of households living on less than R800 per month. As a result, most of the people in UMkhanyakude district rely on the public sector services for their health needs. The district has four sub-districts namely: Big Five Hlabisa, Jozini, Mtubatuba and Umhlabuyalingana. UMkhanyakude provides health services to a population of 649 643 with five district hospitals (serving as mother hospitals), 57 PHC facilities, 1 community health centre (CHC) and 18 mobile facilities ('UMkhanyakude District Health Plan', 2016/2017).

PHC facilities in UMkhanyakude are the first point of contact communities have for their health needs. Therefore, PHC as the first point of contact for rural patients must offer a comprehensive and coordinated health care (Mung'omba, 2016). Rural district hospitals are the first frontiers in support of PHC. Health services include child immunisation and vaccinations, family planning, circumcision, collection of chronic medication, including antiretroviral (ART) and medicines for non-communicable diseases, Human Immunodeficiency Virus (HIV) testing, Tuberculosis (TB) screening and ante-natal visits (ANC). The mobile facilities have designated mobile points known to the communities where they provide mainly prevention and healthcare services. This is a way for people in remote areas to overcome barriers of time, money and long distance travelling to access PHC facilities.

Each PHC facility is managed by a facility manager, several nurses and in some instances a pharmacist's assistant is in charge of the medicine store room. In cases where there is no pharmacist's assistant, the facility manager usually delegates an enrolled nurse to manage the medicine store room. There are no permanent doctors based at these facilities. Multi-disciplinary teams comprising medical officers, social workers, dentists, allied health professionals, including pharmacists, and specialised nurses from mother hospitals visit PHC facilities on specific days, thereby reducing congestion in the out-patient departments (OPD) at mother hospitals ('UMkhanyakude District Health Plan', 2016/2017). A pharmacist in this team supports the medicine store personnel making use of an MSM audit tool; to check for

compliance and addresses any gaps with the Facility Manager.

The PHC facilities procure their medicines through their mother hospitals which then send the order electronically to the central medical depot called Provincial Medicine Procurement Unit (PMPU). The PMPU is about 400 kilometres from UMkhanyakude district. The PMPU will then place orders on behalf of health facilities as per tender allocations. Some medicines will be supplied from the PMPU to both PHC facilities and mother hospitals but other medicines that are on the direct delivery system are delivered straight to mother hospitals from the pharmaceutical companies. In cases where an emergency medicine is out of stock at the PHC facility, the mother hospital will arrange transport to supply from its buffer stock or to collect the stock timeously from the PMPU (Fakude, 2017). However, this is not possible with those medicines on the direct delivery system as the hospital facilities have to rely solely on the pharmaceutical company's delivery schedule, regardless of additional requirements that may occur between delivery dates.

1.3. Problem Statement

In 2013 key initiatives were implemented in UMkhanyakude district aimed at improving medicines management at PHC facilities. These included development and implementation of PHC SOPs for medicines management and the introduction of pharmacist's assistants located at PHC facilities to manage pharmaceuticals (Fakude, 2017). However, a shortage of pharmacist's assistants at PHC facilities was noted in the 'UMkhanyakude District Health Plan' 2016/17, (2016) and this was attributed as the reason for continuing poor medicine supply management. A recent study by Fakude (2017), conducted at hospitals in this district, again highlighted a shortage of pharmacist's assistants, and reported a lack of computerised stock control system, transportation problems and poor implementation of medicine supply management at PHC facilities as factors contributing to shortages of medicines in the district. Hence, despite of a number of interventions over the past five years there seems to be little improvement in medicine management in the district and the author recommended further research to investigate poor medicine supply management in the district, particularly at PHC facilities.

1.4 Aim

The aim of the study was to assess medicine supply management (MSM) at primary health care

(PHC) facilities in UMkhanyakude district, KwaZulu-Natal.

1.5 Objectives

The objectives of the study were:

1. To describe the personnel managing pharmaceutical stock at PHC facilities.
2. To assess storage management at PHC facilities.
3. To assess the medicine ordering and receiving processes at PHC facilities.
4. To assess stock inventory systems at PHC facilities.
5. To assess systems in place for reporting stock-outs at PHC facilities.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

According to Management Sciences for Health (MSH) 2012 in most low medium income countries (LMICs) approximately 40 per cent of the health care budget is consumed by pharmaceuticals but large portions of populations still lack access to essential medicines. This points to improper medicine management in the supply chain resulting in populations below the poverty line suffering even more as they cannot access essential medicines (Zuma, 2013). This chapter discusses the available literature on human resources involved in medicines supply management (MSM), storage of medicines, procurement of medicines, inventory management and stock-out reporting systems at primary health care (PHC) facilities.

2.2 Human Resources for medicines supply management management

The shortage of healthcare workers in rural and remote areas remains a growing concern in LMICs and high income countries (HICs) alike. The achievement of universal health coverage and the health-related Sustainable Development Goals (SDGs) will depend substantially on improving health worker availability, accessibility, acceptability and quality (WHO, 2017). According to Mbemba *et al.*, (2016), it is recognized that nearly half of the global population living in rural and remote areas is facing enormous difficulties in access to quality healthcare. Health workers are the representation of any health system therefore adequately skilled, productive and well-motivated health workforce is a prerequisite for effective medicine supply management (Mbemba *et al.*, 2016). The availability of both medicines and a pharmacy workforce in adequate numbers with appropriate competencies is crucial to ensuring a well-functioning pharmaceutical system (FIP, 1998). In South Africa, pharmaceutical services are generally delivered by pharmacy personnel registered under the Pharmacy Council.

Throughout the world there has been a long suffered severe lack of skilled workers and managers (MSH, 2012). The Alma Ata WHO (2000), calls for "*a reorientation and broadening of the skills of health personnel to enable them to respond to the challenges of implementing PHC and to work in teams as well as with other sector professionals and communities"*. This means that, an effective health service delivery is determined by an intensive labour workforce which is the primary determinant of an effective health system (MSH, 2012). According to WHO (2007) the dramatic inequities and insufficient absolute numbers of health personnel,

has been identified as one of the key impediments in the improvement of health systems performance worldwide.

Globally, the quality of health services is hindered by insufficient human resources for health (HRH), making it difficult to achieve population health goals (Mburu *et al.*, 2017). Limited human resources are a major impediment to achieving the United Nations health-related Sustainable Development Goals (SDGs) in LMIC (Mburu *et al.*, 2017). According to van Rensburg *et al.*, (2008), South Africa's public health system is characterised by human resource shortfalls which is something that is common in other LMIC. Rispel (2016) reiterates the need for politicians and senior managers to recognize the importance of addressing human resources for health in order to improve the performance of the country's health system. Mung'omba (2016) further noted the uniqueness of rural healthcare with respect to human resource and bemoaned the absence of acknowledgement by different policy initiates.

Primary healthcare in South Africa is mostly staffed by professional, enrolled and auxiliary nurses who are supported by some clerical and general health workers (Lehmann, 2008). According to Rispel (2016), evidence suggests that proper training and support of mid-level workers can render health care within their scope of practice, which is of equal or better quality than that rendered by health professionals. South Africa has made progress with the introduction of mid-level health workers in the PHC re-engineering in order to widen access, coverage and ensuring service delivery in areas that are severely underserved (Lehmann, 2008).

In South Africa, the pharmacy profession, other than nursing, was the first to introduce mid-level cadres as pharmacist's assistants to improve service delivery with more focus at the PHC level (Lehmann, 2008). In a study by Zuma (2013), medicine availability was found to be between 75% and 95% and this was attributed to insufficient availability of pharmacist's assistants resulting in inconsistent ordering and stock level monitoring at the facilities. This is because professional nurses have other duties to execute rather than focusing exclusively on medicines supply management.

Almost 20 years ago, NDoH embarked on an initiative to support PHC through the introduction of pharmacist's assistants in the pharmacy profession, Government Gazette (2000). The South African Pharmacy Council (SAPC) envisaged that these assistants would work at PHC level and develop competency standards to include roles at that level. The set competency skills

included those required to perform duties such as stock control, ordering and issuing of medicines and packaging and/or pre-packing of pharmaceuticals making use of the SOPs (SAPC, 2010). However, despite this initiative, there are still insufficient pharmacists and pharmacist's assistants at PHC level, particularly in rural areas, and frequently nursing personnel take on the responsibility of managing the medicines supply at PHC level (Zurn *et al.*, 2016). According to Mbemba *et al*., (2016), staff retention becomes a big problem as most professionals prefer working in the cities as opposed to rural areas. This is quite the case in UMkhanyakude district since it is situated in the rural areas of KwaZulu-Natal, far from the urban cities and towns.

The South African Pharmacy Council (2010) stipulates that the pharmaceutical storage area must be under the control of a responsible pharmacist and delivery of medicines must be made directly to a pharmacy. At PHC facilities, the pharmacist is not present, hence the medicine store personnel assigned by the facility manager is responsible for packing or unpacking and storage of medicines. District tailored standard operating procedures (SOPs) are critical in guiding medicines stores personnel on how medicines are received and stored safely to avoid spillage, breakages or expiries.

2.3. Storage of medicines

Storage, in terms of medicine supply systems, involves ensuring that medicines are kept safely and not damaged and this can be at any point in the medicine supply cycle (USAID: Deliver Project, 2011). Improper storage practices may lead to physical deterioration, chemical decomposition or reduced potency which may result in the formation of toxic by-products by degradation (MSH, 2012). This means that environmental control (i.e., adequate space, security, stock rotation, expiries, ventilation, and back-up generators) must be maintained wherever medicines are stored at PHC premises (Ideal Clinic Manual, 2018).

According to the International Pharmaceutical Federation (FIP) (1997), well-located, well built, well organized and secure storage facilities are an essential component of the medicine supply system. This means an appropriate building or space that provides the correct environment for the storage of medicines and assists the efficient flow of supplies. It is important that the storage area meets physical dimension standards to ensure that medicines are kept properly, as the shelf life of medicines depends on their storage conditions (MSH,

2012).

In a study conducted in PHC facilities in Nigeria, storage conditions were found to be generally acceptable in a situation assessment which found that 84% and 92% of the facilities met more than 50% of ARV storage requirements in their dispensaries and stores respectively (FMoH/WHO, 2003). However, facilities frequently struggle to meet storage conditions. In Uganda, public hospitals and PHC facilities were found to have low quality of storage and only one out of nine (11.1%) hospitals, and two out of 60 (3.33%) PHC facilities were rated as having good storage conditions (Sowedi *et al.*, 2000). According to Trap *et al.*, (2016) facilities in Uganda that are constructed and equipped by donors often have more space, shelves, refrigerators, running water, and electricity than government facilities. This is an indication that a public-private partnership or inter-sectoral collaboration can improve service delivery, pharmaceutical care and medicine supply management if government takes this into consideration. Disturbingly, a study by Mahoro (2014) in the Cape Metropole, Western Cape, found that 20% of community health centres (CHCs) did not meet the appropriate standards for the physical dimensions of the pharmacy storage site, whilst appropriate labelling of the shelves in the dispensary and in the storeroom was only found at 66.7% of the CHCs.

In a study by Crowley *et al.*, (2015), problems related to infrastructural challenges, comprising of inadequate storage space and lack of security, were identified in uMgungundlovu district in KwaZulu Natal. It was found that one facility did not have an allocated medicine room and stored all medicines in cabinets in consultation rooms; only 50% of the facilities had sufficient storage space in the medicine room to store medicines; and due to insufficient storage space, boxes containing medication were stacked on the floor and medicine rooms were used to store medical and cleaning supplies. Another study by Blick *et al.*, (2018) found that continuous assessment of the storage management practices improved following interventions to 73% just below the 75% threshold.

The SAPC (2010) requires the storage site to be a secured area that allows protection of medicines against contamination and deterioration, and permits the maintenance of the integrity of the packaging and quality. Some evidence suggests that poor storage conditions such as, excessive heat, moisture and light, as well as, poor needs estimation and stock control management, are amongst the principal causes of medicine expiration in health facilities (Ali, 2009). Infrastructure and space at the facilities for the storage of medicines was also lacking

and the dispensing rooms were very small with one facilities' medicines stored in cabinets in the nurses' consulting rooms (Munedzimwe, 2017). This study found that PHC's could therefore not store extra emergency stock for effective pharmaceutical service delivery.

Motlanthe (2012) is of the view that avoiding the expiry of medicines as part of inventory management forms the heart of a proper medicines supply system. Two principles are used for stock rotation namely first expired-first out (FEFO) and first in-first out (FIFO) (MSM, 2012). A stock rotation system needs to be in place to determine which items need to be used first on either a FIFO or a FEFO basis. These principles, if properly implemented, will in turn avoid accumulation of expired and obsolete stock. For instance, a large buffer stock can cause high losses of stock due to expiry. Every facility needs an effective inventory management system to deal with ordering supplies, receiving, storing stock, issuing, re-ordering and accounting for stock (Munedzimwe, 2017).

Stock must be stored in appropriate and auditable environmental conditions, (Shafaat *et al.*, 2013). Many medical products require storage in cool conditions and refrigeration is widely used which needs to be carefully monitored to ensure that the correct temperatures are maintained. In general, vaccines lose their effectiveness quickly if they become too hot or too cold at any time, especially during transport and storage, (Shafaat *et al.*, 2013). Inappropriate storage may result in vaccines wastage, or if undetected, failure of the vaccine to protect. An optimum temperature range of +2ºC to +8ºC is desired to maintain the potency of most vaccines (Ideal Clinic Manual, 2018). The SAPC states that a refrigerator must be connected to a standby generator or other emergency power system to ensure uninterrupted power supply in case of power (current) failure (SAPC, 2010). For instance, the auditor general's report (2017) pointed out that for many PHC facilities generators were not seen as a priority which actually disrupted the whole cold chain management. In summary, storage management is important because it ensures that the facility has the right medicines, in adequate quantities, with respect to the right location, time and medicine quality (Barasa *et al.*, 2018)

2.4. Ordering and receiving processes

International initiatives such as the Global Fund to Fight AIDS, Tuberculosis and Malaria, the President's Emergency Plan for AIDS Relief and the President's Malaria Initiative have significantly increased availability and access to medicines in many LMICs (Matowe *et al.*,

2008). However, these increases in the supply of medicines are straining systems that are already weak in pharmaceutical supply management. Realistic improvements in managing supply and use of medicines are possible when due attention is focused on the prevailing issues of management. The proper supply management would ensure the judicious use of limited financial resources (Mohamed *et al.*, 2007).

In most LMIC it is important to minimize resource wastage by ensuring that procured medicines and medical supplies are appropriately received, stored and distributed while maintaining their quality (MSH, 2012). Placing of orders timeously improves service delivery and ensures that stock outs are avoided and action is taken in cases where the medicine is not available from the depot or nationally. It is the responsibility of the medicine store personnel to make sure that there is enough stock at all times and it is imperative for a facility to have SOPs in place for ordering and receiving of medicines (Ideal Clinic Manual, 2018).

Studies have reported different ways of handling medicine stock in cases where there are known shortages in order for it to last longer. It has also been acknowledged that in order to handle medicine shortages well, healthcare providers need to ensure that they have systematic processes of how to handle shortages. These ways can be in the form of SOPs (Munedzimwe, 2017). The ordering process involves assumptions based on monthly consumption, lead time, safety stock, re-order levels, stock-on-hand and the procurement period (MSH, 2012). As a result of a strict order and delivery schedules for the government facilities in Uganda, the routine task of calculating re-order levels resulted in government facilities scoring higher in stock availability of essential medicines (Trap *et al.*, 2016). This shows that if SOPs are properly implemented and supervised the availability of medicines will be increased.

A study by Crowley *et al.*, (2015), conducted at PHC facilities in uMgungundlovu district, found that none of the facilities had a written SOPs for medicine receiving, storing and dispensing. However, in most of the facilities medication was stored on shelves with stock cards that were updated when medication was received and dispensed. Furthermore, administrative clerks or support officers were found assisting professional nurses with ordering and storing medication in medicine rooms as well as replenishing medicine stock in consultation rooms.

2.5. Stock inventory management

An inventory management system aims to assist in determining when and how much stock to order or issue. According to MSH (2012), poor inventory management systems can lead to a waste of financial resources, shortages of essential medicines and poor quality of care. This means that inventory systems should be managed in a coordinated manner to ensure that patients receive the correct quantity of the correct medicine at the right time.

Forecasting and order planning supports methods and processes are used to estimate quantities of pharmaceuticals needed for the organisation (MSM, 2012). The USAID: Deliver Project., (2011), further explains forecasting in medicine supply systems as those techniques that are used to ensure that a facility has enough stock to meet the potential demand for those particular medicines in a specified period of time.

In a structured system of forecasting, the occurrence of shortages and stock outs is likely to be reduced (MSH, 2012). There have been many cases where reports mention that the methods used to forecast, or lack thereof, by facilities resulted in medicine shortages and stock outs occurring (Lufesi *et al.*, 2007). According to the Practical Guide for the Supply Chain Management of Health Commodities (USAID: Deliver Project., 2011) the methods used when forecasting should be based on past consumption data, reflecting the burden of disease in the area. However this data must be reviewed from time to time as some diseases may be seasonal hence a constant reviewing of consumption data would ensure that the quantities ordered are always up-to date (USAID: Deliver Project., 2011). It is unfortunate that the organisational supply chain in most LMICs is not accorded a central role in the overall strategy of the organization (Riungu, 2007). For example, the national malaria strategy for Kenya lacked the supply chain component until it was reviewed in 2009. Due to this omission, supply of malaria commodities was inconsistent in spite of good planning at the programme level (Riungu, 2011).

If stock cards are completed correctly, the fundamental need of medicines will be ensured and quantified (Trap *et al.*, 2016). The use of an inventory system allows for checking of the physical stock of product quantities in the store to ensure a balance on hand. A study by Trap *et al* (2016), found that stock cards were available in facilities but not filled out correctly and this was also the case in facilities that had received new stock books. This is an indication that keeping stock records is difficult even with the introduction of the new stock books. However,

it is important that SOPs are re-enforced as a form of reminding medicine store personnel of the required procedures or steps to take when managing stock.

Sowedi *et al.*, (2000) found in their study carried out in Uganda, that PHC facility staff did not know any inventory control method, resulting in holding unnecessary stock. Similarly, a study by Lufesi *et al.*, (2007) in Malawi, found that poor stock control and forecasting caused many discrepancies between the reported stock levels and actual stock-on-hand at health facilities. This was an indication that health workers were not following protocols on medicine stock management with the result that facilities encountered major stock outs and medicine shortages whilst stock was available at the central depot. It was suggested that this non-compliance could have been because of lack of training and supervision from seniors such as district pharmacists (Lufesi *et al.,* 2007).

According to MSH (2012), the availability of pharmaceuticals in health facilities is determined by the procurement system. Furthermore, an effective procurement process should set the purchasing schedule, formulas for order quantities, and safety stock levels to achieve the lowest total cost of purchasing at each level of the system. At PHC level, the facility manager needs to know the maximum order quantity that should be ordered at any time without subjecting the facility to overstock, under stock or unnecessary cost. This is referred to as Re-order quantity (ROQ), which is the level of medicines in stock that signals placement of new orders. In a study conducted by Roy *et al.*, (2009) in the Darbhanga district of India, the re-order and buffer stock levels were not maintained at any of the PHC facilities which resulted in demand estimations not following consumption patterns.

This lack of understanding of basic principles of the reordering skills, such as failure to calculate average monthly consumption or how to calculate orders on maximum and minimum quantities, was found to be a factor contributing to mismanagement of medicine supply (Sowedi *et al.,* 2000). The Nigerian medicine supply system favours a push system rather than a pull one in medicine allocation to PHC facilities, however this system results in overstocking, and facilities receive medicines that do not meet their needs (FMOH, 2003). Similarly, allocation to regional stores in Malawi was found to ignore the available historical consumption data and was population-based instead (Raja *et al.,* 2008). A recent study by Munedzimwe (2017), in one of South Africa's provinces, found that medicine stock outs at PHC facilities are a result of inaccurate medicine stock levels and failure to adhere to the recommended methods

of forecasting when placing medicine orders from the depot.

2.6. Facility Stock Status Reporting Systems

Technology advancement has enabled health systems in countries worldwide to computerize their medicine management systems as a measure of mitigating medicines unavailability (Githinji *et al*., 2013). For instance, a facilitated communication web-based system for the management of stock levels between stakeholders has solved the problem in Haiti where obstacles existed with the paper based systems (Berger *et al*., 2007).

Medicine availability has been noted to improve in Kenya through the implementation of an 'SMS *for life'* system in reporting of anti-malarial medicines (Githinji *et al*., 2013). It also solved the problems of unavailability of rapid diagnostic tests and anti-malarial medicines by enhancing stock visibility (Githinji *et al*., 2013). Health workers at facilities used their personal cell phone devices to send the weekly facility stock levels via SMS to a central data base which was accessible to those at the higher level such as the district managers (Githinji *et al*., 2013). The study found that this intervention improved the rate of reporting of the facilities and as a result the district managers could intervene on medicine shortages once identified on the central database by arranging that facilities which had more stock than they needed shared it with those with a shortage and this reduced the occurrence of stock outs (Githinji *et al*., 2013).

In South Africa, at hospital level, a software programme called, RxSolution® has been introduced in most public health facilities to support the regulation of stock control in public health facilities (Meyer *et al.*, 2017). This programme allows the monitoring, tracking, and ordering of medicine stock as well as movement of stock among health facilities on a computer system. RxSolution® is able to generate re-order quantities for the stores personnel informing them when and what to order in the right quantities to avoid stock outs (Liebenberg, 2017). This relieves health workers from manually calculating re-order quantities for themselves. This system allows for the information on medicines availability to be available to all the stakeholders involved in the processes of medicine stock management. It has also been set to automatically submit weekly dashboards showing medicine availability data to the national surveillance center (Liebenberg, 2017). However, instances have been observed where for example, one facility in a particular district reports a high stock out rate of a certain medicine while other facilities report no stock outs. In such circumstances, that stock out would be

attributed to that particular facility and not as a provincial or national crisis; therefore it would call for scrutiny of the internal processes in that facility (Mayosi *et al.*, 2014). In a situation where there is a stock out at the PMPU, the pharmacy managers at different facilities are encouraged to communicate with each other so that stock can be shared to improve pharmaceutical care. Costing of this stock between the facilities is done through obtaining finance letters, submitting them to the finance department and payments are then processed through journaling the facilities.

The NDoH has recently introduced the Stock Visibility Solution (SVS) in South Africa as part of the PHC re-engineering in a bid to reduce stock outs, (Chowles, 2016). SVS is a mobile application and web based management tool used at PHC facilities to capture medicine availability data (Meyer *et al.*, 2017). This initiative aims to improve the reporting of medicine availability by PHC staff using cell phones to capture and send this information to the district level. It will in turn generate alerts when stock is too high or too low to both the health facility and those with access to the central database where the information is loaded such as the district managers, (Chowles, 2016). This is similar to the SMS *for life* program that improved the availability of rapid diagnostic tests and anti-malarial medicines by enhancing stock visibility in Kenya (Githinji *et al.*, 2013).

In conclusion, the management of medicines is essential for the provision of health care and even more important in lower income countries where resources are scarce. It has also been reported that one of the major areas of wastage in the health system occurs in the use of medicines (Schouten *et al.*, 2011). Pharmaceutical personnel have the responsibility to be in charge of the core aspects of medicine management as they are specifically trained on handling medicines compared to other health care workers. Proper inventory management practices are significant in ensuring continuous availability of medicines particularly at PHC facilities. This in turn reduces frequent stock outs and medicine expiries as long as there is sufficient storage space, ventilation, standby generators and security systems

CHAPTER 3: METHODOLOGY

3.1 Study Design

The study used a quantitative methodology which took a descriptive cross-sectional approach. A cross-sectional study is conducted at a specific point in time and was suitable to give a snap shot of medicines supply management (MSM) at primary health care (PHC) facilities in the district of uMkhanyakude (Polit *et al*, 2010).

3.2 Study population

The study population was 55 PHC facilities in the four sub-districts of uMkhanyakude district. At each PHC facility, the facility manager was targeted for this study. This was because in most cases the PHC facility manager is responsible for overseeing pharmaceutical management at the facilities and for activities that take place in the medicine storeroom.

3.2.1 Inclusion criteria

The eligibility criteria for selection in this study included the following:

- All PHC facilities in uMkhanyakude district

3.2.2 Exclusion criteria

- Mother hospitals and the community health centre (CHC) in uMkhanyakude district because they provide services at a higher level than PHC's.
- Mobile PHC's facilities in uMkhanyakude district (do not have a medicine store room);
- Two Gateway PHC facilities - Bethesda Gateway and Mseleni Gateway (do not render similar services to the other PHC facilities).

3.3 Sampling

The study sample comprised 20 PHC facilities across the four sub-districts of uMkhanyakude, five from each sub-district. A sample of 20 facilities was used to give a broad picture of MSM procedures at different facilities across uMkhanyakude district. This sample was chosen because the study was a mini-thesis and took into account the feasibility, time and financial constraints of the study which could only be carried out at the actual facilities during working hours. Information regarding the sub-districts' PHC facility head count was obtained from the district pharmacy manager from uMkhanyakude District Health Information Systems (DHIS).

This was 12 months data collected between August 2017 and July 2018. The researcher then purposively selected five facilities from each sub-district by selecting two facilities with the lowest head count *(Small)*, one with median head count *(Medium)* and two with highest head count *(Large)* (Appendix 1). This was because pharmaceutical management at facility level tends to vary according to the size of the facility, with larger facilities having more dedicated space and equipment and more likely to employ pharmacist's assistants at operational-level rather than nurses.

3.4 Data Collection

The researcher contacted the selected PHC facility managers telephonically to explain the purpose of the study and the data collection procedures including proposed dates for data collection.

3.4.1 Data Collection Tools

A structured questionnaire (Appendix 2) was used as the research instrument. This was based on similar tools used by other organisations that monitor standards of pharmaceutical practice at health facilities in South Africa, including the South African Pharmacy Council (SAPC) and the Office of Health Standards Compliance. The closed-ended questions were posed to the facility manager and these were followed by verification of the actual practice at the PHC facility by the researcher.

The questionnaire consisted of the following five domains:

Section A: Human Resources managing medicines at the facility;

Section B: Storage Management of medicines at the facility store room;

Section C: Ordering and Receiving Processes at the facility;

Section D: Stock Inventory Systems that the facility uses to monitor their stock levels, especially when to order and how much;

Section E: Stock out Reporting System that the facility uses to prevent patients from leaving without a full quota of their medicines.

3.4.2 Data Collection Procedures

The researcher had planned to visit all the facilities and perform verifications at the same time but it proved to be logistically impossible. Twelve facilities were visited by the researcher and interviews together with verifications were done at these facilities. The researcher used his own

transport to visit these twelve PHC's and made verifications. The researcher then made use of the district MSM workshop held in the month of June 2019 in Mtubatuba where he met all the district's facility managers and PHC supervisors. The researcher had one on one interviews with remaining eight facility managers whose facilities he could not physically visit. He made verifications of these eight facilities with the roving pharmacists who were also present at the workshop by inspecting their MSM SOP files and SVS cell phones which they had brought to the workshop. Prior arrangements were made telephonically by the researcher with these PHC roving pharmacists to also bring their June quarterly stocktake results as supporting evidence for deficits and surpluses. The usual due dates for quarterly stocktake are at month end, therefore facilities usually start conducting stocktakes at the beginning of the month such that by month end, stocktakes would have been submitted to the KZN DoH head office. In cases where the facility manager was not present, the researcher requested the acting facility manager's participation.

3.4.3 Pretesting

Pretesting of the questionnaire was conducted at three PHC facilities not included in the study sample in one of the sub-districts, prior to the actual study. PHC facilities were selected by identifying one large, one medium and one small facility with respect to facility head count. These PHC facilities were similar to those included in the study. The researcher administered the questionnaires to the facility managers and conducted verifications of actual practice. After pre-testing, some necessary changes to the questionnaire and data collection procedures were made. These included removing the MSM abbreviation and writing it in full, adjusting the verifications, reducing the number of questions under human resources and adjusting the numbering on the questionnaire.

3.5 Data Management and Analysis

The questionnaires were carefully checked by the researcher for completeness prior to leaving each PHC facility as well as at the MSM workshop. Data from the questionnaires was captured on a Microsoft Excel spread sheet and analysed using Microsoft Excel. This data showed both reported and verified data but the researcher consolidated the data according to verified data only. The verified data was chosen using several indicators per domain: storage management of medicines (7 indicators); ordering and receiving processes (5 indicators); stock inventory system (4 indicators); and stock-out reporting systems (4 indicators). Each positive response

indicator was allocated a score of one (1). The total score for the chosen indicators was calculated using the same method as used in the Ideal Clinic Manual, (2018) checklist and the SAPC inspection checklist. The cut off percentages were: poor (<50%), fair (50-79%) or excellent (≥80%). These percentages were also presented in different colours on the excel chart as well as the summary table to clearly show the medicine management pattern across the sub-districts. The final summary table represents the verified data and shows the overall PHC performances as percentages per sub-district.

3.6 Validity and Reliability

Validity was assessed during pre-testing, prior to the actual research data collection process. This was performed to ensure that all questions asked were understood correctly, and that the researcher was satisfied with the responses to questions. Pre-testing improved the internal validity of this study. Data collection was carried out by the researcher to ensure uniformity. Data forms were checked for accuracy at the end of each day at the PHC or MSM workshop and cleaned and checked before data analysis.

Reliability was achieved by standardising the measurement procedures, so that the procedure was always the same (Creswell, 2014). A clearly defined measurement and a well-detailed questionnaire which was based on other similar instruments was used for this study to ensure reliability. The use of only one researcher for data collection and entry improved reproducibility, since inter-researcher variability was nullified.

3.6.1 Generalizability

The results of this study cannot be generalized to all PHC facilities in this district as a statistical sample was not used; however, the results provided a good indication of the current MSM situation in the district.

3.6.2 Limitations of the study

It would have been preferable to include all PHC facilities in the district in the study, or to select a randomised sample, but this was not possible due to resource constraints. In addition to this, data collection was also adjusted such that the researcher interviewed the some of the Facility Managers at the MSM workshop and made verifications with the roving pharmacists

who were also present at the workshop. However, the researcher acknowledges the fact that this may have caused bias.

3.7 Ethical Considerations

Before commencing the study, the researcher received institutional approval for the study proposal from the Bio-Medical Research Ethics Committee (BMREC) of the University of the Western Cape (Reference Number: BM19/3/1) (Appendix 3). The researcher also received approval from uMkhanyakude district health office (Appendix 4) and the KwaZulu-Natal provincial department of health head office (Reference Number: KZ_201905_011) (Appendix 5).

The researcher ensured that the participants were given an information sheet (Appendix 6) and a consent form (Appendix 7) to sign before participating in the study. The information sheet detailed issues of confidentiality of participants, ensuring no harm to participants, the voluntary nature of participation, as well as the ability to withdraw from the study at any particular point in time. This was important in order to provide assurance to participants that, the information collected from them was not to be used against them in any way (Polit *et al.*, 2010).

The fundamental ethical principle of beneficence was employed in this study to ensure that the researcher minimised harm whilst at the same time maximising benefits (Polit *et al*, 2010). Questions that could compromise facility managers' emotions, social support and financial well-being were avoided (Polit *et al.*, 2010).

The results of the study, either positive or contrary, were disclosed while at the same time respecting the privacy and anonymity of the facility managers (Creswell, 2014). Privacy was ensured by keeping all the information provided by the facility managers' confidential (Polit *et al*, 2010). The facility managers were protected by using composite scores so that they cannot be identified. The raw data collected about each facility will be stored by the researcher in a MSM file for five years after the study was conducted (Creswell, 2014).

The study findings will be shared with the uMkhanyakude district management team, including the district pharmacist, sub-district pharmacists and PHC facility managers. It is hoped that the

study findings and recommended strategies will lead to improved MSM in these rural PHC facilities.

CHAPTER 4: RESULTS

4.1 Introduction

This chapter presents the findings of the study which assessed medicine supply management (MSM) at 20 selected primary health care (PHC) facilities in UMkhanyakude district, KwaZulu-Natal. The findings are predominantly presented as tables and accompanying narrative. The chapter begins by describing the key characteristics of the PHC facilities investigated. Thereafter, a summary of the overall performance of the PHC facilities as it relates to the various domains of MSM is presented. Finally, the five domains of MSM assessed, namely, human resources (HR), storage management, ordering and receiving processes, stock inventory systems and stock-out reporting systems are presented. For each domain several key indicators were used to assess current PHC facility performance and a scoring system used to rate facility performance as poor (<50%), fair (50-79%) or excellent (≥80%).

4.2 Characteristics of PHC facilities

The characteristics of the 20 PHC facilities from across the four sub-districts that fall under the uMkhanyakude district are shown in Table 1. Of the 20 PHC's, nine were small, four were medium-sized and seven were large according to headcount. All PHC facilities were serviced by their mother hospitals and the distance from the mother hospitals varied with the closest being 1.5km away and the furthest PHC being 100km away. In all except one PHC (DM), the facility manager was the questionnaire respondent.

Table 1: Characteristics of PHC facilities

Sub District Code	Facility Code	Facility Size	Distance from the mother hospital (km)
B	AB	Small	48
	BB	Small	8
	CB	Medium	54
	DB	Small	100
	EB	Large	75
J	AJ	Small	25
	BJ	Small	60
	CJ	Medium	33
	DJ	Large	52
	EJ	Large	28
M	AM	Small	35
	BM	Small	49
	CM	Medium	55
	DM	Large	50
	EM	Large	55
U	AU	Small	55
	BU	Small	21
	CU	Medium	67
	EU	Large	25
	DU	Large	1.5

4.3 Summarized PHC facility performance in MSM components

Table 2 shows the performance of all the facilities across the five domains within their respective sub-districts, as well as scores for each of the four sub-districts and the overall performance. The overall MSM performance for all the 20 PHC's investigated in the district was 59.4% (fair). The overall performance for sub-districts B, J, M and U was 60% (fair), 74% (fair), 50% (fair) and 55% (fair) respectively, with sub-district J the top performing (74%) and sub-district M the least performing (50%).

Sub-district B had fair storage management, ordering and receiving processes, and stock-out reporting systems. However, HR practices (47%) and stock inventory systems (45%) were poor. In sub-district J, the ordering and receiving processes was excellent whilst HR, storage management, stock inventory systems and stock-out reporting systems were fair. In sub-district M, the HR practices, ordering and receiving processes and stock-out reporting systems were fair, whilst storage management and stock inventory systems were poor. In sub-district U, HR practices, storage management and stock-out reporting systems were fair; however, the ordering and receiving processes and stock inventory systems were poor.

The overall PHC facility performance for each of the domains was as follows: HR - 60% (fair), medicine storage management – 55% (fair), ordering and receiving process – 66% (fair), inventory management – 45% (poor) and stock out reporting performance – 71% (fair). MSM HR practices were 100% (excellent) in one PHC whilst there were fair in fourteen PHC's and poor in five facilities. The storage management was excellent at five facilities, fair at five facilities and poor at ten facilities. Nine PHC facilities had excellent ordering and receiving processes whilst they were fair at six facilities and poor at five facilities. The stock inventory systems were excellent at one facility, fair at eleven facilities and poor at eight facilities. The stock-out reporting systems were fair for all the PHC facilities. Generally, based on the findings of the study the most competent component of MSM in uMkhanyakude district was stock out reporting systems (71%) followed by ordering and receiving processes (66%). The poorest component was storage management (55%).

Table 2 Key:

POOR	FAIR	EXCELLENT
<50%	50% - 79%	≥80%

Table 2: Overall summarised PHC facility MSM performance

Domain (No. indicators)	Facility Code	Facility Size	Human Resources (3)	Storage Management (7)	Ordering & receiving processes (5)	Stock inventory systems (4)	Stock out reporting system (4)	Overall Performance %
Sub-district B	AB	S	33	71	80	50	75	**62**
	BB	S	67	57	60	25	75	**57**
	CB	M	67	86	80	75	75	**77**
	DB	L	33	86	80	75	75	**70**
	EB	L	33	43	40	0	50	**33**
		Avg. Sub-district B	**47**	**69**	**68**	**45**	**70**	**60**
Sub-district J	AJ	S	67	86	100	75	75	**81**
	BJ	S	67	43	100	50	75	**67**
	CJ	M	67	14	60	75	75	**58**
	DJ	L	100	71	100	100	75	**89**
	EJ	L	67	71	100	50	75	**73**
		Avg. Sub-district J	**73**	**57**	**92**	**70**	**75**	**74**
Sub-district M	AM	S	67	29	40	0	75	**42**
	BM	S	33	14	60	0	50	**32**
	CM	M	67	43	40	0	50	**40**
	DM	L	67	43	100	75	75	**72**
	EM	L	67	71	80	25	75	**64**
		Avg. Sub-district M	**60**	**40**	**64**	**20**	**65**	**50**
Sub-district U	AU	S	33	14	10	0	75	**27**
	BU	S	67	86	50	50	75	**66**
	CU	M	67	43	40	25	75	**50**
	DU	L	67	43	50	75	75	**62**
	EU	L	67	86	50	75	75	**71**
		Avg. Sub-district U	**60**	**54**	**40**	**45**	**75**	**55**
Overall district performance			**60**	**55**	**66**	**45**	**71**	**59**

4.4 Medicine Supply Management Human Resources

Three indicators were used to measure HR performance with respect to MSM at the facilities namely, whether standard operating procedures (SOPs) files for MSM were in place (signed and up-to-date), whether responsibility for MSM had been allocated to a specific staff member and attendance at MSM training workshops.

4.4.1 Standard Operation Procedure File for Medicine Supply Management

All the twenty selected PHC facilities in uMkhanyakude district had SOP files aimed at serving as guides for MSM. However, only two facilities had SOPs that were signed and up-to-date. Seventeen facilities had unsigned but up-to-date SOP files and one facility had an SOP file that was not up to date (Table 4.3).

Table 3: Status of SOP books at facilities

Status of SOP books	Number of facilities
Signed and up to date	2
Up to date but unsigned	17
Not up to date	1

4.4.2 Staff member responsible for MSM

At all PHC facilities, the responsibility for MSM was designated to either a pharmacist's assistant or an enrolled nurse (Table 4). None of the facilities had a pharmacist present.

Table 4: Percentage and type of staff responsible for MSM

MSM Responsible Individual	Percentage
Pharmacist's assistant	40%
Enrolled nurse	60%

4.4.3 Training and capacity building for MSM

Fourteen (70%) of the facilities had sent a representative to attend the MSM workshop conducted at the mother hospitals. The training attendance for sub-districts B, J, M and U was 40%, 100%, 80% and 60% respectively. Sub-district J had the highest training attendance (100%) whilst sub-district B and the lowest training attendance (40%). Notably, the majority of the facilities that did not send representatives for training were located the furthest away from their mother hospital.

Table 5: Summarised PHC facility performance in HR management

SUB-DISTRICT	FACILITY CODE	FACILITY SIZE	HUMAN RESOURCE MANAGEMENT (3)			OVERALL
			Updated SOP Book	MSM staff member allocated	FM/AFM MSM Workshop Attendance	
Sub-district B	AB	S	N	Y	N	**1 (33.3%)**
	BB	S	N	Y	Y	**2 (66.7%)**
	CB	M	N	Y	Y	**2 (66.7%)**
	DB	L	N	Y	N	**1 (33.3%)**
	EB	L	N	Y	N	**1 (33.3%)**
Avg. Sub-district B			**0 (0%)**	**5 (100%)**	**2 (40%)**	**46.7%**
Sub-district J	AJ	S	N	Y	Y	**2 (66.7%)**
	BJ	S	N	Y	Y	**2 (66.7%)**
	CJ	M	N	Y	Y	**2 (66.7%)**
	DJ	L	Y	Y	Y	**3 (100%)**
	EJ	L	N	Y	Y	**2 (66.7%)**
Avg. Sub-district J			**1 (20%)**	**5 (100%)**	**5 (100%)**	**73.3%**
Sub-district M	AM	S	N	Y	Y	**2 (66.7%)**
	BM	S	N	Y	N	**1 (33.3%)**
	CM	M	N	Y	Y	**2 (66.7%)**
	DM	L	N	Y	Y	**2 (66.7%)**
	EM	L	N	Y	Y	**2 (66.7%)**
Avg. Sub-district M			**0 (0%)**	**5 (100%)**	**4 (80%)**	**60%**
Sub-district U	AU	S	N	Y	N	**1 (33.3%)**
	BU	S	N	Y	Y	**2 (66.7%)**
	CU	M	N	Y	Y	**2 (66.7%)**
	DU	L	N	Y	Y	**2 (66.7%)**
	EU	L	Y	Y	N	**2 (66.7%)**
Avg. Sub-district U			**1 (20%)**	**5 (100%)**	**3 (60%)**	**60%**
OVERALL AVG. SUB-DISTRICTS			**10%**	**100%**	**70%**	**60%**

4.4.4 Summarized PHC facility performance in HR management

- Overall MSM HR performance for uMkhanyakude district was 60%
- Overall MSM HR performance for sub-district B, J, M and U was 46.7%, 73.3%, 60% and 60% respectively
- Sub-district J was the best performing in terms of HR practices
- Sub-district B was least performing in terms of HR practices
- Highest performing facility in terms of HR had an overall performance of 100%
- Five least performing facilities had an overall performance of 33%

4.5 Medicine Storage Management Performance

Seven indicators were used to measure medicine storage management performance with respect to MSM at the facilities namely, storage space availability, access control, FIFO/FEFO adherence, expired medicines, air conditioners, fridge and back-up generators.

4.5.1 Storage space

Only seven (35%) of the facilities had sufficient storage space for medicines, and this varied considerably between sub-districts with sub-district B performing the best with 68.6% and sub-district M the worst with 40%.

4.5.2 Locked access control

Overall, only twelve (60%) of PHC facilities had locked access control to store rooms and this was fairly consistent across the four sub-districts only varying between 40-60%. All the facilities attested to ensuring that the medicine room is locked all the time, however, facility AU, facility EU, facility CB, facility DB, and facility AM mentioned that they faced challenges in monitoring staff entry and exit into the medicine room.

4.5.3 Adherence to FIFO/FEFO principles

All the PHC facilities except one confirmed to adhering to FIFO/FEFO stock rotation. However, verification proved otherwise as only nine facilities had their stock organized according to mostly FEFO. Notably, the facilities that stated had insufficient storage space in section, 4.5.1 were unable to adhere to FIFO/FEFO owing to space limitations and storage. It also seemed the majority of the facilities not adhering to FIFO/FEFO principles had not attended MSM training.

4.5.4 Expired medicine

All the PHC's attested to ensuring that expired medication was taken off the shelves according to FEFO principles, and facilities had green buckets/bins that they used to store expired medication prior to disposal. However, on-spot verifications conducted, four (20%) of facilities were found to have medication expiring within 3 months on their shelves.

4.5.5 Medicine storage conditions

All medicine rooms within the facilities had air conditioners. In sub-districts B, J and U air conditioners were functional in all facilities (100%). However, in sub-district M, only 60% of the facilities had functional air conditioners. All PHC's had fridges to store medicines that required refrigeration; however, 75% of the PHC's stated that their fridges had insufficient space to allow for adequate free air circulation. None of the facilities had standby back-up generators; hence they used cooler boxes with icepacks to keep medication cool during power outages. The majority said they sent the medicines to the mother hospital for cold chain maintenance as they have standby generators during power outages.

Table 6: Summarised PHC facility performance in storage management

SUB-DISTRICT	FACILITY CODE	FACILITY SIZE	MEDICINES STORAGE MANAGEMENT (7)							OVERALL
			Space	Locked	FIFO/FEFO	Expiry	Air conditioner	Fridge	Generator	
Sub-district B	AB	S	N	Y	Y	Y	Y	Y	N	**5 (71.43%)**
	BB	S	Y	N	N	Y	Y	Y	N	**4 (57.14%)**
	CB	M	Y	Y	Y	Y	Y	Y	N	**6 (85.71%)**
	DB	L	Y	Y	Y	Y	Y	Y	N	**6 (85.71%)**
	EB	L	Y	N	N	N	Y	Y	N	**3 (42.86%)**
Avg. Sub-district B			**4 (80%)**	**3 (60%)**	**3 (60%)**	**4 (80%)**	**5 (100%)**	**5 (100%)**	**0 (0%)**	**(68.57%)**
Sub-district J	AJ	S	Y	Y	Y	Y	Y	Y	N	**6 (85.71%)**
	BJ	S	N	N	N	Y	Y	Y	N	**3 (42.86%)**
	CJ	M	N	N	N	N	Y	N	N	**1 (14.29%)**
	DJ	L	N	Y	Y	Y	Y	Y	N	**5 (71.43%)**
	EJ	L	N	Y	Y	Y	Y	Y	N	**5 (71.43%)**
Avg. Sub-district J			**1 (20%)**	**3 (60%)**	**3 (60%)**	**4 (80%)**	**5 (100%)**	**4 (80%)**	**0 (0%)**	**(57.14%)**
Sub-district M	AM	S	N	N	N	Y	N	Y	N	**2 (28.57%)**
	BM	S	N	N	N	N	Y	N	N	**1 (14.29%)**
	CM	M	N	Y	N	Y	Y	N	N	**3 (42.86%)**
	DM	L	N	Y	N	Y	N	Y	N	**3 (42.86%)**
	EM	L	N	Y	Y	Y	Y	Y	N	**5 (71.43%)**
Avg. Sub-district M			**0 (0%)**	**3 (60%)**	**1 (20%)**	**4 (80%)**	**3 (60%)**	**3 (60%)**	**0 (0%)**	**(40%)**
Sub-district U	AU	S	N	N	N	N	Y	N	N	**1 (14.29%)**
	BU	S	Y	Y	Y	Y	Y	Y	N	**6 (85.71%)**
	CU	M	N	N	N	Y	Y	Y	N	**3 (42.86%)**
	DU	L	N	Y	N	Y	Y	Y	N	**3 (42.86%)**
	EU	L	Y	Y	Y	Y	Y	Y	N	**6 (85.71%)**
Avg. Sub-district U			**2 (40%)**	**3 (60%)**	**2 (40%)**	**4 (80%)**	**5 (100%)**	**4 (80%)**	**0 (0%)**	**(57.1%)**
OVERALL AVG. SUB-DISTRICTS			**35%**	**60%**	**45%**	**80%**	**90%**	**80%**	**0%**	**55,7%**

4.5.6 Summarized PHC facility performance in storage management

- Overall MSM storage management performance in uMkhanyakude district was 55,7%
- Overall MSM storage management performance for sub-district B, J, M and U was 68.6%, 57.1%, 40% and 57.1% respectively
- Sub-district B was the best performing in terms of storage management
- Sub-district M was least performing in terms of storage management
- Five top-performing facilities in terms of storage management had an overall score of 85.7%
- Three least performing facilities in terms of storage management had an overall performance of 14.3%
- Overall, storage space was the most challenging component of storage management

4.6 Ordering and receiving processes

Five indicators were used to measure ordering and receiving processes performance with respect to MSM at the facilities namely, SOPs for ordering stock, order form completion, stock card review, documentation filing and signing of delivery notes and invoices.

4.6.1 SOPs for ordering stock

All the PHC's indicated that they had SOPs for ordering medicines. In sub-districts M, J and U all facilities (100%) had signed and up to date SOP books. However, in sub-district B, 60% of the facilities had signed and up to date SOPs whilst 40% of the facilities had unsigned SOPs.

4.6.2 Order submission, stock cards updating and document filing

The overall order submission performance for sub-districts B, M, J and U was 80%, 100%, 60% and 80% respectively. Sixteen (80%) of the facilities had complete order forms and 19 (95%) facilities had accurate stock cards on verification. Ten (50%) of the facilities had accurate filing processes. The remaining ten (50%) had their filing either partially done or not done at all. Notably, one facility that had not done any filing at all had not sent a representative for the MSM training.

4.6.2 Medicine verification on delivery

60% of the facilities verified the number of medicine boxes delivered with the amount stipulated on the delivery note. Sub-districts B and M had the lowest performance (40%) in terms of verifying delivery notes and invoices. At facility AU understaffing was cited as cause of inconsistent verification.

Table 7: Percentage ordering and receiving process scores per facility

SUB-DISTRICT	FACILITY CODE	FACILITY SIZE	ORDERING AND RECEIVING (5)					OVERALL
			SOP for ordering and receiving	Completed order forms	Stock card review	Filing documents	Signed delivery notes and invoices	
Sub-district B	AB	S	Y	Y	Y	N	Y	**4 (80%)**
	BB	S	Y	Y	Y	N	N	**3 (60%)**
	CB	M	N	Y	Y	Y	Y	**4 (80%)**
	DB	L	N	Y	Y	Y	Y	**4 (80%)**
	EB	L	Y	N	Y	N	N	**2 (40%)**
Avg. Sub-district B			**3 (60%)**	**4 (80%)**	**5 (100%)**	**2 (40%)**	**2 (40%)**	**68%**
Sub-district J	AJ	S	Y	Y	Y	Y	Y	**5 (100%)**
	BJ	S	Y	Y	Y	Y	Y	**5 (100%)**
	CJ	M	Y	Y	Y	N	N	**3 (60%)**
	DJ	L	Y	Y	Y	Y	Y	**5 (100%)**
	EJ	L	Y	Y	Y	Y	Y	**5 (100%)**
Avg. Sub-district J			**5 (100%)**	**5 (100%)**	**5 (100%)**	**4 (80%)**	**4 (80%)**	**92%**
Sub-district M	AM	S	Y	N	Y	N	N	**2 (40%)**
	BM	S	Y	Y	Y	N	N	**3 (60%)**
	CM	M	Y	N	Y	N	N	**2 (40%)**
	DM	L	Y	Y	Y	Y	Y	**5 (100%)**
	EM	L	Y	Y	Y	N	Y	**4 (80%)**
Avg. Sub-district M			**5 (100%)**	**3 (60%)**	**5 (100%)**	**1 (20%)**	**2 (40%)**	**64%**
Sub-district U	AU	S	Y	N	N	N	N	**1 (10%)**
	BU	S	Y	Y	Y	Y	Y	**5 (50%)**
	CU	M	Y	Y	Y	N	Y	**4 (40%)**
	DU	L	Y	Y	Y	Y	Y	**5 (50%)**
	EU	L	Y	Y	Y	Y	Y	**5 (50%)**
Avg. Sub-district U			**5 (100%)**	**4 (80%)**	**4 (80%)**	**3 (60%)**	**4 (80%)**	**40%**
OVERALL AVG. SUB-DISTRICTS			**90%**	**80%**	**95%**	**50%**	**60%**	**66%**

4.6.3 Summarized PHC facility performance on ordering and receiving processes

- Overall MSM ordering and receiving process performance for uMkhanyakude district was 66%
- Overall MSM ordering and receiving process performance for sub-district B, J, M and U was 68%, 92%, 64% and 40% respectively
- Sub-district J was the best performing in terms of the ordering and receiving process
- Sub-district U was least performing in terms of the ordering and receiving process
- Five top-performing facilities in terms of the ordering and receiving process had an overall score of 100%
- Least performing facility in terms of the ordering and receiving process had an overall performance of 10%
- Filing of documents was the most challenging component of the ordering and receiving process.

4.7 Stock inventory system

Four indicators were used to measure stock inventory system performance with respect to MSM at the facilities namely, stock card accuracy (stock card comparison with physical stock), stock taking, calculation OF AMC, ROL (re-order level) and maximum stock levels, and availability of designated vehicle for transporting medicine.

4.7.1 Stock card accuracy

In 15 (75%) of the facilities, the stock cards matched the physical medicine stock. The top performing sub-district in terms of stock card accuracy was J (100%) whilst the least performing was M (20%).

4.7.2 Monthly stock takes

Ten (50% of the facilities conducted monthly stock takes that were documented. The overall monthly stock take performance for sub-districts B, J, M and U were 60%, 80%, 20% and 40% respectively.

4.7.3 Average monthly consumption (AMC), Re-order level (ROL) and Maximum stock level calculations

Of all the facilities, nine (45%) accurately calculated AMC, ROL and maximum stock levels. Some of the facilities indicated that the lack of calculation was owed to a lack of knowledge of the formula that is used to calculate these stock monitoring indicators.

4.7.4 Transportation for medicine distribution

Only two (10%) of the facilities had a vehicle specifically designated for medicine transportation.

Table 8: Percentage stock inventory management scores per facility

SUB-DISTRICT	FACILITY CODE	FACILITY SIZE	STOCK INVENTORY SYSTEMS (4)				OVERALL
			Physical stock comparison with stock card	Stock take records for previous month	ROL and max stock levels calculated	Designated vehicle	
Sub-district B	AB	S	Y	Y	N	N	**2 (50%)**
	BB	S	Y	N	N	N	**1 (25%)**
	CB	M	Y	Y	Y	N	**3 (75%)**
	DB	L	Y	Y	Y	N	**3 (75%)**
	EB	L	N	N	N	N	**0 (0%)**
Avg. Sub-district B			**4 (80%)**	**3 (60%)**	**2 (40%)**	**0 (0%)**	**45%**
Sub-district J	AJ	S	Y	Y	Y	N	**3 (75%)**
	BJ	S	Y	N	Y	N	**2 (50%)**
	CJ	M	Y	Y	N	Y	**3 (75%)**
	DJ	L	Y	Y	Y	Y	**4 (100%)**
	EJ	L	Y	Y	N	N	**2 (50%)**
Avg. Sub-district J			**5 (100%)**	**4 (80%)**	**3 (60%)**	**2 (40%)**	**70%**
Sub-district M	AM	S	N	N	N	N	**0 (0%)**
	BM	S	N	N	N	N	**0 (0%)**
	CM	M	N	N	N	N	**0 (0%)**
	DM	L	Y	Y	Y	N	**3 (75%)**
	EM	L	Y	N	N	N	**1 (25%)**
Avg. Sub-district M			**2 (40%)**	**1 (20%)**	**1 (20%)**	**0 (0%)**	**20%**
Sub-district U	AU	S	N	N	N	N	**0 (0%)**
	BU	S	Y	N	Y	N	**2 (50%)**
	CU	M	Y	N	N	N	**1 (25%)**
	DU	L	Y	Y	Y	N	**3 (75%)**
	EU	L	Y	Y	Y	N	**3 (75%)**
Avg. Sub-district U			**4 (80%)**	**2 (40%)**	**3 (60%)**	**0 (0%)**	**45%**
OVERALL AVG. SUB-DISTRICTS			**75%**	**50%**	**45%**	**10%**	**45%**

4.7.5 Summarized PHC facility performance in stock inventory management

- Overall MSM stock inventory management performance of uMkhanyakude district was 45%
- Overall MSM stock inventory management performance for sub-district B, J, M and U was 45%, 70%, 20% and 45% respectively
- Sub-district J was the best performing in terms of stock inventory management
- Sub-district M was least performing in terms of stock inventory management
- Highest performing facility in terms of stock inventory management had an overall score of 100%
- Least performing five facilities in terms of stock inventory management had an overall performance of 0%
- Most challenging component of inventory management was ROL and maximum stock level calculation.

4.8 Stock out reporting system

Four indicators were used to measure stock out reporting system performance with respect to MSM at the facilities namely: SOPs for stock out reporting, efficiency of electronic networked SVS (stock visibility solution) systems (data capturing function well), availability of list of tracer medicines and monthly update of electronic networked SVS system.

4.8.1 SOP for stock out

None of the twenty facilities had an SOP for stock-outs. SOPs are an integral part of MSM. SOPs enable tasks or operations to be consistently conducted correctly and in a similar manner, thus reducing errors and improving efficiency. However, in this case, the provincial and district pharmacist had not provided the stock-out reporting SOP for the facilities.

4.8.2 Electronic networked Stock Visibility Solution (SVS) system for monitoring the availability of medicines

All facilities had an electronic networked SVS system for monitoring the availability of medicines. Nineteen (95%) of the facilities had functional electronic networked SVS system. The systems for all the facilities were updated regularly through synchronization and automatic updates.

4.8.3 List of tracer medicines updated and visible

There was 100% compliance in terms of updating and displaying tracer medicines amongst all the facilities in sub-districts J and U. Sub-districts B and M had 80% compliance in terms of updating and displaying the list of tracer medicines. It is mandatory for PHC facilities to have an available copy of the national essential drug list (EDL) and a list of Tracer medicines. In this study, the majority of the facilities were compliant in this regard.

Table 9: Percentage stock out reporting scores per facility

SUB-DISTRICT	FACILITY CODE	FACILITY SIZE	STOCK OUT REPORTING (7)				OVERALL
			SOP	Capturing Device Functions Well	Tracer List	Previous Month Update	
Sub-district B	AB	S	N	Y	Y	Y	**3 (75%)**
	BB	S	N	Y	Y	Y	**3 (75%)**
	CB	M	N	Y	Y	Y	**3 (75%)**
	DB	L	N	Y	Y	Y	**3 (75%)**
	EB	L	N	Y	N	Y	**2 (50%)**
Avg. Sub-district B			**0 (0%)**	**5 (100%)**	**4 (80%)**	**5 (100%)**	**70%**
Sub-district J	AJ	S	N	Y	Y	Y	**3 (75%)**
	BJ	S	N	Y	Y	Y	**3 (75%)**
	CJ	M	N	Y	Y	Y	**3 (75%)**
	DJ	L	N	Y	Y	Y	**3 (75%)**
	EJ	L	N	Y	Y	Y	**3 (75%)**
Avg. Sub-district J			**0 (0%)**	**5 (100%)**	**5 (100%)**	**5 (100%)**	**75%**
Sub-district M	AM	S	N	Y	Y	Y	**3 (75%)**
	BM	S	N	N	Y	Y	**2 (50%)**
	CM	M	N	Y	N	Y	**2 (50%)**
	DM	L	N	Y	Y	Y	**3 (75%)**
	EM	L	N	Y	Y	Y	**3 (75%)**
Avg. Sub-district M			**0 (0%)**	**4 (80%)**	**4 (80%)**	**5 (100%)**	**65%**
Sub-district U	AU	S	N	Y	Y	Y	**3 (75%)**
	BU	S	N	Y	Y	Y	**3 (75%)**
	CU	M	N	Y	Y	Y	**3 (75%)**
	DU	L	N	Y	Y	Y	**3 (75%)**
	EU	L	N	Y	Y	Y	**3 (75%)**
Avg. Sub-district U			**0 (0%)**	**5 (100%)**	**5 (100%)**	**5 (100%)**	**75%**
OVERALL AVG. SUB-DISTRICTS			**0%**	**95%**	**91%**	**100%**	**71.25%**

4.8.4 Summarized PHC facility performance in stock out reporting

- Overall MSM stock out reporting performance in uMkhanyakude district was 71.3%
- Overall MSM stock out reporting performance for sub-district B, J, M and U was 70%, 75%, 65% and 75% respectively
- Sub-district J and U were the top-performing in terms of stock out reporting
- Sub-district M was least performing in terms of stock out reporting
- Seventeen top-performing facilities in terms of stock out reporting had an overall score of 100%
- Least east performing three facilities in terms of stock out reporting had an overall performance of 50%.

CHAPTER 5: DISCUSSION

5.1 Introduction

In this chapter the study findings are discussed in relationship to published literature. The overall Medicine Supply Management (MSM) performance for all the 20 primary health care (PHC) facilities investigated was 59.4% (fair). According to Mohamed *et al*., (2007), good MSM practices have a number of benefits including avoiding wastage, ensuring availability of medicines at all times and avoiding dangers associated with improper usage. In order to improve MSM whilst addressing the current deficiencies in the services provided by Primary Health Care (PHC) in South Africa the Ideal Clinic Initiative was introduced in July 2013 (Ideal Clinic Manual, 2018). An 'Ideal Clinic' is defined as "a facility with good infrastructure (i.e. physical conditions and spaces, essential equipment, and information and communication tools), adequate staff, adequate medicines and supplies, good administrative processes, and adequate bulk supplies; such a facility uses applicable facility policies, protocols and guidelines, as well as partner and stakeholder support, to ensure the provision of quality health services to the community"(Ideal Clinic Manual, 2018) **.** The facilities in this study were making progress towards being an Ideal Clinic as indicated by their fair performances in various MSM aspects (stock out reporting systems (71%), ordering and receiving processes (66%), HR practices (60%) and storage management (55%).

5.2. MSM Human Resources

The overall MSM HR performance for all the 20 facilities assessed was 60%. Key challenges in MSM HR related to designation of staff member responsible for MSM and attendance of the training workshop. Most of the facilities (60%) designated the responsibility of MSM to an enrolled nurse whilst 40% of the facilities designated responsibility to a pharmacist's assistant. The responsibility of MSM is normally designated to a pharmacist. However, in recent times owing to shortages of pharmacists, the responsibility of MSM is often delegated to pharmacist's assistants who work under the direct or indirect supervision of a pharmacist. According to Gray *et al.*, 2005), pharmacist's assistants are increasingly becoming an indispensable part of health care systems. The South African Pharmacy Council, (2011) asserts that the training of pharmacist's assistants is assisting in developing skills that are relevant to pharmaceutical services.

Although pharmacist's assistants are deemed capacitated and skilled to conduct MSM, in this study there was a shortage of pharmacist's assistants, leaving enrolled nurses to conduct MSM at most facilities (60%). It has been a strategy by the KwaZulu-Natal Department of Health (KZN DoH) over the last number of years to deploy pharmacist's assistants (post basic) to facilities and it is disappointing that it has not achieved its desired goal. The auditor general's report for KZN DoH (2017), also pointed out that human resource processes were

very lengthy and submissions that were made in 2016 to the DoH to appoint additional pharmacist's assistants had not materialised by the time the audit was done.

The findings of this study affirmed the current human resource challenges in South Africa of inadequate pharmacy workforce with appropriate competencies that were highlighted a few years ago in a study by (Crowley *et al.*, 2015) According to van Rensburg *et al.*, (2008), most rural areas lack trained pharmacy staff owing to urban migration and failure to attract pharmacy personnel to these communities. Previous studies have also found that the district under investigation in this study experienced a shortage of pharmacist's assistants owing to the recruitment of pharmacist's assistants from cities and not from within the communities (Mburu *et al.*, 2017). These pharmacist's assistants have a high likelihood of moving once posts in urban areas or closer to their homes open up.

Although professional nurses are legally allowed to dispense medicine and be involved in MSM, a study in Eastern Cape found nurses to possess inadequate pharmacological knowledge thus raising concerns on the quality and efficiency of pharmaceutical services rendered by nurses (Crowley *et al.*, 2015) . Gray (2010) is of the view that the provision of quality pharmaceutical services is rooted in quality assurance practices such as double-checking, hence nurse-initiated prescriptions must be checked by a pharmacist or pharmacist's assistant (post basic). In the light of this, it is vital to train nurses that are involved in MSM, as well as ensuring availaility of pharmaceutical staff at facilities.

5.3 Training and capacity building for MSM

Training is a crucial tool in equipping healthcare professionals with the necessary skills and knowledge relevant for effective MSM. Essential medicines supply management training and an adequate pharmaceutical workforce with appropriate competencies is crucial to ensuring a well-functioning PHC pharmaceutical service. It is more so important amongst nursing staff that do not possess the necessary skills and knowledge to work within the MSM sphere. In this study, 70% of the facilities had a representative in attendance of the MSM workshops conducted at the mother hospitals. This could negatively affect MSM as the individuals responsible for MSM within the remaining 30% facilities missed an opportunity to be capacitated with knowledge and skills necessary for them to conduct their responsibilities effectively. The implications of their absence during training would be exacerbated in the cases of ENs as they are not trained to manage and dispense medication in their basic training. According to O'Mahony *et al.*, (2014) nursing staff have to receive training for the effective execution of MSM duties. Health facilities, therefore, have the responsibility of identifying staff that are legally permitted to work within MSM and ensure that they are sent for training to acquire the necessary skills.

In this study, MSM training workshops were predominantly attended by Facility Managers, Pharmacist's Assistants and Enrolled Nurses. Notably, in some facilities, the individuals who attended the training alongside the Facility Manager were not responsible for MSM. In these cases, although training was rendered, it was not given to the right/appropriate individuals. The implication of this is redundant skills transfer unless if those that attended shared the knowledge acquired with fellow staff members. Similarly, in a study by Shamima, (2012) only 12% of the nurses conducting MSM had received training and this was an impediment to efficient MSM and a study by Mohammed *et al*., (2007) found lack of training to hinder effective MSM within PHC facilities in Nigeria. Notably, the majority of the facilities that did not send representatives for training were located the furthest away from their mother hospital. In light of this logistical and transport problems could have hindered them from attending training.

5.4 Medicine storage management

The medicine storage management of the facilities investigated in this study was generally fair as indicated by an overall MSM storage management performance of 55%. Key challenges related to the availability of storage space, medicine storage conditions and availability of back-up generators. Only 35% of the facilities investigated had sufficient storage space for medicines. Shamima (2012) asserts that the size of the medicine room should be dictated by medicine consumption of the healthcare facility. Inadequate storage space often leads to placement of orders based on capacity instead of consumption and demand (Shamima, 2012). This will result in periods of medication unavailability as it will be out of stock. Consequently, pharmaceutical care will be negatively affected which also results in poor service delivery due to inept supply of medicines. Furthermore, insufficient storage space leads to higher risks of medication damage and expiration and this is costly to the health care system. In a study by Crowley and Stellenberg (2015), 50% of the facilities investigated had insufficient storage space and this negatively affected MSM.

In this study it appeared the lack of sufficient space also negatively affected other components of storage management such as adhering to FIFO/FEFO stock rotation. The facilities that stated that they had insufficient storage space were unable to adhere to FIFO/FEFO owing to space limitations. The use of stock rotation systems such as FIFO/FEFO is critical in avoiding expired and obsolete stock accumulation. A study by Barasa *et al.*, (2018) reported that PHC clinics in Bungoma County in Kenya preferred using FEFO relative to FIFO as it promotes the use of medicines near expiration and retention of those that still have a long shelf-life.

Storage conditions have the potential to affect the potency and efficacy of medicines hence it is essential to ensure that medication is stored under the right conditions. All medicine rooms within the facilities had air conditioners and fridges. However, 25% of the facilities stated that the fridges were over-packed hence the air circulation was limited. None of the facilities had standby by generators, hence they used cooler boxes with

icepacks and sent medicines requiring cold storage to mother hospital during power outages. The current practice as verified by the Facility Managers (FM) was that if the power outages were more than two hours, the vaccines were taken to the mother hospital for storage and safekeeping. However, all these conditions could potentially place the refrigerated stock at risk of not being useable.

Vaccines, test kits, sera and certain types of medicines come with instructions to be stored under cold conditions (Shaafat *et al*., 2013). Their potency depends on cold storage. In particular, vaccines are required to be stored under refrigeration conditions and exposure to high temperatures or freezing conditions results in loss of potency. Breaking of the cold chain has been found to cause vaccine defects in many immunization programs. The auditor general's report (2017) identified the root cause to be that back-up generators were not seen as a priority at facilities and therefore were not budgeted for. It is therefore imperative for PHC facilities to have a fully functional refrigerator with sufficient space. In addition, the facilities should have standby generators that immediately provide power during power outages.

5.5 Ordering and receiving processes

The overall MSM ordering and receiving process performance achieved was 66%. The main challenges faced by the facilities in ordering and receiving medication related to documentation filing and stock card updating and stock verification on receipt of new stock. The general procedure for receiving medicine stock at facilities is that the number of boxes received is checked against the delivery note. The delivery note is signed as confirmation of receipt. The stock is then checked against the invoice, expiry dates of received medication checked, medicines packed on the shelf in accordance with FEFO and stock cards or electronic systems updated in last month order. Some facilities were not following this procedure and ascribed this to understaffing. According to MSH (2012), a critical component of MSM is checking medication within 24hrs of receipt as this lowers the risk of medicine misappropriation.

5.6 Stock inventory management

The findings of this study showed that stock inventory management was the most challenging component of MSM amongst facilities investigated. The overall MSM stock inventory management performance was 45%. The main challenges faced by the facilities related to balancing of stock cards and the actual stock, calculation of ROL and maximum stock levels and medicine transportation.

Effective coordination of medicine flow through the distribution chain largely depends on the establishment and enforcement of effective inventory systems. Inventory systems play a number of roles including requisitioning, medicine issuing, financial accounting, determining consumption patterns and making stock balance reports required for procurement (Shamima, 2012). Stock cards an important tool used in inventory

management. In this study, in some facilities stock card balances did not match with the actual stock. This could be attributed to a number of factors such as:

- Entry errors resulting from the repetitive nature of recording stock
- Duplicate entries
- Failure to write off spoiled or damaged medication from the stock
- Theft
- Inadequate space in the storage room making it difficult to conduct physical stock count

Factors relating to human error can be minimized by using computer-based systems. A study by Munedzimwe (2017) found a facility using a system called Rx solution® to have minimal challenges relating to inventory management and medicine availability relative to those that did not use the system.

The study found that 55% of the facilities were either not calculating or incorrectly calculating the Re-order level (ROL) and maximum stock levels according to the SOP. Some facilities indicated that the lack of calculation was owed to a lack of knowledge of the formula that is used to calculate these parameters. These findings were similar to a study conducted in Mopani where the health facilities' workers attested to having no clue of how-to inadequate knowledge of calculating stock monitoring indicators such as ROL, Average Monthly Consumption (AMC) and maximum stock levels (Matse, 2005). As a result, the staff relied on work experience to determine the quantity of medicine to be ordered and this often led to overstocking and stock-outs. In contrast, in a study by Munedzimwe (2017), found that none of the facilities investigated calculated AMC although they knew that they were required to do so and were aware of the formula used to monitor stock levels. They cited that the calculations were tedious and time-consuming. Calculation of ROL and maximum stock levels are important forecasting methods for MSM. Incorrect or lack of use of the prescribed forecasting methods can lead to stock outs and interruption of medicine availability ((Harries *et al.*, 2007)

In this study 90% of the facilities lacked a vehicle specifically designated for medicine transportation. Medicine transportation is an important aspect of MSM and influences medicine availability (WHO, 2017). According to Bateman (2013), rural health facilities face greater transportation challenges as they often do not have vehicles at their disposal. This has a negative effect on MSM as it can result in stock outs or medicine shortages. This was the case in this study. A study by Hasselback *et al.*, (2014) conducted in Mozambique found health facilities furthest away to the depot to have greater transport problems leading to frequent stock outs. In a study in Sedibeng district, all the transport officers indicated that they often failed to adhere to delivery schedules. This was due to the lack of a specific vehicle dedicated for medicine transportation.

5.7 Stock out reporting system

The overall MSM stock out reporting performance was 71.3% which was exceptionally good. The major challenge in terms of stock out reporting was the absence of a SOP for stock outs. Essentially SOPs are compulsory instructions that allow for a task or an operation to be consistently conducted correctly and in a similar manner, with non-compliance to SOPs leading to errors and reduced efficiency (WHO, 2008). In MSM lack of adherence to SOPs can lead to stock-outs, poor inventory management and poor service delivery. Although none of the facilities in this study had SOPs for stock out reporting, they performed exceptionally well in this area. This could be attributed to the fact stock-out reporting is measured as a weekly and monthly indicator.

A SOP for stock outs typically articulates the measures that must be taken to prevent stock outs as well as ways of placing emergency orders. A study by Shamima (2012) found that PHC facilities without SOPs experienced more stock outs and inventory challenges. Similarly, a study conducted within the uMgungundlovu district in KwaZulu-Natal by Crowley *et al.*, (2015) found that the twenty facilities investigated had no written standard operating procedures (SOPs) for drug receiving, storing and dispensing of medication which negatively impacted the pharmaceutical services rendered by these facilities.

In the hope of eliminating stock-out problems across South Africa's healthcare system, reports of medical supply shortages have been prevalent and observed throughout facilities nationwide for many years (Stop Stockouts, 2013). There are many NGO's along with political and media coverage that conduct national stock out audits. In 2015, Stop Stock Outs found 20% of the reported cases to have been caused by manufacturing issues whilst 80% were attributed to flaws in the medicine supply chain management. Logistical challenges between the medicine depots and facilities at both provincial and district levels also cited incorrect quantities of medicines being ordered by facilities, inaccurate forecasting of medicines per population, and poor stock management at facility level (Bateman, 2015).

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1. Introduction

This chapter presents the principal conclusions drawn from the empirical investigations of this study and provides recommendations for improving medicines supply management (MSM) at primary health care (PHC) facilities in uMkhanyakude district. The key findings focused on deficiencies related to human resources (HR) and inadequate storage space and conditions.

6.2 Conclusions

The findings of this study found a shortage of an adequately qualified pharmacy workforce in the uMkhanyakude District. The majority of facilities had designated the responsibility of MSM to enrolled nurses (ENs) due to the absence of a qualified pharmacist or pharmacist's assistant. Although training was arranged at the mother hospitals to bridge the skills deficit for staff members involved in MSM, a significant number of PHC facilities did not send a representative for training and this likely negatively affected MSM adherence at the facility. This was particularly concerning in cases where EN was responsible for MSM at the PHC facility, as they are not trained to manage and dispense medication during their primary training. Remarkably, in some facilities, the individuals who attended the training alongside the Facility Manager (FM) were not responsible for MSM leading to skills transfer to the wrong individuals. It was noteworthy that the facilities that did not send representatives for training tended to be located furthest away from their mother hospital. This could be an indication of logistical and transport challenges.

Storage management was one of the most challenging components of MSM identified in this study. Most of the facilities had insufficient storage space leading to lack of adherence to FIFO/FEFO stock rotation principles. In addition, storage conditions at the facilities were poor. Although all the medicine rooms within the facilities had air conditioners, in some facilities there were malfunctioning. A substantial number of facilities had over-packed fridges thus hindering air circulation. Furthermore, none of the facilities had standby generators hence they used cooler boxes and icepacks to keep medication cool during power outages. All these circumstances have the potential to break the cold chain which could negatively affect the potency of thermo labile products and vaccines.

The ordering and receiving processes for most of the facilities were generally good. However, some facilities had filing challenges and did not verify the medication on receipt. This was ascribed to understaffing. Stock inventory management was also a major challenge experienced by most of the facilities. In some facilities, stock cards and physical stock count did not match. This could have been caused by entry errors, failure to write off spoiled or damaged medication from the stock, theft and inadequate space in the storage room making

it difficult to conduct physical stock count. Monthly stock takes were not consistently done and, in some facilities, there was no documentation proving it had been done. Primary Health Care (PHC) facilities had challenges in calculating average monthly consumption (AMC); re-order level (ROL) and maximum stock levels. Some of the facilities indicated that they were not aware of the formulas used to calculate these parameters. The inability to calculate these parameters as well as other poor inventory management practices point to HR challenges identified in this study. The right HR personnel with the right qualifications would have been able to calculate AMC, ROL and maximum stock levels. On the other hand, the stock out reporting system for all the facilities was generally very good, despite most facilities not having a standard operating procedure (SOP) for stock outs. This was attributed to constant weekly reminders from the facility managers in conjunction with the hospital pharmacists to send Stock Visibility Solution (SVS) reports on time.

6.3 Recommendations

Based on the findings of this study the following recommendations are made:

- All staff members involved in MSM should attend regular training on relevant aspects of MSM.
- A MSM training needs assessment and evaluation be conducted by Facility Managers to clarify key gaps that need to be addressed.
- PHC facilities should improve their medicine storage by:
    - Providing sufficient medicine storage space with sufficient and appropriate shelving.
    - Procuring bigger/more refrigerators for medicine storage at PHC facilities where refrigerators are over packed (leading to poor air circulation).
    - Appropriating standby generators and an automatic system that immediately switches to the generator once power is cut MUST be put in place to ensure that the cold chain is not broken.
    - Introducing computer-based systems at PHC facilities to improve inventory management as these have the ability to improve efficiency, minimize human error and reducing expiries.
- The district transport management team to request provincial KZN head office for specific vehicle allocation at each PHC in the district to improve medicine availability.
- The Facility Managers to ensure that MSM SOP's are always available, signed and updated at the beginning of every financial year.
- Promote sharing of best practices of top-performing PHC facilities within the district.

REFERENCES

Ali, G. K. M. (2009) 'Accessibility of medicines and primary health care: The impact of the revolving drug fund in Khartoum State', *African Journal of Pharmacy and Pharmacology*, 3(3), pp. 070–077. Available at: https://www.researchgate.net/publication/228851118_Accessibility_of_medicines_and_primary_health_care_The_impact_of_the_revolving_drug_fund_in_Khartoum_State.

Barasa, N., Oluchina, S. and Cholo, W. (2018) 'Influence of inventory management practices on availability of medicines in public health facilities in Bungoma County , Kenya', *International Journal of Academic Research and Development*, 3(6), pp. 53–60.

Bateman, C. (2013) 'Drug stock-outs: Inept supply-chain management and corruption', *South African Medical Journal*, 103(9), pp. 600–602. doi: 10.7196/SAMJ.7332

Bateman, C. (2015) 'Inept drug supply management causing stock-outs', *South African Medical Journal*, 105(9), pp. 706–707. doi: 10.7196/SAMJnew.8543.

Berger, E. J. *et al.* (2007) 'Implementation and evaluation of a web based system for pharmacy stock management in rural Haiti.', *AMIA ... Annual Symposium proceedings / AMIA Symposium. AMIA Symposium*, 2007, pp. 46–50. Available at: http://www.ncbi.nlm.nih.gov/pubmed/18693795%5Cnhttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC2655915.

Blick, B. *et al.* (2018) 'Evaluating inter-rater reliability of indicators to assess performance of medicines management in health facilities in Uganda', *Journal of Pharmaceutical Policy and Practice*. Journal of Pharmaceutical Policy and Practice, 11(1), pp. 1–12. doi: 10.1186/s40545-018-0137-y.

Chowles, T. (2016) 'NDoH Deploys SVS mHealth App to Prevent Stock-outs - eHealth News ZA'. Available at: https://ehealthnews.co.za/ndoh-svs-mhealth-stock-outs/ (Accessed: 28 April 2019).

Crowley, T. and Stellenberg, E. L. (2015) 'An evaluation of the adequacy of pharmaceutical services for the provision of antiretroviral treatment in primary health care clinics', *Health SA Gesondheid*. Elsevier Ltd, 20(1), pp. 83–90. doi: 10.1016/j.hsag.2015.02.004.

Day, C. *et al.* (2007) 'District Health Barometer Year 2007/08 Team for the preparation of the District Health Barometer 2007/08', *Durban: Health Systems Trust*, 08. Available at: http://www.hst.org.za (Accessed: 22 September 2017).

Fakude, N. Ben (2017) 'An investigation of the factors contributing to the shortage of medicines at district hospitals and Primary Health Care facilities in, UMkhanyakude District, KwaZulu-Natal, South Africa.'

Federation, I. P. (FIP) (1998) 'International Pharmaceutical Federation.', *Drug intelligence & clinical pharmacy*,

10(1), pp. 34–5. doi: 10.1136/bmj.2.4942.787.

FMoH/WHO (2003) 'Situation of Anitretroviral Drug Use in Nigeria in Collaboration With Who November 2003', (November), pp. 1–43.

Githinji, S. *et al.* (2013) 'Reducing Stock-Outs of Life Saving Malaria Commodities Using Mobile Phone Text-Messaging: SMS for Life Study in Kenya', *PLoS ONE*, 8(1), pp. 1–8. doi: 10.1371/journal.pone.0054066.

Government Gezette (2000) 'Pharmacy Act, 1974 (Act No. 53 Of 1974), Regulations relating to pharmacy education and Training.', pp. 1–15.

Gray, A., Gengiah, T. and Naidoo, P. (2005) *South African Health Review 2005*. Available at: http://www.hst.org.za/generic/29 (Accessed: 2 August 2020).

Harries, A. D. *et al.* (2007) 'Ensuring uninterrupted supplies of antiretroviral drugs in resource-poor settings: An example from Malawi', *Bulletin of the World Health Organization*, 85(2), pp. 152–155. doi: 10.2471/BLT.06.032060.

Hasselback, L. *et al.* (2014) 'Rapid diagnostic test supply chain and consumption study in Cabo Delgado, Mozambique: Estimating stock shortages and identifying drivers of stock-outs', *Malaria Journal*. BioMed Central Ltd., 13(1). doi: 10.1186/1475-2875-13-295.

Ideal Clinic Manual (2018). Available at: https://www.idealhealthfacility.org.za/docs/v18/Final Ideal Clinic Manual - version 18 (26 July 2018).pdf (Accessed: 18 February 2019).

Lehmann, U. (2008) 'Strengthening human resources for primary health care', *S Afr Health Rev*, 9, pp. 781–786.

Liebenberg, M. (2017) *Rx Solution, Health Systems Trust*. Available at: http://www.hst.org.za/projects/Lists/HST Projects/DispForm.aspx?ID=169&Source=http%3A%2F%2Fwww.hst.org.za%2Fprojects%2Flists%2Fhst%2520projects%2Fallitems.aspx&ContentTypeId=0x010076EB38ED913E3C43B29121CF2A43A803 (Accessed: 13 October 2018).

Lufesi, N. N., Andrew, M. and Aursnes, I. (2007) 'Deficient supplies of drugs for life threatening diseases in an African community', *BMC Health Services Research*. BioMed Central, 7(1), p. 86. doi: 10.1186/1472-6963-7-86.

Mahoro, A. (2014) *Examining the Inventory Management of Antiretroviral Drugs At Community Health Centres in the Cape Metropole, Western Cape, Igarss 2014*. doi: 10.1007/s13398-014-0173-7.2.

Management Sciences for Health. MDS-3*: Managing Access to Medicines and Health Technologies* . (2012). Arlington VA: Management Sciences for Health. Available at: http://www.msh.org/resource-center/ebookstore/copyright.cfm. (Accessed: 11 September 2017).

Matowe, L. *et al.* (2008) 'Human Resources for Health A strategy to improve skills in pharmaceutical supply management in East Africa : the regional technical resource collaboration for pharmaceutical management', 6, pp. 1–7. doi: 10.1186/1478-4491-6-30.

Mayosi, B. M. and Benatar, S. R. (2014) 'Health and Health Care in South Africa — 20 Years after Mandela', 14(2). Available at: http://www.nejm.org/doi/pdf/10.1056/NEJMsr1405012 (Accessed: 23 September 2017).

Mbemba, G. I. C., Gagnon, M. P. and Hamelin-Brabant, L. (2016) 'Factors influencing recruitment and retention of healthcare workers in rural and remote areas in developed and developing countries: An overview', *Journal of Public Health in Africa*, 7(2). doi: 10.4081/jphia.2016.565.

Mburu, G. and George, G. (2017a) *African Journal of Primary Health Care and Family Medicine.*, *African Journal of Primary Health Care & Family Medicine*. Available at: https://phcfm.org/index.php/phcfm/article/view/1355/2175 (Accessed: 13 October 2018).

Mburu, G. and George, G. (2017b) 'Determining the efficacy of national strategies aimed at addressing the challenges facing health personnel working in rural areas in KwaZulu-Natal, South Africa', *African Journal of Primary Health Care and Family Medicine*, 9(1), pp. 1–8. doi: 10.4102/phcfm.v9i1.1355.

Meyer, J. C. *et al.* (2017) 'Ongoing initiatives to improve the quality and efficiency of medicine use within the public healthcare system in South Africa; A preliminary study', *Frontiers in Pharmacology*. Frontiers Media S.A., 8(NOV). doi: 10.3389/fphar.2017.00751.

Mohamed, S. *et al.* (2007) 'Medicine Supply Management In Nigeria : A Case Study Of Ministry Of Health , Kaduna State', *Nigerian Journal of Pharmaceutical Sciences*, 6(2), pp. 116–120. Available at: http://apps.who.int/medicinedocs/en/d/Js18399en/.

Motlanthe, E. K. (2012) *A study on medicine expiry within the supply chain in Limpopo Province*. Available at: http://ulspace.ul.ac.za/handle/10386/676.

Munedzimwe, F. (2017) *Medicine stock Management at Primary Health Care facilities in one South African Province*. University of Cape Town (UCT). Available at: https://open.uct.ac.za/bitstream/handle/11427/27822/thesis_hsf_2018_munedzimwe_fadzai_eunice.pdf?sequence=1.

Mung'omba, B. (2016) Core Competencies of Radiographers working in rural areas of South Africa. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMSC5594238. Accessed: 13 October 2018.

Najafizada, S. A. M., Labonté, R. and Bourgeault, I. L. (2019) 'HRH dimensions of community health workers: A case study of rural Afghanistan', *Human Resources for Health*. Human Resources for Health, 17(1), pp. 1–10. doi: 10.1186/s12960-019-0347-7.

O'Mahony, D. *et al.* (2014) 'Knowledge and attitudes of nurses in community health centres about electronic medical records', *Curationis*, 37(1), p. 1150. doi: 10.4102/curationis.v37i1.1150.

Polit, D. and Beck, C. T. (2010) *Essentials of Nursing Research. Appraising Evidence for Nursing Practice*. 7th edn.

Raja, S. and Mohammad, N. (2008) *A Handbook on Supply Chain Management for HIV/AIDS Medical Commodities*.

Available at: http://web.worldbank.org/archive/website01390/WEB/IMAGES/GR_PRO-3.PDF.

Rispel, L. (2016) 'Analysing the progress and fault lines of health sector transformation in South Africa 2', pp. 17–24. Available at: http://www.hst.org.za/publications/South African Health Reviews/2 Analysing the progress and fault lines health sector transformation in South Africa .pdf.

Riungu, J. M. (2011) 'Managing Health Supply Chains in Africa', pp. 1–5.

Roy, C. *et al.* (2009) *A Study on the Logistics and Supply Management System of Drugs at Different Levels in District Darbhanga of Bihar*. Available at: https://pdfs.semanticscholar.org/7b9f/1cd5b6f60c398aed2297ad6b4ac0deb8b414.pdf.

Schouten, E. . *et al.* (2011) 'Antiretroviral drug supply challenges in the era of scaling up ART in Malawi', *Journal of the International AIDS Society*, 14(SUPPL. 1), pp. 1–8. Available at: http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed10&NEWS=N&AN=2011376381.

Shafaat, K. *et al.* (2013) 'An Overview : Storage of Pharmaceutical Products', *World Journal of Pharmacy and Pharmaceutical Sciences*, 2(5), pp. 2499–2515.

Shamima, T. (2012) 'Challenges in the Management of Drug Supply in Public Health Care Centres in the Sedibeng District, Gauteng Province.'

South African Pharmacy Council (2010) 'Good pharmacy practice in South Africa', p. 243.

South African Pharmacy Council (2011) 'Pharmacy Human Resources in South Africa', pp. 1–92.

Sowedi, M. *et al.* (2000) 'Baseline assessment of drug logistics systems in twelve DISH-supported districts and service delivery points (SDPs). Final report. June 06-Sept 30, 2000', pp. 38, [75] p. Available at: https://docplayer.net/17555252-Baseline-assessment-of-drug-logistics-systems-in-twelve-dish-supported-districts-and-service-delivery-points-sdps.html.

Stop Stockouts (2013) *Stock Outs in South Africa – A National Crisis*. Available at: http://stockouts.org/uploads/3/3/1/1/3311088/stop_stockouts_report_2013pdf_1.pdf.

Trap, B. *et al.* (2016) 'Article 1: Supervision, Performance Assessment, and Recognition Strategy (SPARS) - a multipronged intervention strategy for strengthening medicines management in Uganda: Method presentation and facility performance at baseline', *Journal of Pharmaceutical Policy and Practice*. Journal of Pharmaceutical Policy and Practice, 9(1). doi: 10.1186/s40545-016-0070-x.

'UMkhanyakude District Health Plan' (2016). Avalaibale at: www.health.gov.za/DHP/docs/DHP2016-19/kwazulu_Natal/UMkhanyakude_DHP_2016.17.pdf (Accessed: 14 April 2019)

USAID: Deliver Project. (2011) *The Logistics Handbook A Practical Guide for the Supply Chain Management of Health Commodities*. Available at: http://apps.who.int/medicinedocs/documents/s20211en/s20211en.pdf (Accessed: 8

April 2019).

van Rensburg, D. H. C. J. *et al.* (2008) 'Human resource development and antiretroviral treatment in Free State province, South Africa.', *Human resources for health*, 6(1), p. 15. doi: 10.1186/1478-4491-6-15.

World Health Organization (WHO) (2000) 'Declaration of Alma Ata', *Declarationof Alma-Ata. International Conference on Primary Health Care, Alma-Ata, USSR, 6-12 September*, (September 1978).

World Health Organization (WHO) (2007) 'Everybody's Business Strengthening Health Systems To Improve Health Outcomes WHO's Framework For Action'. Available at: https://www.who.int/healthsystems/strategy/everybodys_business.pdf (Accessed: 2 August 2020).

World Health Organization (WHO) (2009) 'Increasing access to health workers in remote and rural areas through improved retention', (February), pp. 2–4. Available at: https://www.who.int/hrh/migration/background_paper.pdf.

World Health Organization (WHO) (2017) 'Mid-level health workers: a review of the evidence', *UHC Technical Brief*, (3). Available at: http://www.searo.who.int/entity/health_situation_trends/mid_level_health_workers.pdf?ua=1.

World Health Organisation (WHO) (2019) 'WHO | Essential medicines', *WHO*. World Health Organization.

Zuma, S. M. (2013) 'the Factors Affecting Availability of Medicines in the Free State', (June), pp. 1–108. doi: 10.13140/RG.2.2.34141.92642.

Zurn, P. *et al.* (2016) 'Human Resources for Health', *Toolkit on Monitoring Health Systems Strengthening*, 50(Module 3), pp. 0–20. doi: 10.1186/1478-4491-2-13.

APPENDICES

Appendix 1: Facility sample selection

SUB DISTRICT	CHOSEN FACILITIES	HEAD COUNT	SIZE
UMHLABUYALINGANA	kz Mabibi Facility	4871	S
	kz KwaZibi Facility	9563	S
	kz Bhekabantu Facility	20966	M
	kz Maputa Facility	70237	L
	kz Mbazwana Facility	75877	L
MTUBATUBA	kz Esiyembeni Facility	7795	S
	kz Ntondweni Facility	14612	S
	kz Ezwenelisha Facility	24359	M
	kz Mtubatuba Facility	80082	L
	kz KwaMsane Facility	103294	L
JOZINI	kz Gwaliweni Facility	12447	S
	kz Ekuhlehleni Facility	14652	S
	kz KwaMbuzi Facility	24943	M
	kz Ndumo Facility	62708	L
	kz Jozini Facility	74113	L
BIG FIVE HLABISA	kz Makhowe Facility	18686	S
	kz Mpembeni Facility	21600	S
	kz Macabuzela Facility	36954	M
	kz Hluhluwe Facility	61215	L
	kz Mduku Facility	65174	L

Appendix 2: Facility Manager Questionnaire

QUESTIONNAIRE TO FACILITY MANAGER

Key to assist in answering the questions accurately

Yes : You completely agree to the statement/ all conditions are met in totality
No : You completely disagree to the statement / none of the conditions are met
Sometimes : You partly agree to the statement/ Conditions are met in part
Don't know : You are neither agree or disagree to the statement/ You are unaware

PS: If selected answer is sometimes, specify the extend/ tasks/ frequency/ in the comments section

Code of Facility:					
Sub District:					
Size:	**S**	**M**	**L**	**Dist. from Hosp. (km):**	
Respondent:		**FM**	**AFM**	**Comment**	

Section A – Medicine Supply Management & Human Resources	**Yes**	**No**	**Don't Know**	**Sometimes**	**Specific comments**
A1. Do you have a SOP Book for Medicine Supply Management (MSM)?					
Verify: *Both present, complete, up to date and signed*					
A2. Have you allocated responsibility of medicine supply management to another staff member?					
A3. If yes, is it a PN, EN, PA or other?					
A4. How many staff members (including you- FM) handle medicines at the facility?					
A5. Have you (FM or AFM) attended the Medicine Supply Management (MSM) course at the mother hospital in 2017 or 2018?					

A6.How many staff from your facility (apart from FM or AFM) attended the MSM course at the mother hospital in 2017 0r 2018?					
General comments:					

Section B - Storage Management	**Yes**	**No**	**Don't Know**	**Sometimes**	**Specific comments**
B1. Is there sufficient space in the medicine room to store medicines needed in the facility?					
Verify: *All medicines are stored in the medicine room or dispensary and not in sub-stores, passages or other areas in the facility; and there is no medicine stored on the floor in the medicine room or dispensary.*					
B2. Does the medicine room remain locked at all times?					
Verify*: Staff entering and leaving the medicine room are monitored and there is daily follow-up to ensure medicine room is locked up.*					
B3. Are medicines stored neatly on shelves according to a classification system applying FIFO/FEFO principles?					
Verify: *Check medicines stored according to FIFO/FEFO principles. (Check 5 items)*					
B4. Are expiry checks done on a monthly basis and removing expired stock from shelves?					
Verify*: No expired medicines found on shelves in the medicine room. (Check 5 items)*					
B5. Is there sufficient functioning air conditioner in the medicine room to maintain temperature below 25 degrees Celsius?					
Verify**:** *Air conditioners functioning within the required temperature range (<25degrees Celsius); temperature recording sheets up to date and recorded daily for previous month.*					
B6. For cold chain maintenance, is there a functional fridge in the medicine room?					
Verify**:** *Fridge is not over full, medicines and vaccines are packed appropriately with enough space for air circulation, no stock is touching the back of the refrigerator/condenser which could expose it to freezing.*					
B7. Does the facility have a standby generator or other emergency power system for use in the case of power failure?					
B8. ***Verify****: Functioning standby generator*					

General comments:

Section C- Ordering and Receiving processes	Yes	No	Don't Know	Sometimes	Specific comments
C1. Do you have a SOP for ordering and receiving of medicines?					
Verify: *SOP on ordering and receiving of stock is present signed for review and filed in the MSM SOP file.*					
C2. Are orders submitted to mother hospital on the due date *(Stock on hand, is it counted and recorded when placing an order, out of stock items considered when placing an order).*					
Verify: *Review completed order forms for the last month.*					
C3. Are stock cards updated completely and correctly when receiving stock?					
Verify: *Review stock cards for 5 items received in the last month.*					
C4. Are all procurement and receipt documents filed for each month?					
Verify: *Documents for procurement and receipt of medication are available and filed together with delivery notes for last month orders*					
C5. On delivery is the quantity of boxes always counted and compared to delivery note					
Verify: *Delivery notes signed and filed, expiry dates of received medication checked, medicines packed on the shelf in accordance with FEFO and stock cards or electronic systems updated in last month order.*					

General comments:

Section D- Stock Inventory Systems	Yes	No	Don't Know	Sometimes	Specific comments
D1. Are the stock cards/computer systems and are up to date for all medicines?					
Verify: *Compare the physical stock balance with stock card or information system balance for 5 items*.					
D2. Are stock takes done once a month (with records)					
Verify: *Check stock takes records for previous month.*					

D3. Are the AMC's calculated every 6 months?					
Verify: *Reorder levels and maximum stock levels calculated every 6 months. (Check ROL for 5 items)*					
D4. Is there dedicated vehicle for the distribution of medicines between the hospital and facilities?					
Verify: *Facility has a designated vehicle to transport medicines.*					
General comments:					

Section E- Stock Out Reporting systems	**Yes**	**No**	**Don't Know**	**Sometimes**	**Specific comments**
E1. Is there a SOP for reporting of stock outs?					
Verify*: Check in SOP file*					
E2. Is there a functional electronic networked SVS system for monitoring the availability of medicines					
Verify: *Capturing device and its accessories are in good working order the device is functioning well.*					
E3. Is the approved list of tracer medicines updated and visible in the medicine room?					
Verify: **Check if updated tracer list is available.**					
E4. Does the facility update the electronic networked system at least weekly?					
Verify: *Check for last month's updates.*					
General comments:					

Appendix 3: UWC Biomedical Science Research Ethics Approval Letter

UNIVERSITY of the WESTERN CAPE

OFFICE OF THE DIRECTOR: RESEARCH
RESEARCH AND INNOVATION DIVISION

Private Bag X17, Bellville 7535
South Africa
T: +27 21 959 4111/2948
F: +27 21 959 3170
E: research-ethics@uwc.ac.za
www.uwc.ac.za

13 May 2019

Mr ST Matema
School of Public Health
Faculty of Community and Health Science

Ethics Reference Number: BM19/3/1

Project Title: Assessment of medicine supply management at primary health care facilities in a rural district of Kwazulu-Natal, South Africa.

Approval Period: 17 April 2019 – 17 April 2020

I hereby certify that the Biomedical Science Research Ethics Committee of the University of the Western Cape approved the scientific methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit a progress report in good time for annual renewal.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

BMREC REGISTRATION NUMBER -130416-050

Appendix 4: uMkhanyakude Health District Permission letter

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

304 Ntsinde Road, Jozini, 3969
PB X026, Jozini 3969
Tel: 035 572 1327 Fax: 035 572 1245 Email: hervey.williams@kznhealth.gov.za
www.kznhealth.gov.za

DIRECTORATE:
District Clinical Specialist Team
Umkhanyakude Health District Office

Enquiries : Dr CH Vaughan Williams
Telephone : 035-5721327 Ext 114

14 May 2019

Dear S T Matema,

I have pleasure in informing you that permission has been granted to you by the District Office to conduct research in this district, entitled:

'Assessment of medicine supply management at primary health care facilities in a rural district of KwaZulu-Natal, South Africa'

Please note the following:

1. Please ensure that you adhere to all the policies, procedures, protocols and guidelines of the Department of Health with regards to this research.
2. This research will only commence once this office has received confirmation from the Provincial Health Research Committee in the KZN Department of Health.
3. Please ensure this office is informed before you commence your research.
4. The District Office will not provide any resources for this research.
5. You will be expected to provide feedback on your findings to the District Office.

Sincerely,

C. H. Vaughan Williams

C H Vaughan Williams
Family Physician, Umkhanyakude Health District Office

Appendix 5: KwaZulu-Natal Department of Health Approval Letter

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

Physical Address: 330 Langalibalele Street, Pietermaritzburg
Postal Address: Private Bag X9051
Tel: 033 395 2805/3188/8123 Fax: 033 394 8782
Email:
www.kznhealth.gov.za

DIRECTORATE:
Health Research & Knowledge Management

NHRD Ref: KZ_20190S_011

Dear Mr ST Matema
University of the Western Cape

Approval of research

1. The research proposal titled '**Assessment of medicine supply management at primary health care facilities in a rural district of KwaZulu Natal, South Africa**' was reviewed by the KwaZulu-Natal Department of Health.

   The proposal is hereby **approved** for research to be undertaken at all primary health care clinics in Umkhanyakude District.

2. You are requested to take note of the following:
   a. Kindly liaise with the facility manager BEFORE your research begins in order to ensure that conditions in the facility are conducive to the conduct of your research. These include, but are not limited to, an assurance that the numbers of patients attending the facility are sufficient to support your sample size requirements, and that the space and physical infrastructure of the facility can accommodate the research team and any additional equipment required for the research.
   b. Please ensure that you provide your letter of ethics re-certification to this unit, when the current approval expires.
   c. Provide an interim progress report and final report (electronic and hard copies) when your research is complete to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200** and e mail an electronic copy to hrkm@kznhealth.gov.za

For any additional information please contact Mr X. Xaba on 033-395 2805.

Yours Sincerely

Dr E Lutge
Chairperson, Health Research Committee
Date: 16/05/19

Fighting Disease, Fighting Poverty, Giving Hope

Appendix 6: Information Sheet

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa
Tel: +27 21-959 2809 Fax: 27 21-959 2872
E-mail: soph-comm@uwc.ac.za

INFORMATION SHEET

Project Title: Assessment of medicine supply management in rural primary health care facilities in KwaZulu-Natal, South Africa

What is this study about?
This is a research project being conducted by **Shingirai Trymore Matema** at the University of the Western Cape. We are inviting you to participate in this research project because you are the facility manager responsible for pharmaceuticals at your facility. The purpose of this research project is to assess the medicine supply management in primary health care facilities in Umkhanyakude rural district.

What will I be asked to do if I agree to participate?
You will be asked to read this information sheet, and sign a consent form as an agreement to take part in the study. The study will be conducted at your PHC facility in the facility manager's office where you will complete a questionnaire. Thereafter the researcher will also make verifications of the medicine store room. The overall duration should not take more than 30-40 minutes. The questionnaire will comprise of questions on medicine supply management principles including staffing, infrastructure and standard operating procedures.

Would my participation in this study be kept confidential?
The researcher undertakes to protect your identity and the nature of your contribution. To ensure your anonymity, (1) your name will not be included on the surveys; (2) a code will be placed on the questionnaire; and (3) only the researcher will be able to link the facility and the questionnaire. To ensure your confidentiality, the researcher will keep the raw data in a lockable filing cabinet. All the results on the computer will be stored and hidden using password-protected computer files.

If we write a report or article about this research project, your identity will be protected.

What are the risks of this research?
There may be some risks from participating in this research study. All human interactions and talking about self or others carry some amount of risks. We will nevertheless minimise such risks and act promptly to assist you if you experience any discomfort, psychological or otherwise during the process of your participation in this study. Where necessary, an appropriate referral will be made to a suitable professional for further assistance or intervention.

What are the benefits of this research?
The benefits to you include identifying the areas that may need attention to improve medicine supply management at your facility. This research is not designed to help you personally, but the results may help the investigator learn more about medicine supply management at PHC level in this district. We hope that, in the future, other people might benefit from this study through improved understanding of medicine supply management in PHC at a rural district level. As a result patients will have all their medicines on time and on the date of their presentation to the health facility and decrease the cost burden of returning to clinics.

Do I have to be in this research and may I stop participating at any time?
Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

What if I have questions?
This research is being conducted by **Shingirai Trymore Matema**, **School of Public Health** at the University of the Western Cape. If you have any questions about the research study itself, please contact **Shingirai Trymore Matema** at: *Mosvold Hospital Hospital Pharmacy, 035 591 0122/072 577 6228 or 3706258@myuwc.ac.za*

Supervisor:
Dr Hazel Bradley
School of Public Health
University of the Western Cape
Private Bag X17
Bellville 7535
hbradley@uwc.ac.za +27 21 959 2630

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Prof Uta Lehmann
Director
School of Public Health
University of the Western Cape
Private Bag X17
Bellville 7535
ulehmann@uwc.ac.za

Prof Anthea Rhoda
Dean
Faculty of Community and Health Sciences
University of the Western Cape
Private Bag X17
Bellville 7535
chs-deansoffice@uwc.ac.za

BIOMEDICAL RESEARCH ETHICS ADMINISTRATION

Research Office

University of the Western Cape

Private Bag X17

Bellville 7535

Tel: +27 21 959 2988

Email: research-ethics@uwc.ac.za

This research has been approved by the University of the Western Cape's Research Ethics Committee. (REFERENCE NUMBER: *BM19/3/1*)

Appendix 7: Consent Form

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa
Tel: +27 21-959 2809, Fax: 27 21-959 2872
E-mail: soph-comm@uwc.ac.za

CONSENT FORM

Title of Research Project: **Assessment of Medicine Supply Management at Primary Health Care Facilities in a rural district of KwaZulu-Natal, South Africa.**

The study has been described to me in language that I understand. My questions about the study have been answered. I understand what my participation will involve and I agree to participate of my own choice and free will. I understand that my identity will not be disclosed to anyone. I understand that I may withdraw from the study at any time without giving a reason and without fear of negative consequences or loss of benefits.

Participant's name.....

Participant's signature.....

Date.....