

**ASSESSMENT OF MEDICINES PRICE, AVAILABILITY AND
DISTRIBUTION IN THE CENTRALISED AND DECENTRALISED
PROCUREMENT SYSTEMS IN DAR ES SALAAM REGION**

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**MSc. (Pharmaceutical Management) Dissertation
Muhimbili University of Health and Allied Sciences
October, 2013.**

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By

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**A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree
of Master of Science in Pharmaceutical Management of the
Muhimbili University of Health and Allied Sciences**

**Muhimbili University of Health and Allied Sciences
October, 2013**

CERTIFICATION

The below undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation / entitled: **“Assessment of medicines price, availability and distribution in the centralized and decentralized procurement systems in Dar es Salaam region”** in partial fulfilment of the requirements for the degree of Msc Programme (Pharmaceutical Management) of Muhimbili University of Health and Allied Sciences.

Prof. Appolinary A. R. Kamuhabwa
(Supervisor)

Date

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DEDICATION

*“I dedicated this dissertation in loving memory of my revered daughter Enitah Dedan,
may the almighty God rest her in peace”*

ABSTRACT

Background: Medicines procurement processes in the public health facilities (PHFs) in Tanzania are characterized by two main procurement systems, the centralized and decentralized procurement systems. Policy for medicines procurement is in favour of the centralized procurement system, managed by the Medical Stores Department (MSD). Despite much effort of improving the access of medicines in the public health facilities, prices of medicines have remained substantially high for individuals to afford.

Objective: The main objective of the survey was to assess medicines procurement price, availability and distribution of medicines in the centralized and decentralized procurement systems in the public health facilities in Dar es Salaam region.

Methods: The study was an explorative cross-sectional survey that applies both quantitative and qualitative approaches to determine medicine procurement price of the centralized and decentralized systems, investigate the medicines availability in the selected public hospitals and assess the efficiency of distribution systems.

Results: The result shows that median percentage availability of medicines in the hospital was 72.5 %. Overall median percentage availability of each individual medicine in the surveyed hospitals was 71.4%. The average median stock-out days per year was 97.2. The median decentralized, centralized and international reference prices were, Tshs 122.5, 77.7 and 63.35 respectively. MPR of the decentralized to international reference prices, centralized to international reference prices, and the decentralized to centralized procurement prices, the ratios were, 1.92, 1.1, and 1.85 respectively.

Conclusion: Findings of the study revealed that, availability of medicines is fairly high in public hospitals during day of data collection but high stock out for the past six months of review. There is no statistical significant difference in median prices across all procurement systems. However, there was statistical significance difference in MPRs of medicines procurement prices across the categories. The centralized procurement prices were reasonably cheaper compared to decentralized and international reference prices. Low order fulfilment rate in the centralized procurement and high supplier procurement lead time in the decentralized procurement systems are the factor contributing to the fairly high availability and stock out of medicines in the public hospitals.

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LIST OF ABBREVIATIONS

CCBRT	-	Comprehensive Community Based Rehabilitation Tanzania
DDs	-	Direct Delivery System
DMO	-	District Medical Officer
GDP	-	Gross Domestic Products
HAI	-	Health Action International
HF _s	-	Health Facilities
HTC	-	Hospital Therapeutic Committee
IRP	-	International Reference Price
LMIC	-	Low-Middle Income Country
PHF	-	Primary Health Facilities
PMU	-	Procurement Management Unit
PPRA	-	Public Procurement Regulatory Authority
PWG	-	Pharmaceutical Working Group
SDC	-	Swiss Agency for Development and Cooperation
S Median	-	Supplier median price
S Mean	-	Supplier Mean price
SPSS	-	Statistical Package for Social Sciences
STG	-	Standard Treatment Guidelines
TFDA	-	Tanzania Food Drug Authority
Tsh	-	Tanzanian Shillings
LPO	-	Local Purchase Order
MOHSW	-	Ministry of Health and Social Welfare
MSD	-	Medical Stores Department
MSP	-	Manufacturing Selling Price
MPR	-	Median Price Ratio
NEMLIT	-	National Essential Medicines List for Tanzania
ORS	-	Oral Rehydration Salts
UNRWA	-	UN Relief and Works Agency
WHO	-	World Health Organization

DEFINITIONS OF KEY ITEMS

Centralized procurement: A purchasing system in which all the health facilities with wide distribution can make purchases through a common purchasing organization.

Decentralized procurement: A decentralized procurement system, means that a health facility purchasing activities are delegated to individual health facility.

Gross Domestic Products (GDP): The monetary value of all the finished goods and services produced within a country's borders in a specific period of time. GDP is usually calculated on annual basis. GDP includes all private and public consumption, government outlays, investments and exports less imports that occur within a defined territory.

International reference price: the reference price from MSH (Management Science for Health) international reference drug price guide that are updated annually, the one used for this study is of 2011.

Lead time: Is defined as the latency between the initiation and excursion of a process. An example is the time between when the order is place and time when the products are delivered and ready to be used.

Local unit price: Prices of the unit with the pack size from the survey samples, which is calculated by dividing, price per pack size/ number of tablets, capsules, vials or ampoules.

Medicines: In this study means, pharmaceutical products used to prevent, to manage and to treat diseases in the health facilities.

Median prices: Is the type of average value that splits a series of value in half when the series is put in ascending order. This is likely to be more valuable approach for estimating actual future prices when there is a skewed distribution, in the hospitals and primary health facilities.

Order fulfilment rate: Calculated by the number of orders filled with the number of orders received. Only orders that have been received within 90 days are included in determining the fulfilment rate.

Public health facilities: Are health facilities that are managed by both the government and a Faith Base Organization and they receive funds for management and purchasing medicines from the ministry of health.

CHAPTER ONE

INTRODUCTION, STATEMENT OF THE PROBLEM, RATIONALE AND OBJECTIVES

1.0. INTRODUCTION

1.1. Background information

Essential medicines and medical supplies are critical elements to reducing morbidity and mortality and improving quality of life. Insufficient access to essential medicines and medical supplies is a prominent public health problem that affects populations in many Low and Middle Income Countries (LMIC) ¹. The World Health Organization (WHO) estimates that, overall, 30% of the world population does not have regular access to essential medicines, and that in the poorest areas of Asia and Africa over half of the population lacks access to medicines ². Those who do have access to medicines face a relatively high cost burden ³. In LMIC payments for medicines consume the largest proportion of out-of-pocket health care expenditures ⁴. Poor households devote 60% to 90% of their health care expenditures to medicines, and medicines consume 25% to 65% of total public and private spending on health expenditure ⁵.

The supply of medicines in Public Health Facilities (PHFs) in Tanzania is characterized by two mainly procurement systems, the centralized and decentralized medicines procurement systems. The policy for procurement of medicines in the public health facilities is in favour of a centralized medicines procurement system managed MSD. MSD is an agency under the Ministry of Health and Social Welfare (MoHSW) responsible for procurement, storage, and distribution of medicines to the public health facilities in the country ⁶. The MoHSW disburse funds to the health facilities accounts that have been established at MSD to enable health facilities to order medicines for their uses. The policy of public procurement of medicines in public health facilities requires health facilities to purchase medicines from MSD first and when medicines of interest are out of stocked at MSD, health facility is then allowed to procure from the decentralized system. Procurement through decentralized system is done through pre-qualified private suppliers who have been selected by the Institution or

Municipal Tender Boards (TB) and Procurement Management Unit (PMU) of the respective hospitals, districts or councils.

1.1.1. Global Medicines Procurement Systems

Worldwide medicines procurement systems are characterized by procuring medicines centrally through a company or an agent at the head quarter or at the division or zone level. Public health facilities are required to procure medicines from that agency or an agency distributing medicines to public health facilities after their orders have been submitted. The advantages of the centralized medicines procurement are related to economies of scale, efficient coordination, and control of procurement activities is made easier ⁷. Centralized procurement, avoids duplicity of orders and promotes benefits arising from the high volume bulk discounts, lower transportation and inventory management costs, organized transactions and improved vendor relationships. Centralized procurement, it allows forecasting for a total requirement for all health facilities for the specific period of time.

Opposite to centralized purchasing is the decentralized medicines procurement system, in which each public health facility engages in the medicines procurement individually. The procurement can be done by quotations to pre-qualified suppliers or direct purchase from suppliers. The advantage of the decentralized medicines procurement system is that the response is timely and rapid but it may conflict with forecasting due to lack of consolidation of medicines requirements to the procurement agency ⁷.

Total price paid for procurement of medicine in both the centralized and decentralized procurement systems comprises a number of price components, the Manufacturer's Selling Price (MSP) being just one of them. As medicines move along the supply chain, from the manufacturer to the health facility, then to the patient, additional costs are added to the MSP ⁸. These price components come from a variety of sources, such as freight costs, government-collected tariffs, taxes and supplier's mark-ups that have made to meet the overhead costs. If these costs are not fairly calculated, they will affect the availability and affordability of medicines in the health facility.

1.1.2. Availability and affordability of medicines in the health facility

The availability and affordability of medicines in the health facility is often considered as a major factor that builds trust to patients when seeking intervention for their health problems⁹. Patients tend to equate medicine availability and affordability with quality of care leading to satisfaction with the health services. A well functioning medicines supply system is a major contribution to making a health system operational and improves the responsiveness of the health facilities to the health care needs of the population.

Medicines procurement prices of public health facility at the centralized medicines procurement system in recent years has shown to be higher than procuring medicines in the decentralized system. Lack of medicines pricing policy and control mechanism has led to suppliers to decide on their own price mark-up in both procurement systems. This research was aimed at determining the medicines procurement prices from both the centralized and decentralized medicines procurement systems, the effect of price on medicines availability in the public hospitals, implementation of medicines policy and assessing efficiency in medicines distribution system in public health facilities. The results from this study were expected to convince policy makers in the development of medicines pricing policy and control.

1.1.3. Direct Delivery System of medicines to public health facility

The Direct Delivery (DDs) of medicines to the public health facilities is a government effort for improving the availability of medicines in the public health facilities. The centralized procurement agency, MSD is now conducting the Direct Delivery of medicines to public health facilities. In this system, consignments of ordered medicines that have been placed at MSD by health facility are packed and delivered direct to the health facility without passing through the District Medical Officer (DMO). This system is against the old methods of indirect distribution system, where delivering of medicines consignment to health facility was through the DMOs office. During the indirect distribution system there was an outcry from health facilities workers that, the medicines are late delivered, theft and delivering short expiring date of medicines. The project started in 2010 by delivering medicines from MSD

direct to PHC. Evaluation of this project has shown to be successful, it is expected that by July 2013 the DDs will be implemented in all hospitals in Tanzania.

1.2. STATEMENT OF THE PROBLEM

In Tanzania, the procurement, storage and distribution of medicines in the public sectors are managed by the MSD ⁶. MSD procures medicines in bulk from international and local manufacturers, wholesalers and distributors. The public health facilities are required to order and procure medicines from MSD first and when medicines of interest are out of stock at MSD, health facilities are allowed to procure through decentralized system. The bulk purchasing of medicines and medical supplies by centralized system have been considered as one of the most important achievements of the medicines supply in Tanzania. It has ensured the purchasing of high quality products at reasonable prices from international and local manufacturers ⁹.

Despite much efforts of improving the access to medicines in the public health facility in Tanzania, affordability has remained low, prices are high compared to international prices and availability of medicines in public health facilities is not sufficient ¹⁰. Unpublished data and stakeholders' views indicate that, in recent years purchasing prices of medicines from MSD are higher than those from private suppliers. Some perceived reasons for low availability of medicines in public health facilities are due to high prices of medicines at MSD, limited budget of health facilities for procurement of medicines and erratic disbursement of funds from Ministry of Health and Social Welfare (MOHSW) to the health facilities. It has been expected that, medicine prices at MSD would be relatively cheaper because of its system of bulk purchase from international and local manufacturers and hence improve availability of medicines in the public health facilities.

Essential drugs at MSD, have consistently been out of stock for some times and this has encouraged a system of rationing throughout the supply chain, which has led to erroneous behaviour of the zonal stores and their customers to over-ordering when stocks are available and thus creating the bullwhip effect that are difficult for MSD to manage ¹¹. In addition, there is poor performance of pharmaceutical supply chain and distribution network which has

negative implications on access to medicines and quality health care ¹². There is also poor order fulfilment rate and late delivery of medicines to public health facilities.

There is lack of medicines pricing policy and control in Tanzania and therefore procurement prices of medicines from different suppliers is not unified, hence each supplier has different price mark-up for profit determination. In order to ascertain claims of the higher price of medicines at MSD, regular stock out of medicines in the public health facilities, low availability of medicines in the facility, and inefficient distribution system, this study assessed health facility procurement price, distribution process, implementation of medicines policy in pricing policy, cost of procurement, order fulfilment rate and suppliers lead time as well as quality of medicines supplied to health facilities.

Therefore, the main focus of this study was to assess the prices of the centralized and decentralized medicines procurement systems, policy regarding medicines prices, determine medicines availability and the efficiency of supply and distribution system, cost, order fulfilment rate and lead time in the public health system in Tanzania. The results and information gathered from this study are expected to draw the conclusion and recommendations that will be used by decision makers in improving medicines prices and availability in health facilities and make accessible to the population.

1.3.0 RATIONALE / SIGNIFICANCE OF THE STUDY

High price of medicines is one of the obstacles to access health services by the individual patient. The final price paid for a medicine whether by health facilities or by a patient reflects the suppliers selling price plus all the taxes and other costs. Examining the components of the price of medicines which the public health facilities incurs during the procurement from both the centralized and decentralized procurement systems, medicines availability, medicines policy and medicines supply and distribution system are important steps in the review of policy of medicines pricing and control in the country.

Figure 1 below explains the link between the health status of the population and Gross Domestic Products (GDP), the economic performance of the populations.

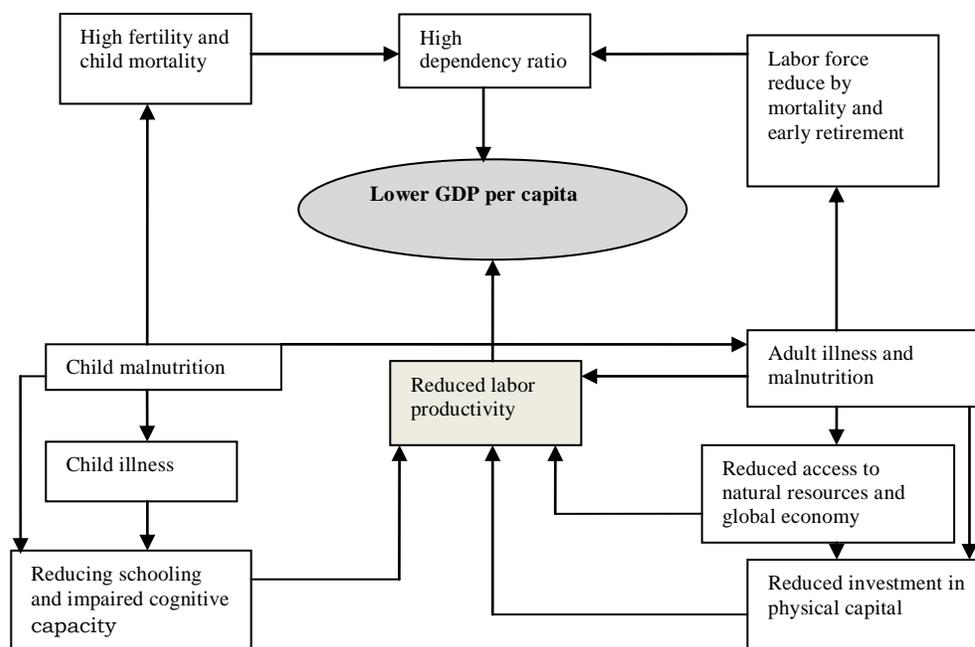


Figure 1: Population's health status link to economic performance of the country's

(source: *Health and Development. A compilation of articles from Finance & Development, International Monetary Fund Washington, DC December 2004*)

A poor health population reduces GDP per capita by reducing labor productivity and the relative labor force. Healthy workers are more productive than workers who are otherwise comparable to their health¹³. Accesses to medicines are contributed by the ability of patients to procure medicines when they fall sick. The higher price of medicines hinders the

accessibility to medicines resulting to poor improvement of the health status, therefore affecting of individuals and communities.

Findings and information gathered from this study are expected to draw the conclusion and recommendations that will be used by the decision makers to improve availability of medicines in health facilities and make accessible to the population in terms of medicines price.

The findings also are expected to provide information that will contribute in the area of pharmaceutical management particularly medicines pricing policy and availability. The knowledge gained from this study will contribute to formulation of policies in pricing of medicines and improvement of their availability in public health facilities. This in turn will improve accessibility and affordability of medicines in public health facilities to patients who need them.

1.3.1 Conceptual framework of medicines pricing in the Centralized and Decentralized procurement system in Tanzania.

Figure 2 below describes the contributing factors that may lead to high price of medicines in the centralized and decentralized procurement systems.

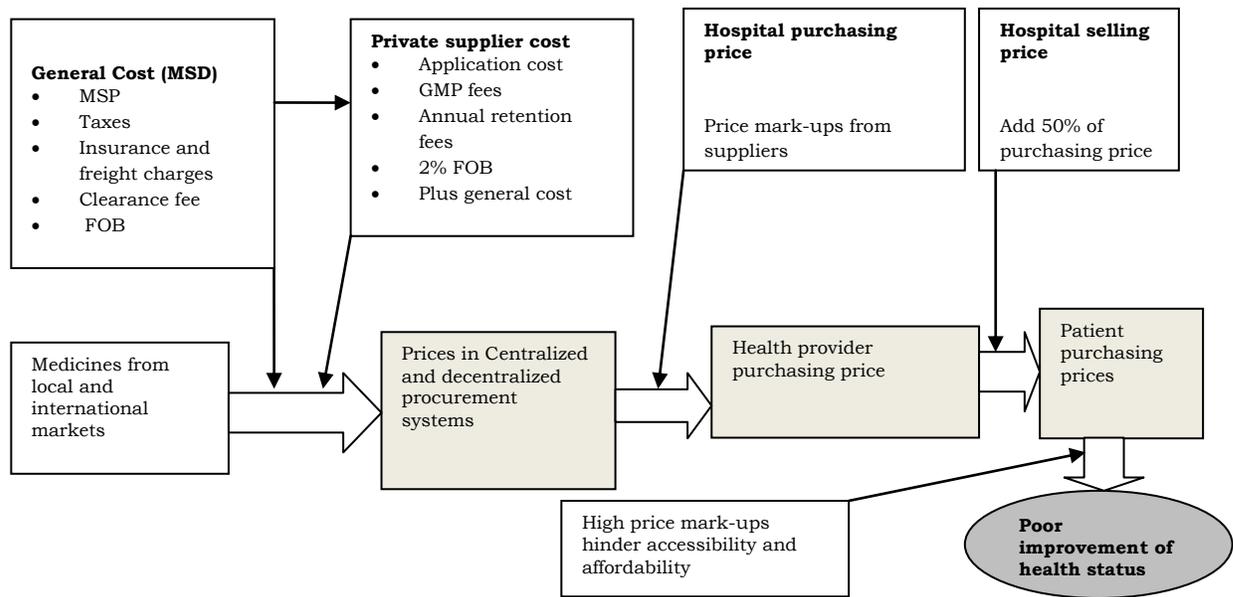


Figure 2: Conceptual framework of Pricing

- a. General costs: The general cost consist the expenses importers incur during the importation of medicines or raw material at the point of entry including the Manufacturer's Selling Price (MSP). Total price paid for procurement of medicine in both the centralized and decentralized procurement systems comprises a number of price components, the MSP being just one of them⁸. The other cost are insurance and freight costs, government-collected tariffs, taxes and clearance fees. If these costs are not fairly calculated they will affect the accessibility, availability and affordability of medicines in the health facility.

- b. Private suppliers cost: Apart of the general cost that have been narrated in section (a) above, private suppliers are required to pay other cost to TFDA on the following;-
- a. Application for medicines registrations fees
 - b. GMP fees for inspection of manufacturing industries
 - c. Annual retention fees
 - d. 2% Free On Board (FoB) ¹⁴
- c. Hospitals purchasing price: The hospital purchasing price is mainly affected by price mark-up. A mark-up may be simply defined as the difference between the purchase price (cost price) and selling price of a commodity. A mark-up thus represents the additional charges and costs which are applied in order to cover overhead costs, distribution charges, and a profit and may also be described as the “gross profit”. The mark-up may be expressed as a defined, fixed value or as a percentage of the price at which the goods or services were procured (the purchase price) or a combination of the two. Mark-ups are often expressed as a percentage of the purchase price ¹⁵. The mark-up percentage affect hospital procurement price.

$$\text{Percent mark - up} = \frac{(\text{selling price} - \text{purchase price})}{\text{purchase price}} \times 100$$

Sources: WHO/HAI: Project on Medicine Prices and Availability, The Regulation of Mark-ups in the Pharmaceutical Supply Chain, May 2011.

- d. Hospitals selling price: Tanzania practices a cost sharing system for charging patients to obtain the health services. However, some patients pay a flat rate for total treatment and other services, while others do not pay anything. Medicines for conditions like mental illness, epilepsy, tuberculosis, leprosy, HIV/AIDS and other chronic conditions are given free. Children under five years of age and adult above sixty years of age also receive free treatment including medicines and consultations. Guidelines for medicines charging at the hospital in the cost sharing scheme provide price mark-up of 50% of hospital purchasing price ¹⁶.

1.4. RESEARCH QUESTIONS

This study sought to answer the following research questions:

1. What proportions of essential medicines are available in public health facilities for the prevention and treatment of common diseases in Tanzania?
2. What are the prices of medicines in the basket of the centralized and decentralized procurement systems compared to international reference prices?
3. What is the scope of the implementation of medicines policy for medicines pricing, control and procurement process in the centralized and decentralized procurement systems?
4. What are the medicines management, distribution, supply, and storage system in the centralized and decentralized procurement system in the public health facilities in Tanzania?
5. What are the order fulfilment rates, lead time, and quality of medicines in the centralized and decentralized procurement system in public health facilities in Tanzania?

1.5. STUDY OBJECTIVES

1.5.1. Broader Objective

To assess prices, availability, distribution and policy for pricing and procurement process of essential medicines in the centralized and decentralized procurement systems, in the public hospitals in Dar es Salaam region, Tanzania.

1.5.2. Specific Objectives

1. To investigate the availability of commonly selected medicines in the public hospitals that are used to treat common diseases.
2. To determine the centralized and decentralised procurement prices of the selected essential medicines commonly used to manage and to treat common diseases in the public hospitals.
3. To analysed the implementation of medicines policy on medicines pricing, control and procurement process in both the centralized and decentralized procurement systems
4. To asses medicines management, storage, distribution, and Direct Delivery system (DDs) in the hospitals.
5. To determine quality of medicines, order fulfilment rate, and procurement lead time in the centralized and decentralized procurement systems.

CHAPTER TWO

LITERATURE REVIEW

A study conducted in public health facilities by using WHO methods reported that there is low availability of medicines (34.9%) in 27 developing countries ¹⁰. As results, patients purchase medicines in the private sector and sometimes they go without the medicines at all ¹⁰. For instance, the reproductive health medicines, procurement prices in the public health sector are relatively low and most products are supplied on free charges to patients, but if comparing on ability to pay in relative to the International Reference Price (IRP) and wages income, prices are often high in the private sector and Non-governmental organization (NGO) sectors for the same products ¹¹. Different studies conducted by WHO on medicines prices and availability have concluded that, the availability of medicines in the public sector is far from optimal and many people are forced either to rely on the private sector or go without treatment. Another study has shown that, in the countries that have many medicines industries like India, procurement prices of medicines in the public sector were low to the patient when compared to the IRP; but still medicines availability was low in the public sector, ranging from 0 to 30 percent with the median prices of less than twice of the IRP ¹² when comparing to private sector procurement prices.

The availability of medicines for specific diseases such as asthma was reported to be low and its purchase price is higher than IRP, the cost ranging between 1.6 to 2.3 working days ¹⁷. Prices of medicines to treat chronic diseases have been shown to be high and their availability is low and cost of treatment ranges between 1.6 to 18.4 wages days ¹⁸. A study on assessing prices, availability and affordability of essential medicines in rural areas of Hubei Province, China, 2009, reported that, the median availability of medicines in the public and private sectors was low. The Median Price Ratios (MPRs) of procurement prices for innovator brands (IBs) and lowest-price generics in the public sector were higher than the IRP; and the MPRs of retail prices to patients for low-price generics in the public sector were higher than those in the private sector ¹⁹.

In Malaysia, prices for innovator brands in the private hospitals and pharmacies where patients opt to seek services have remained higher than the generic brands and it was found that the price is about 16 times higher than IRP. In private clinics where doctors are allowed to dispense medicines, doctors applied high mark-ups up to 316% for generics while in retail pharmacy mark-ups are high up to 100%–140% for IBs and generics, respectively. The study in Malaysia revealed that, in the public sector, where medicines are free, availability was low even for medicines that are available in the National Essential Drugs List ²⁰. A recent study on the availability of acute and chronic diseases conditions reported that, availability of medicines for both conditions is sub-optimal across the World Health Organization (WHO) countries, particularly in the public sector ²¹. Other studies reported that, generic medicines for chronic diseases conditions were significantly less available than those for acute diseases conditions in both the public and the private sector ^{22, 23}. All these studies have shown low availability of medicines, high price and cost that patients have to pay in the public health facilities.

Medicine's survey studies conducted in Tanzania in 2004, in the public sector facilities, reported that, patient median prices for the lowest priced generic medicines were found to be higher than IRP ²⁴, the patient prices ranged from 0.29 to 16 times. In 2009 the price monitor report, reported that, medicines prices were still more expensive in the private and faith – based sector when compared to public health facilities for patients to afford ²⁵. In many developing countries including Tanzania cost of medicines accounts for a large portion of total expenditures on health services. Majority of people in developing countries do not have health insurance; hence they have to pay from their pockets³¹. Most medicines that are provided for children and adults under the exemption in the public sector are not available ²⁹. This results for patients purchasing medicines from the private sector where they are expensive and often unaffordable.

Many studies have been conducted on price and availability of medicines in the health facilities, but no study has been conducted to assess the health provider procurement price of the centralized or decentralized systems. In Tanzania the implications in medicines

availability and patients' procurement prices in the health facility have not been analyzed to explore the magnitude of relationship. The reasons for low availability of medicines in the public health facilities have not been thoroughly investigated to compare local prices with IRP.

Insufficient reliable information on medicines pricing policy and availability hinders the government to develop a sound medicines price control mechanism or evaluate the impact of price to health providers and end users ⁴⁰. Lack of policy for medicines price control in Tanzania has made suppliers to decide their own price mark-ups. Currently it is estimated that, one third of the world's populations do not have regular access to essential medicines ⁵. Additionally, a survey conducted by the WHO in capital cities of 14 countries in Central Africa reported poor availability of key medicines in the treatment of common diseases ³². Factors that contributed to poor access to essential medicines in the third countries are high price of medicines, lack of information regarding medicine resources, lack of efficiency of implementation of medicines policy and dependence on the single supply of medicines ^{30, 33, 34}.

In order to improve availability of medicines in the public health facilities in Tanzania, the government through the Ministry of Health and Social Welfare established the central procurement agency for purchasing medicines in bulk and distribute to the public health facilities at reasonable prices. However, different studies on price and availability of medicines conducted in Tanzania have reported low availability of medicines and high procurement prices ^{28, 29}. The prices of medicines at centralized medicines procurement system have been observed to increase in the recent years, and this is not in favour with the objectives of lowering prices by the establishment of the centralized procurement system, at the MSD.

CHAPTER THREE

3.0 METHODS AND MATERIAL

3.1. Overview of study area

3.1.1. Study Area

This study was conducted in public hospitals located in Dar es Salaam region. Dar es Salaam is one of the 25 administrative regions in Tanzania mainland. It is located on the latitudes 6.36 degree and 7.0 degree to the south of Equator and longitude 39.0 and 33.33 to the east of Greenwich. It is bounded by the Indian Ocean on the east and is completely landlocked by Pwani region to the other side. It has three of the administrative municipal councils, namely; Temeke, Kinondoni, and Ilala. Dar es Salaam is the wealthiest region in Tanzania. It is also the most densely populated region with 3,133 people per square mile, and population growth rate of 5.6%. The region has the population of 4,364,541 according to the 2012 national census²⁶.

Dar es Salaam is one of the cities that have a good number of private pharmaceutical companies that engage in selling products to the public hospitals. The region has thirteen (13) public hospitals, four of them are military hospitals and these are, National Service Medical Centre, Police Kilwa Road Medical Centre, Tanzania People Defence Force Head Quarter-Medical Services and Lugalo General Military Hospital. There are two specialized hospitals namely, Ocean Road Cancer Institute and Muhimbili Orthopaedic Institute. Other hospitals are, Muhimbili National Hospital (MNH), Mwananyamala, Temeke, Vijibweni, Amana, Sinza, and Comprehensive Community Based Rehabilitation of Tanzania (CCBRT). MNH is a national referral hospital that is managed by the Ministry of Health and Social Welfare. Mwananyamala, Temeke, Vijibweni, Amana, and Sinza hospitals these are managed by the Prime Minister's Office and Local Government (PMOLG) and CCBRT hospital is a Non-Governmental Organization hospital. All these hospitals apart of procuring medicines from private suppliers they also procure medicines from MSD, the centralized procurement agency.



Figure 3: Map of Dar es Salaam region

3.2 Methodology

3.2.1. Survey methods

The survey methods were based on the WHO/HAI medicines price survey methodology (WHO/HAI, 2003). Some key aspects were modified to suit this study. The modified aspects, this study focused only in the hospitals procurement rather than patients purchasing price and affordability and there is additional of medical supplies in the assessment, further more only twenty essential medicines were assessed for procurement prices instead of forty that were recommended in the WHO/HAI medicines price survey methodology.

3.2.2. Study Design

The study is an explorative cross-sectional survey where both quantitative and qualitative approaches were used to gather the data. Quantitative approach was used to gather data about procurement price and availability of medicines in the selected public hospitals; while the qualitative approach (in-depth interview) was used to gather data on distribution systems from both the centralized and decentralized procurement systems. By combining both qualitative and quantitative methods, detailed information was obtained to address the objectives of the study³⁶.

3.2.3. Survey setting

The medicines price survey was conducted to obtain the baseline assessment of the current level of hospital procurement prices at the centralized and decentralized markets. Data of availability of medicines in the hospital on the day of the survey was used to assess the availability of medicines to all hospitals. The in-depth interview and documentary search were used to understand the implication of implementation of medicines policy, general pharmaceutical management, and policy regarding the public procurement, order fulfilment rate and suppliers lead time.

3.2.4. Survey period and durations

The survey was conducted from March to April, 2013. Prior to data collection, communication was made to the Hospital Health Secretary, to plan the survey schedule in order to ensure good cooperation. The principal investigator visited the hospitals recorded data and conducted in depth interview with a support of hospital pharmacists.

3.3. Study Population

3.3.1 Sample size

The study populations were the public hospitals available in the Dar es Salaam region. Seven hospitals were involved in this study from the three municipal councils; Temeke, Ilala and Kinondoni. Selection of these hospitals was based to level of diseases management, accessibility and availability of the research data.

3.3.2 Sample selection criteria

Dar es Salaam City has thirteen (13) public hospitals, four of them are military hospitals and the other two are specialised hospitals. These military hospitals apart from getting funds from Ministry of Health and Social Welfare they also get funds from parent ministry. To avoid bias on procurement power, the military and specialized hospitals were not involved in this study because of having different management setup of health management services, although both of them receive funds for medicines procurement from MoHSW and procure medicines from MSD. Medicines used in the specialized hospitals are atypical to those used in general hospitals therefore these two specialized hospitals were as well not involved in the study. Seven hospital with same disease management and source of funds were selected in this study, and these were; Muhimbili, Mwananyamala, Temeke, Vijibweni, Amana, Sinza, and the Comprehensive Community Based Rehabilitation of Tanzania (CCBRT). These hospitals have the same health services management, and disease management are typical, and medicines data are available and the hospitals are accessible. Medicines and related pharmaceutical products used in these seven selected hospitals are almost the same. These hospitals also receive funds from the government and they practice both the centralized and decentralized medicines procurement systems as well as having the same supply and

distribution system. These hospitals are allocated within Dar es Salaam city therefore easier to be visited for less than three hours by private or public transport.

3.3.3. Inclusion criteria

This study includes all hospitals in Dar es Salaam city that receive funds only from MoHSW and use their own sources of funds to procure medicines from centralized and decentralized procurement systems.

3.3.4. Exclusion criteria

Hospitals that receive funds from MoHSW and from other Ministries to procure medicines in the centralized and decentralized procurement systems were not included in this study to avoid bias on funds availability for medicines procurement. Specialized and military hospitals were not included in this study because they are not practicing in the same way as other selected hospitals and difficulties in accessing the information. Public hospitals that have similar health services as well as disease management but are not in the Dar es Salaam city were not involved in this survey.

3.4. Tools and Data collection

Medicines price collections forms (Appendix D) were used to collect data of medicines prices which the hospitals had procured from decentralized procurement system. Medicines price data were gathered from invoices and quotations available in the hospital on the day of survey. Maximum of five quotations or invoices per order from suppliers were used to calculate procurement prices from Decentralized Procurement System. Availability of medicines in the day of survey was collected by availability forms (Appendix E). The in-depth interview guide questions (Appendix F) were used for gathering information from informants regarding the implementations of medicines policy, general management of medicines in the hospital, process of medicines procurement and order fulfilment rate and suppliers lead time. The in-depth interview was conducted by interviewing key informants. The informants in this study were the Medical officer in-charge/Hospital Director, Pharmacist In-charge of the hospital and hospital procurement officers. These three cadres

were selected due to their roles and responsibilities in the medicines management, procurement, and storage and distribution process.

3.4.1 List of selected medicines for study

The basket contained forty (40) indicator products. Indicator medicines in the basket were those medicines and medical supplies that are used in the management and treatment of common acute and chronic conditions that cause substantial morbidity and mortality among the populations. These medicines are usually recommended, as first-line courses or second lines of treatment in National Treatment Guidelines (Table 1). The source of medicines and medical supplies in the basket included tracer medicines from Health Management Information System (HMIS) of Tanzania Mainland ³⁷ (Annex A), and medicines that are required to be reported monthly for their availability at the health facilities in Tanzania (Annex B). The basket also considered the standard list of WHO model to allow the comparison ³⁸. The WHO Model Lists of Essential Medicines are updated every two years since 1977. The current versions are the 17th WHO Essential Medicines List for Adults and the 3rd WHO Essential Medicines List for Children updated in March 2011 ^{39,41}. These two models have been used as a baseline guide in selecting medicines in the basket.

Table 1: List of selected medicines and medical supplies in the basket

SN	Category of medicines	SN	Category of medicines
	Amoebicides		Antipyretics
1	Metronidazole Tablets	23	Paracetamol Tablets
2	Metronidazole injection		Ant-malarial
	Ant-asthmatics	24	Quinine injection 300mg/ml
3	Aminophylline tablet	25	Quinine Sulphate Tablet 300mg
4	Salbutamol aerosol		Correcting sugar and water electrolytes and acids
5	Magnesium Suphate Injection	26	Oral Rehydration Salts Sachets for one litre
	Anthelmethics		
6	Albendazole Tablets	27	Dextrose 5% or dextrose normal saline
7	Mebendazole Tablets		Diuretics
	Antibacterial	28	Frusemide Tablet
8	Amoxicillin Capsules	29	Atenolol Tablet
9	Amoxicillin suspension		Iron deficiency anaemia
10	Co-trimoxazole Tablets	30	Ferrous + Folic Acid Tablets
11	Co-trimoxazole suspension		Medical supplies
12	Benzyl Penicillin Injection	31	Mackintosh
13	Gentamycin Injection	32	Hospital Gauze
14	Ceftriaxone Injection	33	Cotton wool
15	Chloromphenicol injection	34	Syringe 5cc
16	Ciprofloxacin Injection	35	Catgut Sutures 2/0
	Anti-diabetic	36	Surgical Glove
17	Chlopropamide Tablet	37	Examination Gloves
18	Metformin Tablet		Oxytocics
19	Insulin Human Injection	38	Ergometrine Injection
	Antifungal	39	Oxytocin Injection
20	Fluconazole Tablets	40	Misoprostol Tablets
	Anti-hypertensive		
21	Captopril Tablet		
22	Hydralazine Tablet		

3.4.2 Data collection tools

Medicines price and availability forms were used to collect quantitative information. The form describes the name of hospital, address, date of visit, name of data collector and the

name and details of the person who provided the data information. The price collection forms (annexed D), described, medicines names, strength, pack size, MSH-IPR (unit price in Tsh), MSD individual medicines unit price of 2011. The forms were also used to record prices of individual medicines per single different suppliers in the hospital. The availability collecting form (Annex E) described the following; medicines name, strength, pack size, the status of medicines availability during the day of visit with the respond of 'YES'= 1, for availability and 'NO'= 0, for not available, and the number of days where medicines were stocked out in the hospital for the period of six months.

In-depth interview was used to gather information from key personnel on implementation of medicines policy for the component of medicines pricing, control and procurement process. The specific objectives also analyzed, pharmaceutical management, supply and distribution practices as well as information on supplier efficiency on order fulfilment rate and suppliers lead time. The guide and probed questions were prepared to obtain detailed information for the purpose of this study (Annex F).

3.4.3 Data Collection Procedure

Data collection was conducted from 10th, march to 29th, April, 2013. Before initiating data collection activities, an appointment was made to the Hospital Health Secretary three days before the day of visit. By working one day per site, the principal investigator could perform quality checks of the data collected from the informants.

3.4.3.1 Quantitative data collection procedure

Medicines price collection forms were used to gather the data of medicines price form suppliers in the surveyed hospitals (Annexed D) for the record of financial year of July, 2011 to June, 2012. The criterion used to select quotations was based on the availability of suppliers quotations placed at the hospitals against the invoices or LPO of the same order for medicines that were revived in the hospital. A minimum of five quotations were selected for price determination. Invoices and quotations from non-registered private pharmaceutical wholesalers were not considered in data collection for this study to avoid bias of the overall findings, quality and prices of medicines obtained from these sources are not unified. Data for medicines prices from the centralized procurement system were obtained from MSD catalogue (2011/2012) and MSD sales invoices for the period of July, 2011 to June, 2012. Medicines supplied largely through donations or externally funded by vertical programs, such as antiretroviral, vaccines or tuberculosis medicines, were not included in this study. These kinds of medicines do not indicate the typical functioning of the centralized and decentralized procurement systems.

Information on medicines availability in the health facility was collected by using a designed form (Annex E). Number of days in which medicines were out of stock was recorded for the period of the past six months prior to the day of the survey. Availability and stock out of medicines were conducted by inspecting available stocks in shelves and ledger books or stock cards for the period between financial year from July, 2011 to June, 2012. Medicines availability was inspected and counted on the day of the survey. Number of days in which medicines were stocked out for the period of six months were counted from the ledger books or stock cards and recorded in the availability form. The medicines were considered available if it had less than seven days for stock out. Number of days in which medicines were stocked out within six months was calculated and converted in to equivalent the number of days per year.

Formula:

$$\text{Equivalent number of days Medicines were out of stock} = \frac{\text{Number of days medicines were out of stock} \times 360}{182}$$

3.4.3.2 Qualitative data collection

In-depth interviews, were used to gather the information on the implementation of medicines policy for the component of medicines pricing, control and procurement process. The specific objectives also involved assessing the pharmaceutical management, including medicines distribution, efficiency in order fulfilment rate and suppliers lead time. The main issues that were probed are:

- The laws governing public procurement, implementation of medicines policy for the component of medicines pricing, control, and procurement process
- Source of funds for medicines procurement
- Medicines management, storage, supply and distribution
- Quality of medicines, order fulfilment rate, and suppliers lead time in the centralized and decentralized procurement systems.

The study respondents for qualitative information were, Medical Officer In Charge or Hospital Directors, Pharmacists, and Procurement Officers of the hospital. The guide and probed questions were prepared to obtain detailed information (Annex F).The study respondents were sixteen and their numbers have shown in the table below:

Table 2: Number of respondents from study hospitals

Hospital Name	Director/Medical In charge	Pharmacist/Pharmaceutical Technician	Supplies Officers
Temeke	1	1	1
Amana	1	1	1
Vibweni	1	1	0
MNH	0	1	1
CCBRT	1	1	0
Sinza	1	1	0
Mwananyamala	1	1	0
Total	6	6	4

3.4.3.3 Pre-testing of data collection tools

To provide an opportunity for refining the study objectives and data collection tools, a pilot study was conducted in Morogoro region hospital. The hospital is located in Morogoro municipal and has similar characteristics with the selected public hospitals for the study in Dar es Salaam region. Some changes in guide questions were made to suit with this study. The pilot improves the study by reducing number of guide questions and the interview questions were structured according to interviewed cadres.

3.5. Study variables

The variables in this survey were availability of medicines in the hospitals, average stock out days, the prices of Centralized and Decentralized procurement systems, policy for medicines pricing, price control and medicines procurement process, medicines management and distribution process, quality of medicines, order fulfilment rate and suppliers lead time.

3.6. Data management and Analysis

3.6.1 Data management

Several validation and data checking steps during and after collection were done to ensure data quality. If any of the important information were missing, a follow up by visiting or telephone calls were made to obtain missing information. Data were first cleaned and entered in Excel 2007 on daily basis followed by transformation to SPSS Version 20 for analysis.

3.7. Data Analysis

Data analysis was done through SPSS Version 20. The frequency distribution, minimum and maximum, Median, 25th and 75th percentile were used to show distribution outcome and explanatory of the variables. The median test was done to compare the median outcome of the results. The differences on prices and MPRs of the procurement systems were considered statistically significance if the p-value is less than 0.05 ^{40, 41, 44}. The T- test as well was done for comparison and the results were the same.

In-depth interview responses were analyzed manually according to informants' responses. Major and subtopics were listed in the data sheet then for each of the subtopics, the responses for each informant were recorded. The information from respondents was then combined for analysis. The number of same responses was gathered together for reporting.

3.7.1. Availability of medicines in the surveyed hospitals

Proportion of medicines available in the basket at the facility was determined. Availability was classified as: Absent (0%), Very low (less than 30%), low (30%-49%), fairly high (50%-80%), and high (greater than 80%). Availability was reported as the percentage of medicine in the hospital where a medicine was available on the day of the survey ⁴⁵ (table 2).

Table 3: The criteria used to describe the availability of essential medicines in the hospitals.

SN	Level of availability	Categories
1	Absent 0%	Medicine was not found in any of the surveyed hospitals
2	Less than 30%	Very low
3	30% - 49%	Low
4	50% -80%	Fairy high
5	Greater than 80%	High

The average numbers of stock-out days of medicines in the facility were reported as “**median average stock-out days of essential medicines per year in the facility on the day of data collection.**”⁴⁶.

3.7.2. Analyzing price from suppliers

The price of essential medicines and medical supplies in the basket were analyzed. Median price from the three categories, centralized, decentralized and international reference prices were calculated. Maximum of five quotations were reviewed for decentralized procurement prices. The median figure was used in comparison with the other two prices, i.e. MSH-IRP and MSD procurement prices.

- The local unit price for each essential medicine in the basket were calculated and recorded in the price collection form to determine the median unit price of each medicine.
- Price for decentralized procurement was calculated to median. All prices were computed to local currency ⁴³.
- The Median Price Ratios (MPRs) for each medicine of the decentralized to international reference prices, centralized to international reference prices, and decentralized to centralized procurement systems were calculated to evaluate the volume magnitude for price comparison for the three categories of medicines prices. The ratio of equal to 1 means there is no difference in the

prices, the ratio of less than 1 means the decentralized price is less and the ratio of greater than 1 the decentralized prices is high ⁵⁵.

- Variations in prices and MPRs across the all procurement categories were determined, using the 25th/75th percentiles and the maximum and minimum values.

Calculation of Price Indicators

- Median local price of each medicine from all price categories for the medicines which price data were available. (For international comparison: 1 USD dollar to Tsh 1501, average exchange rate of (2011/2012) was used.
- Median price ratios of decentralized to international reference price for international comparison for decentralized procurement prices.
- Median price ratio of centralized to international reference prices for international price comparison of centralized procurement prices.
- Median price ratios of decentralized to centralized for local prices comparison.
- Variation in price and MPRs across all categories of prices, 25th / 75th percentiles and maximum and minimum values.

Calculating the median price ratio (MPRs) ⁴⁰

MPR (Decentralized median price/international reference price)

$$= \frac{\text{Decentralized median procurement prices}}{\text{International Reference Price}}$$

MPR (Centralized price/international reference price)

$$= \frac{\text{Centralized median procurement prices}}{\text{International Reference Prices}}$$

MPR (Decentralized median procurement price/centralized price)

$$= \frac{\text{Decentralized median procurement prices}}{\text{Centralized median procurement prices}}$$

3.7.3. The centralized and decentralized procurement prices and MPRs

The medicine prices per pack size were converted to unit prices of the centralized and decentralized procurement. The median unit price of international reference was available from MSH-IRP. To calculate magnitude of variation in prices, MPRs were determined by dividing decentralized median price of each medicine to the centralized unit price and international reference price. Price for centralized procurement was collected from MSD fixed price catalogue of 2011/2012.

3.8. Study limitations

The exploration cross sectional study collects data at one point in time. The availability of medicines in the hospitals was assessed in one day survey and the stock-out days were counted for the past of six months to the day of survey, some data were missed for some medicines. Consequently, some hospitals may usually have a product in stock but it may be out of stock on the day of the survey. For assessing procurement prices, price data for about 20 products were not available for comparison. Ten products were not found in the MSH-IRP median price list of 2011, therefore were not analyzed in procurement prices. One product were not available in MSD price catalogue of 2011/12 and nine products prices from the decentralized markets were not found, also these products were not considered during analysis of procurement prices. Thus only 20 products were analyzed for decentralized, centralized and international references procurement prices in this study.

3.9. Ethical considerations

Ethical approval to conduct the study was obtained from Muhimbili University of Health and Allied Sciences' (MUHAS) (Annex G). In addition, Principal Investigator received a letter of introduction to the surveyed hospitals, i.e. Muhimbili, CCBRT, municipal councils of Temeke, Ilala, and Kinondoni (Annex H, I, J, K, L M).

Consent form was prepared explaining the objectives and confidentiality concerning the study. Participants were required to read the consent form before engaged in the study (Annex N). Contact information was provided in the letter for any concerns or explanation.

In order to ensure confidentiality, no names of interviewees were recorded in the in-depth interview guide. Data were entered into the computer Microsoft excels 2007.

CHAPTER FOUR

3.0. RESULTS

4.1. Quantitative data collections

4.1. 1. Availability of Medicines in the surveyed hospitals

4.1.1.1. Percentage of medicines which were available in surveyed hospitals

This survey revealed that, median availability of medicines in the basket on the day of survey was 72.5%, ranged between 50% (fairly high) to 87.1% (high), (Table 3 and Figure 2). The availability was fairly high at Vijibweni hospital and high at Muhimbili National Hospital with availability of 50% and 87.1% respectively. For the seven hospitals surveyed, three hospitals, availability were high and for the rest were fairly high. During the day of survey, 20 (50%) products in the basket were not available at Vijibweni hospital.

Table 4: Summary of percentage availability of medicines in the basket in the surveyed hospitals (N=7)

Level availability	Number(N)	Percentage (%)
Less than 30% (very low)	0	0%
30% - 49% (low)	0	0%
50% - 80% (fairly high)	4	57.1%
Greater than 80%(high)	3	42.9%
Total	7	100%

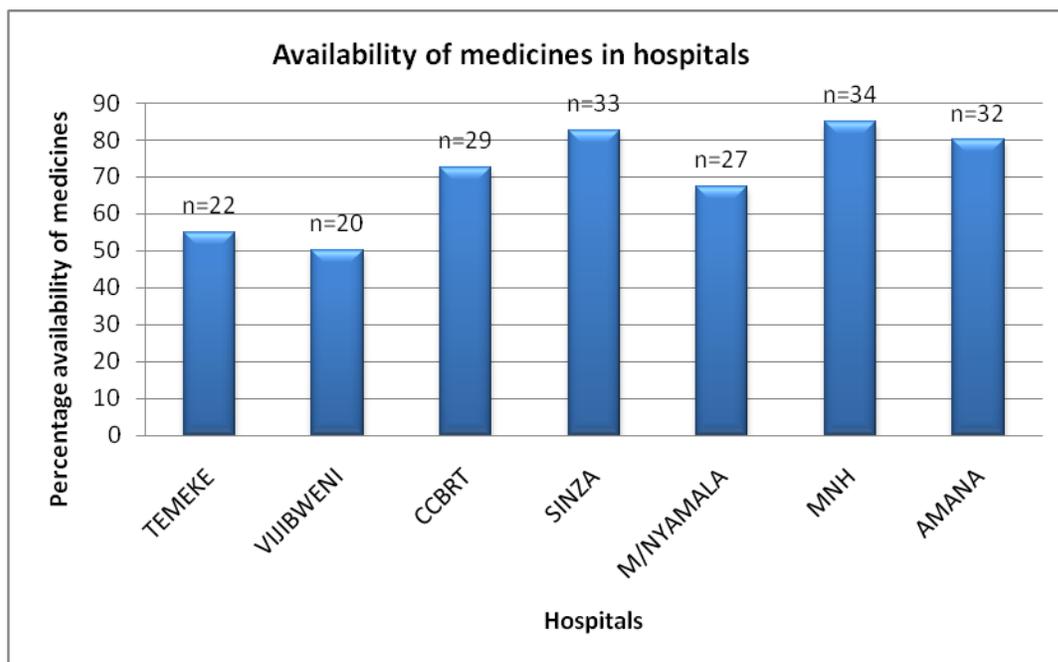


Figure 4: Percentage availability of medicines in the surveyed hospitals.

4.1.1.2. Availability of individual medicines in the surveyed hospitals during the day of survey

Medicines and medical supplies in the basket were classified as vital, essential and non-essential (Table 4). According to the interview conducted in this study it was revealed that, funds allocated from government to hospitals for medicines procurement are not sufficient and its disbursement is erratic. Due to limitation of resources, hospitals are advice to stock medicines by VEN analysis.

Table 5: Availability of individual medicines in the served hospitals in Dar es Salaam

Availability of individual medicines in the hospitals on the day of survey classified by VEN analysis							
SN	Medicines products	VEN	% Availability	SN	Medicines products	VEN	% Availability
1	Amoxicillin Caps	V	100	1	Metronidazole Tabs	E	100
2	Quinine injection	V	100	2	Paracetamol Tablets	E	100
3	Dextrose 5%	V	100	3	Ferrous + Folic Acid Tablets	E	100
4	Surgical Glove	V	100	4	Examination Gloves	E	100
5	Oxytocine Injection	V	85.7	5	Metronidazole injection (Vial)	E	100
6	Benzyl Penicilline Injection	V	85.7	6	Mackintosh	E	100
7	Chloramphenicol injection	V	85.7	7	Hospital Gauze	E	100
8	Aminophyline Tabs	V	85.7	8	Cotton wool	E	100
9	Insulin Human Injection	V	85.7	9	Mebendazole Tablet	E	85.7
10	Magnesium Suphate Injection	V	71.4	10	Fluconazole Tablets	E	85.7
11	Cat gut sutures 2/0	V	71.4	11	Albendazole Tablet	E	71.4
12	Quinine Sulphate Tablet	V	57.1	12	Co-tromoxazole Tabs	E	71.4
13	Gentamycin Injection	V	57.1	13	Syringe 5cc	E	71.4
14	Hydralazine Tablet	V	57.1	14	Amoxicillin Suspension	E	57.1
15	Frusemide Tab	V	57.1	15	Co-tromoxazole Suspension	E	57.1
16	Ergometrine Injection	V	28.6	16	Oral Rehydration Salts	E	57.1
17	Ciprofloxacin injection	V	14.2	17	Metformin Tab	E	57.1
18	Chlopropamide Tab	E	42.8	18	Captopril Tablet	E	57.1
19	Ceftriasone Injection	E	42.2	19	Atenolol Tab	E	57.1
20	Misoprostol Tablets	E	28	20	Salbutamol Aerosol	E	42.8

Abbreviations: E= Essentials medicine, V= vital medicine, N = non – Essentials medicine

The median percentage availability of the vital items in this survey was 85.7% with the minimum of 14.2% to maximum of 100% (ranging from 14.2% for Ciprofloxacin injection that was available in only one hospital to 100% availability of Amoxicillin caps, quinine injection, dextrose 5% and surgical glove). Ergometrine injection was available in two hospitals (Table 4). The 25th and 75th percentile of availability are 57.1% and 92.85% respectively. Median test shows that, the average of availability of vital medicines are the same across all surveyed hospitals ($p= 0.785$) (Table 5).

Table 6: Comparison of availability of category of medicines in surveyed hospitals

Sn	Category of medicines	Min	Max	Median	25 th percentile	75 th percentile	P-value
1	Vital	14.2%	100%	85.7%	57.1%	92.85%	0.785
2	Essential	28.0%	100%	71.4%	57.1%	100%	

The median availability of essential medicines in this study was 100%, ranging from 28% availability of misoprostol to 100% of availability of the other medicines in the basket. The 25th and 75th percentile availability of the essential medicines was 57.1% and 100% respectively. Median test shows that, the average of availability of essential medicines are the same across all surveyed hospitals ($p= 0.785$). The data analysis shows that essential medicines were high available across all the hospitals with 75 percentile of 100% across all hospitals. Statistics show no significance difference in median availability of vital and essential medicines across the hospitals (Table 5).

4.1.1.3. Stock-out days of medicines and medical supplies in the surveyed hospitals

Among the 40 selected products in the basket, the average median stock-out days per year was 97.2 days (ranging from 53.7 to 119.9 days). Stock-out days was low at Amana hospital and high at Temeke hospital (Figure 3 and Table 6).

Table 7: Average stock-out days of medicines and medical supplies in the surveyed hospitals

Sn	Name of Hospital	Average stock out days
1	Vijibweni	97
2	Temeke	119.9
3	CCBRT	101.5
4	Sinza	57.7
5	Mwananyamala	88.7
6	MNH	110
7	Amana	53.7

The result shows that ergometrine injection, ciprofloxacin injection and frusemide tablets were not available in all of the surveyed hospitals for the period of one year. Ciprofloxacin injection was not stocked at MSD during the period of survey and was not available in the MSD catalogue. Information from the respondents indicates that, frusemide tablets, Misoprostol tablets, Amoxicillin and co-trimoxazole suspension were not available at MSD during the time of survey.

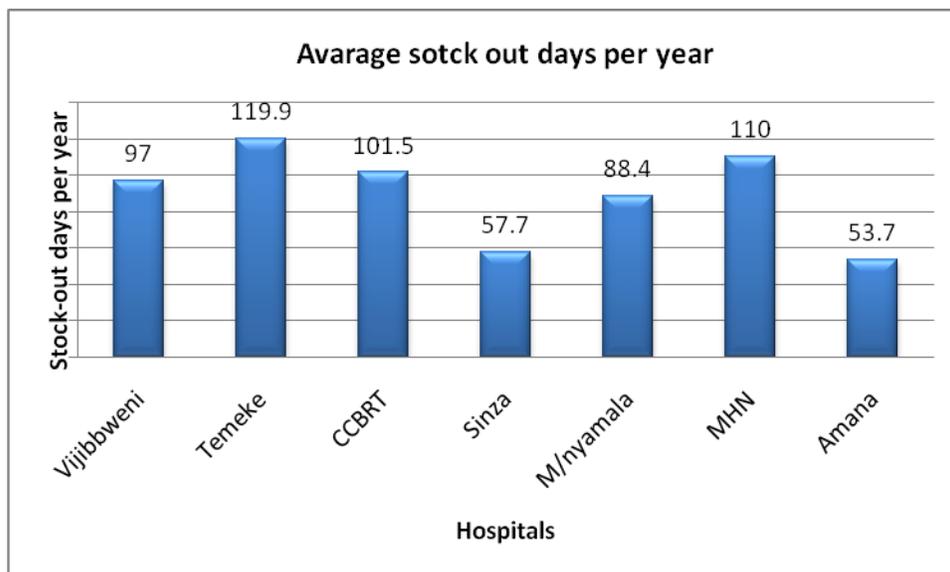


Figure 5: Average stock-out days of medicines in the surveyed hospitals

The median stock out days of 97.2 days per year for the past six months is high regarding the fairly high availability during the day of survey. The statistical test shows that the average stock out days is the same across all surveyed hospitals (Table 7).

Table 8: Stock out days of medicines median non parametric test

Minimum	Maximum	Median	25 th percentile	75 th percentile	p-value
53.0	119.9	97	57.1	57.1	0.321

4.1.2. Price of medicines in the centralized and decentralized procurement systems

Medicines price data in the basket were collected in hospitals from both the centralized and decentralized procurement systems. Medicines prices for the centralized procurement were collected from the MSD catalogue and invoices that were available at the hospital. Prices of medicines from decentralized were collected through supplier's invoices and quotation documents available at the hospital. Where invoices and quotations were not available, LPOs were used to generate medicines prices data for the decentralized procurement system.

The basket contained 40 products, but data collections managed to assess 20 products those prices were available for local and international comparison. Medicines were identified by VEN analysis. The decentralized prices from different suppliers were computed to median price for each product. The MSD price was collected from MSD catalogue, where the prices are constant. The MSH - IRP list was available for international prices comparison (Table 5). The results show that, dextrose 5% infusion procurement prices were low in the all procurement systems while misoprostol tablet was high in all procurement systems (Table 8, Figure 4 and 5).

Table 9: MSH-IRP median prices, MSD prices, and median prices of the decentralized procurement prices for the vital and essentials medicines

SN	Medicines Name	Strength	VEN Classification	MSH-IRP (2011) Unit Price (tsh)	MSD Unit Price (tsh) 2011/2012	Median Price of the decentralized procurement
1	Albendazole Tab	200mg	E	35.29	16	60
2	Amoxicillin Caps	250mg	V	25.12	30	35
3	Amoxicillin Suspension	125ml/5ml	E	7.02	7.92	7.8
4	Metronidazole Tabs	200mg	E	9.21	6	14.5
5	Fluconazole Tablets	150mg	E	95.63	85	360
6	Ferrous + Folic Acid Tablets	200+0.25mg	E	3.59	5.4	10
7	Oxytocine Injection	5IU/ml	V	163.8	370	390
8	Misoprostol Tablets	200mcg	V	614.48	400	700
9	Oral Rehydration Salts Sachets for one litre	Powder	E	162.86	110	250
10	Quinine Sulphate Tablet	300mg	V	81.74	70	175
11	Dextrose 5% / DNS	5%	V	2.18	0.98	1.9
12	Gentamycin Inj	40mg/ml	V	83.3	180	300
13	Magnesium Suphate Inj	500mg/ml	V	138.84	252	400
14	Ceftriasone Inj	250mg	E	667.68	750	650
15	Metronidazole inj (Vial)	5mg/ml	E	7.33	5	7
16	Metformin Tab	500mg	E	27.93	31	65
17	Captopril Tab	25mg	E	22.62	62	115
18	Hydralazine Tab	25mg	V	45.71	51	135
19	Frusemide Tab	40mg	V	69.11	52	25
20	Atenolol Tab	50mg	E	15.76	30	60

Abbreviations: E= essential medicine, V= vital medicine, N= non-essential medicines

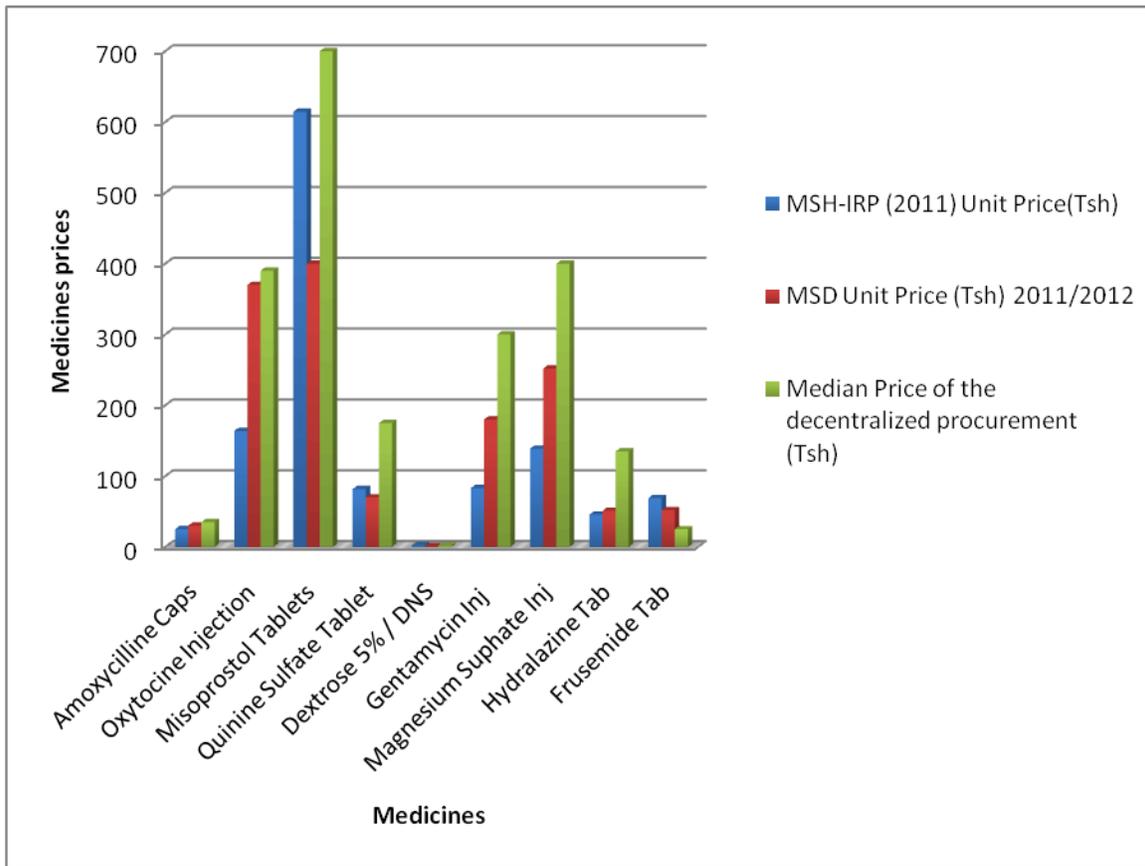


Figure 6: Procurement prices for the vital medicines in procurement systems

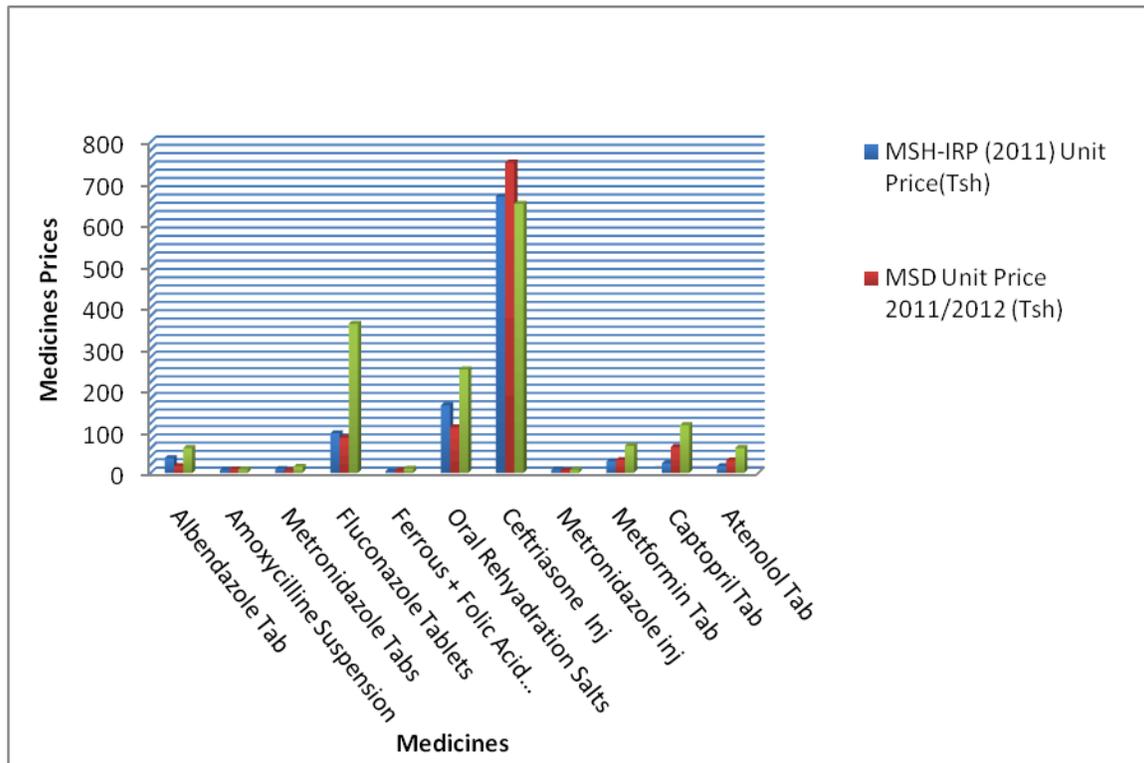


Figure 7: Procurement prices for the essential medicines in all procurement systems.

4.1.2.1 Comparison of procurement prices

4.1.2.1.1. International references prices, MSD, and decentralized procurement prices

The median procurement prices of international reference prices, MSD, and Decentralised procurement were 40.5, 51.5 and 90.0 with minimum of 2.18, 0.98, and 1.9 while the maximum were 667.7, 750 and 700 respectively (Table 8). The 25th percentile of the international reference prices, MSD, and decentralised procurement were, 10.85, 9.9 and 17.13 while the 75th percentile was 128, 162, and 345 respectively. The median and T- test shows that, there is no statistical significance difference in the median prices across all procurement prices. (Table 9). This means that there is no significance difference in procurement prices through the three procurement systems.

Table 10: Comparison of procurement prices

Sn	Category of price	Mean	Median	25 th percentile	75 th percentile	T-test p-value	Median test p-value
1	MSH-IRP vs. MSD	113.96	40.5	10.85	128.04	0.844	0.752
2	MSH-IRP vs. Decentralized	125.72	55.5	9.94	162.5	0.252	0.752
3	MSD vs. Decentralized	188.06	90.0	17.13	345	0.335	0.752

4.1.2.1.2. Median MPR of the decentralized procurement to the median international reference prices.

The median MPR of the decentralised procurement to the international reference prices was 1.92 times the international reference prices (ranging from 0.36 – 3.76) with 25th and 75th percentiles of 1.1 and 2.9 respectively (Table 7). Median and T- test shows that, there is statistical significance difference in the MPRs of the two in procurement prices with p-value of 0.027 and 0.004 respectively (Table 10). This means that prices are not the same in these procurement systems. In this basket containing twenty products, four (20%) products, i.e. Frusemide tablet, Amoxicillin suspension, ceftriaxone injection, and Metronidazole injection, the MPR were equal and below to one. Sixteen (80%) of products from the basket has the MPR of greater than one, emprises that, the decentralised prices of these products are greater than the international procurement prices (Figure 6 and 7). From this finding we can say that more products will be procured in the international procurement system and less from the decentralised procurement system.

Table 11: Median Price Ratio for each medicine in surveyed hospitals for decentralised to centralised and international references prices

SN	Medicines Name	Strength	VEN	MPR = Decentralized Median Price/MSH-IRP	MPR = Centralized price/MSH- IRP	MPR = Decentralized Median price/Centralized price
1	Albendazole Tab	200mg	E	1.70	0.45	3.75
2	Amoxicilline Caps	250mg	V	1.39	1.19	1.17
3	Amoxicilline Suspension	125ml/5ml	E	1.11	1.13	0.98
4	Metronidazole Tabs	200mg	E	1.57	0.65	2.42
5	Fluconazole Tablets	150mg	E	3.76	0.89	4.24
6	Ferrous + Folic Acid Tablets	200+0.25mg	E	2.79	1.50	1.85
7	Oxytocine Injection	5IU/ml	V	2.38	2.26	1.05
8	Misoprostol Tablets	200mcg	V	1.14	0.65	1.75
9	Oral Rehydration Salts	Powder	E	1.54	0.68	2.27
10	Quinine Sulphate Tablet	300mg	V	2.14	0.86	2.50
11	Dextrose 5% / DNS	5%	V	0.87	0.45	1.94
12	Gentamycin Inj	40mg/ml	V	3.60	2.16	1.67
13	Magnesium Suphate Inj	500mg/ml	V	2.88	1.82	1.59
14	Ceftriasone Inj	250mg	E	0.97	1.12	0.87
15	Metronidazole inj (Vial)	5mg/ml	E	0.95	0.68	1.40
16	Metformin Tab	500mg	E	2.33	1.11	2.10
17	Captopril Tab	25mg	E	5.08	2.74	1.85
18	Hydralazine Tab	25mg	V	2.95	1.12	2.65
19	Frusemide Tab	40mg	V	0.36	0.75	0.48
20	Atenolol Tab	50mg	E	3.81	1.90	2.00

Abbreviations: E= essential medicines, V= vital medicines, N= non- essential medicines

4.1.2.1.3. Median MPR of the centralized procurement to the median international reference price

The median MPR of centralised procurement to the international reference prices was 1.1 times the international reference prices (ranging from 0.45– 2.74) with 25th and 75th percentiles of 0.68 and 1.74 respectively (Table 10). Median and T- test shows that, there is no statistical significance difference in the MPRs of the two systems in procurement prices with p-value of 0.46 and 0.96 respectively (Table 11). This means that prices are the same in these procurement systems. The median MPR of the ten (50%) products were less than one, i.e. Misoprostol tablets, Dextrose 5% infusion, Quinine tablets, Frusemide tablets, Amoxicillin suspension, Metronidazole tablets, Fluconazole tablet, ORS, Metronidazole injection, and Metformin tablets (Figure 6 and 7).

Table 12: Comparison of MPRs

Sn	Category of MPRs	Mean	Median	25 th percentile	75 th percentile	T-test p-value	Median test p-value
1	Decentralised vs. MSH-IRP	2.16	1.92	1.1	2.9	0.004	0.027
2	MSD vs. MSH-IRP	1.2	1.1	0.68	1.74	0.49	0.96
3	Decentralized vs. MSD	1.92	1.85	1.23	2.38	0.007	0.027

4.1.2.1.4. Median MPR of the decentralized procurement to the centralized procurement prices

The median MPR of the decentralised procurement to the centralised procurement prices was 1.85 higher times the centralised procurement prices (ranging from 0.48– 4.24) with 25th and 75th percentiles of 1.28 and 2.38 respectively (Table 10). The median and T- test shows that, there is statistical significance difference in the MPRs of the two system in procurement prices with p-value of 0.027 and 0.007 respectively (Table 11). The MPR of three (15%) products were below the cut off point of MPR = 1, i.e. Frusemide tablets, Amoxicillin suspension, and Ceftriaxone injection (Figure 6 and 7).

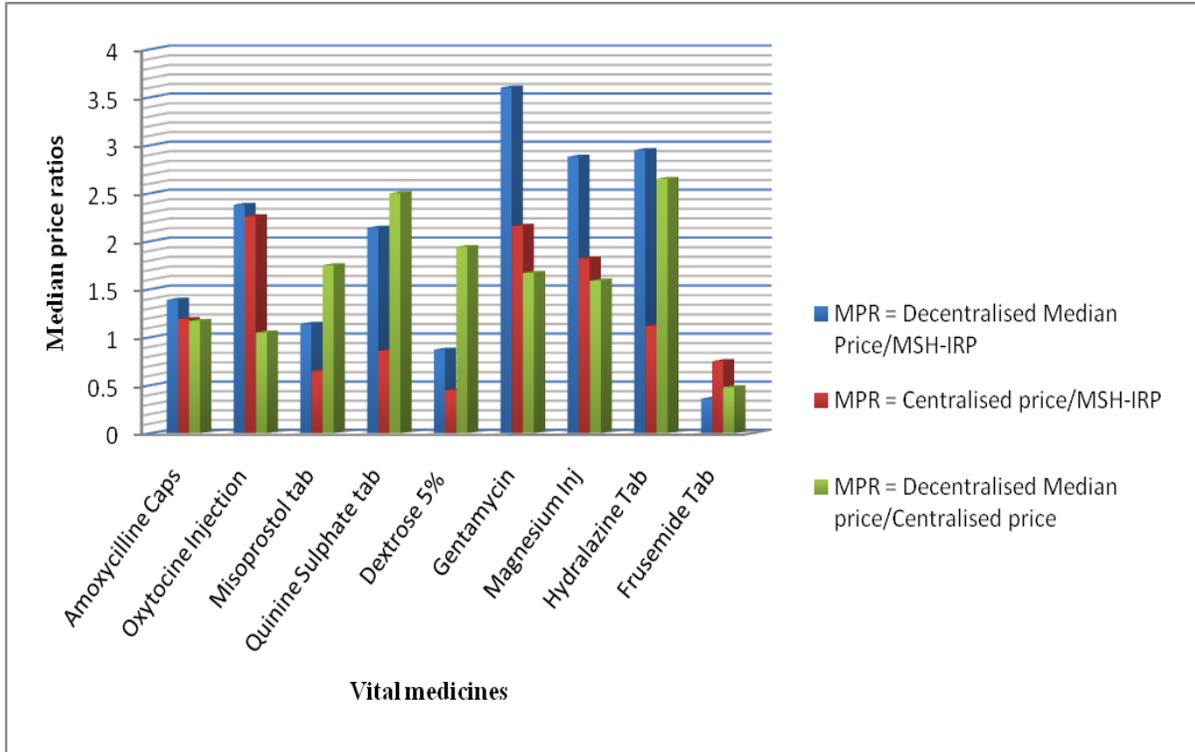


Figure.8: Price Ratio for vital medicines

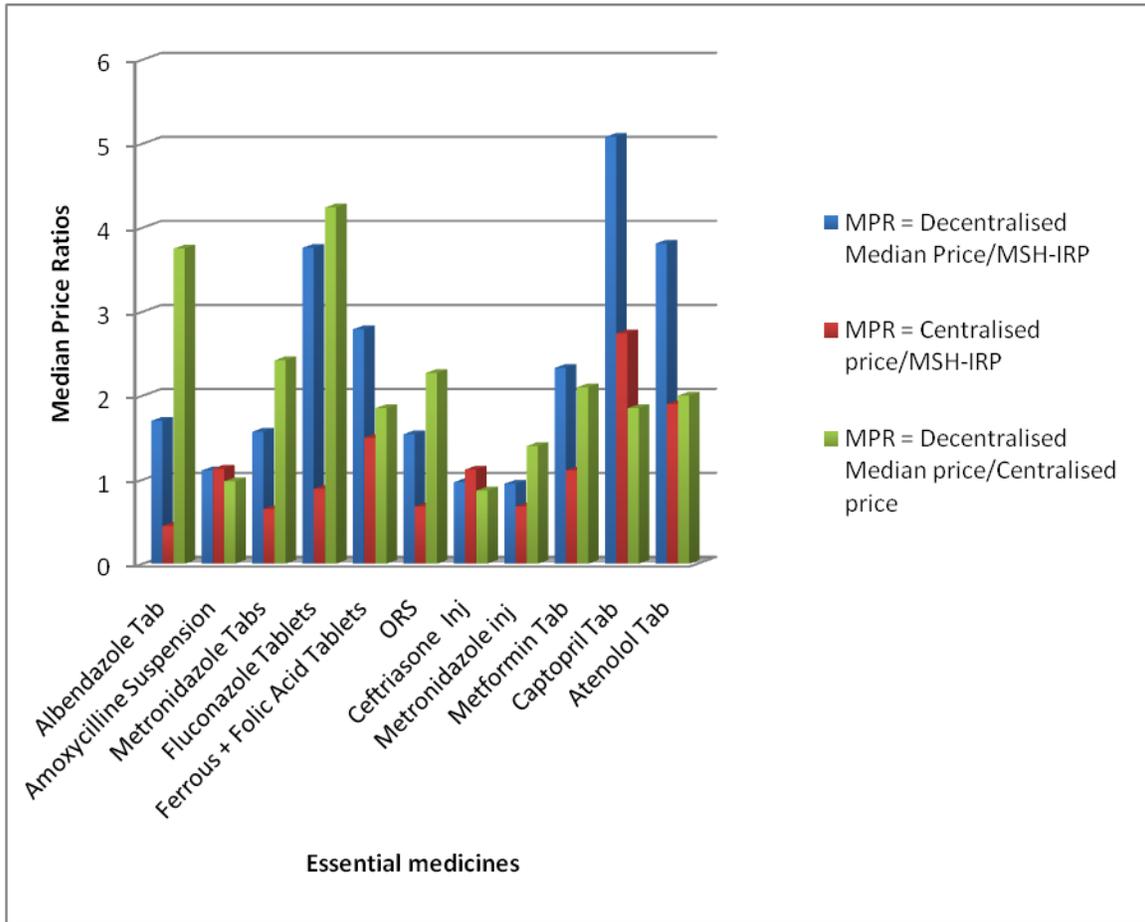


Figure 9:Price Ratio for essential medicines

4.2. Qualitative data collections.

4.2.1. Characteristics of the respondents

The number of respondents to in-depth interview was sixteen (16) personnel, i.e. medical officers (5), hospital directors (2), hospital pharmacist (6), pharmaceutical technician (1) and supplies officers (2).

4.2.2. The laws governing public procurement

Sixteen (16) respondents from this research revealed that, all hospitals have functional tender bodies and PMU at municipal level, among these hospitals, one of the referral hospitals has a functional Tender Board. One hospital belonging to non-governmental organization has the Procurement and Supplies department instead of Tender Board which is responsible for managing all public procurement process. One of the Medical Officer in-charge from government hospital said that: *“We have a tender board and functional procurement management unit at the municipal level, the hospital as the user department is required to provide specifications for the procured items from decentralized procurement system to the PMU”* .

This study found that, the decentralized procurement process in the municipals is conducted through the pre-qualified suppliers. Contrary to this, the decentralized procurement at one of the referral hospital is conducted within the hospital because the Tender Board and PMU are within the hospital. The Hospital Director of this referral hospital said that: *‘We have fully functional tender board and procurement management unit in this hospital. One senior pharmacist has been attached to this procurement management unit to verify any procurement process that involves pharmaceuticals products. The Chairman and secretary to this tender board are within the hospital.’*. In one hospital managed by a non-governmental organization, the procurement process is conducted through the department of Procurement and Supplies’’. The study also found that, one hospital has no tender board at all, but the hospital has Procurement and Supplies department. The hospital director of this hospital said: *“We do not have tender board at the moment; instead we have a department of procurement*

and supplies that is responsible for all the centralized and decentralised procurement. The department adhered to all public procurement procedure laid down by Public Procurement act''.

4.2.3. Implementation of Medicines policy

Regarding the implementation of National Medicines Policy that forms the basis of government's responsibility to ensure access to good quality of medicines at affordable prices to the public. The National Medicines Policy is the commitment of the government to solve problems facing the pharmaceutical sector in the country. It forms a basis for planning, implementation, monitoring and evaluations in the pharmaceutical sector⁶. The information gathered from all hospitals reported that, the National Medicines Policy available is not updated. The last document was printed in 1991 and it was reviewed on 1997 then never updated to date. One of the junior Medical Officer in Charge of the hospital said that: *“Since I had been employed to public service, I had never held or happen come in touch with the document called National Medicines Policy at all”*.

4.2.3.1. Policy of medicines procurement process

Regarding policy of medicines procurement process, according to the information gathered, all respondents reported that there are no guidelines in place that outlines the process of medicines procurement in both public and private institutions. In the decentralized procurement, medicines are procured the same as procuring non medicines products. One of the principle pharmacists from the referral hospital said that: *“at the moment there is no policy or guidelines in place that outlines the process of medicines procurement in both the centralized and decentralized procurement systems. The guidelines in place in the hospital are Standard Treatment Guidelines and Hospital Formulary that we use as the guide in selecting medicines to be procured and use in the hospital”*.

4.2.3.2. Medicines pricing policy and control.

Regarding policy for medicines pricing and control, the information gathered from the informants reported that, there is no in place policy for medicines pricing and control. One of the Medical Officer In charge, said that: *“we don’t have up to date National Medicines Policy as well as policy for medicines pricing and control. I suggest that government should update medicines policy, the framework for implementation of pharmaceutical activities that will put in place policy for medicines pricing and control. In the decentralized procurement, prices of medicines goes far as three times of the centralized procurement due to lack of mechanism that control pricing mark-up, we need to unify medicines procurement prices”*.

4.2.3.3. Medicines procurement process

Regarding medicines procurement process, the respondents from the surveyed hospitals reported that, there is no policy that outlines the process of medicines procurement. Procurement at decentralized system is conducted only when medicines are not available at centralized system. Pharmacist has the role of initiating the decentralized procurement by providing a verified list of missed pharmaceutical products from the centralized procurement system to the PMU. The PMU has to raise up to seven quotations minimum of three from the different selected suppliers who have been pre-qualified by municipal or institution procurement tender board. The quotation need to be analyzed from their prices. Most of the time, winner to bid is selected based on the criteria of best history in supplying performance and the bid that is at lowest price. The quality and price of the product are given equal considerations when determining the factor for awarding tender. The winner will supply the products and delivery note signed by supplies officer and then LPO issued to the supplier for payment. This process is lengthy and more bureaucratic, as the result of this bureaucratic process affect the availability of medicines in the hospital. One of the senior procurement officer, said that: *“The decentralized procurement system is tedious and lengthy due to the involvement of so many actors in procurement process that resulted in taking several days to accomplish the procurement process”*.

4.2.4. Sources of funds for medicines procurement in the hospitals

4.2.4.1. Government allocations and other sources of funds

Regarding sources of funds for procurement of medicines and related medical supplies in the hospitals, the information gathered, reported that, mainly sources of funds are from the government allocations to MSD through the MoHSW. This study revealed that, the allocation is insufficient and erratic. Other sources of funds are government subsidies, Basket funds, Health Insurance Scheme as well as cost sharing. One senior medical officer in charge of the one hospital said that: *“the hospital receives funds from the government that are channelled directly from the Ministry of finance to MSD through MoHSW. This allocation is not sufficient enough and its disbursement is erratic. Once the funds are directly allocated to MSD. It is impossible to use these funds for procuring medicines from the decentralized system. We receive little funds from cost sharing and health insurance schemes, the guide allow us to utilize not more than 60% of the collected funds to procure medicines. The procurement process requires to be conducted at MSD first, when the medicines of interest are out of stock at MSD, the procurement can be conducted at the decentralized system where price of medicines are high. I recommend that, where possible, it would be better for the government to allocate at least 30% of the funds that allocated to MSD to come direct to the hospital for decentralized procurement when medicines are not available at MSD”*

4.2.4.2. Government direct allocations and availability of medicines at MSD

Regarding direct allocations of funds and availability of medicines at MSD, all respondents reported that, the allocations from government to the hospital account at MSD is not enough for procuring medicines. Medicines are not full supplied at MSD. The order fulfilment rate always is below 80%. One of the principle pharmacists from referral hospital said that: *“Funds that are direct allocated to MSD for procurement of medicines is always not sufficient enough. MSD is not fully supplied with medicines therefore medicines of interest may be not available when required, therefore hospital have to purchase medicines from the decentralized procurement system where prices of medicines is high and the procurement process is lengthy, this affect the availability of medicines in the hospital.*

Contrary to this, report from respondents of one of the nongovernmental organization hospital revealed that, they have no problems with medicines availability in the hospital because they budget and collect enough funds for medicines procurement. The pharmacist reported that, *“we have enough funds for medicines procurement from the either sources”*.

4.2.4.3. Medicines procurement prices

Regarding medicines procurement prices at both procurement systems, according to the information gathered from the respondents said, medicines prices at the centralized procurement are comparatively cheaper for the most of the products, when compared to procurement the same quantity in the decentralized system. One of the senior pharmacists commented that: *“prices of medicines at a decentralized procurement system are comparatively high due to high mark-ups. Most of the pre-qualified suppliers that are in contract agreement with municipal councils are not prime suppliers but are middle suppliers, I recommend that, the municipal councils should enter into a contract agreement with prime suppliers who are manufacturers or direct importers of medicines.”*

The respondents also reported that, medicines and medicines related supplies who procured through special procurement program at centralized procurement system, prices of the products are high. The centralized procurement system adds up to 50% of the manufacturer's selling price for special procurement. One of the principle pharmacist said that, *“Prices of medicines or medical product procured by special procurement in the centralized system are twice of manufacturers and decentralized selling prices”*. Contrary to that, one respondent said that, there is no difference in medicines price from both procurement systems. He said that: *“The problems is not price of medicines but the availability of medicines in both procurement systems that is not sufficient, in reality, when medicines are not available in the centralized procurement system, the same will not be available in the decentralized markets”*.

4.2.4.4. Hidden cost in medicines procurement

Regarding the hidden costs that the facility incurs during the process of medicines procurement from the both procurement systems, the information gathered from all respondents reported that, there is very little cost that facility incurs during procurement. The hidden cost neither affects selling prices of medicines to the patients nor the availability of medicines in hospitals. One of senior pharmacist argued that: *'We incur some very little cost apart from medicines prices. The cost is in the transportation after procuring in the centralized system but no cost at decentralized system. In reality this cost does not affect the medicines selling prices to patient as well as medicines availability in the hospital'*.

4.2.5. Medicines management, storage, supply and distributions

According to Pharmacy Act 2002, medicines management, storage, distribution and supply in the centralized and decentralized procurement system should be under the management of qualified registered pharmacists, enrolled pharmaceutical technician, or enlisted pharmaceutical assistant.

4.2.5.1. Medicines management at hospital level

Regarding the information gathered from the respondents, all respondents report that, pharmacist are responsible for management of pharmaceutical product, storage and distribution of medicines. Non pharmaceutical products are managed, stored and distributed by supplies officers. One of the Medical Officer In charge said that: *'In case of decentralized procurement, after the pharmacist has prepared an order of medicines that are required to be procured at the decentralized system supported by a missed item document from MSD, the process of decentralized procurement is managed by PMU, and when supplier is ready to deliver medicines, the pharmacist will be available for verifying the item's specification before approval of the payment to suppliers''*.

4.2.5.2. Receiving, storage, supply and distribution of medicine

Regarding receiving medicines at the hospitals after procurement have done from both procurement systems, 14 respondents said that, before storing, the Hospital Therapeutic Committee should be available for witnessing and approval medicines for storage. The committee have to ensure themselves that the consignment is appropriate according to what have been ordered and issued from the suppliers and received at the hospital pharmacy or procurement officer's storage facility. One of the Medical Officers In charge said that: *'we trust our Hospital Therapeutic Committee (HTC) in witnessing the arrival of supplies from the suppliers, because they have improved the availability of medicines in our hospital'*.

4.2.5.3. Medicines distribution in Direct Delivery system (DDs)

According to the information gathered from the respondents, all reported that, this system is functioning with efficiency in Primary Health Care but will not be effective in the hospitals because of frequently ordering activities of hospitals. One of the Medical Officer In charge said that: *'Most of the hospitals are the facilities with the responsibility of managing referrals from PHC, therefore medicines consumption are high and the storage facility is not enough to stock consignment that will cover the consumption of more than four months, to prevent stock out, hospitals are required to place order frequently'*.

4.2.6. Analyzing the quality of medicines, Order fulfilment rate, and lead time in the procurement systems

4.2.6.1. Quality of medicines in the centralized and decentralized procurement systems

Several elements of quality assurance currently exist within the medicines supply system to ensure that medicines circulating in the market meet established specifications and standards of quality, safety and efficacy. Good Manufacture Practice (GMP) inspections to local and international manufacturers are conducted. However, there are still medicines that are circulating in the country that are of poor quality.

According to the information gathered from the study, all respondents said, quality of medicines from both procurement systems are of good quality, contrary to medical supplies. One senior pharmacist said that: *“Centralized procurement system, quality of medicines are good, but when coming to procuring from decentralized system, especially procuring medical supplies, some suppliers that are not trustful, they temper with medicines manufacturing and expiring dates of the medical supplies hence the quality of products are questionable.”*. Contrary to that, one senior pharmacist said that, qualities of medicines procured from both systems are of good quality due to market surveillance of products in the market conducted by TFDA. He said that: *“Now days, TFDA has increased its activity of post market surveillance to monitor the quality of medicines that are circulating in the country, this activity has reduced the number of medicines circulating in the markets which are of poor quality, thus quality of medicines are the same in both procurement systems”*.

4.2.6.2. Order fulfilment rate in the Centralized and Decentralized procurement systems

Regarding order fulfilment which is referred as the way firms responds to the customer orders. Order fulfilment rate is the one which calculated by the number of orders have been filled with the number of orders you have received. Only order that you have received in 90 days will be included in determining the order fulfilment rate.

4.2.6.2.1. Order fulfilment rate in the Centralized procurement

Regarding the centralized procurement, the reports gathered from the respondents, reported that, the order fulfilment rate for the past three months prior to the day of the survey in the centralized procurement, and were ranged on average mean order fulfilment rate of 40% - 60% per order per year for the centralized procurement system. One senior pharmacist said that: *“Order fulfilment rate at the centralized procurement system is low, and very often the centralized procurement system conduct back order to accomplish requirement. You may sometimes require re-ordering”*.

4.2.6.2.2. Order fulfilment rate in the decentralized procurement

In the decentralized procurement system the order fulfilment rate for past three months prior to the day of the survey, this study reported that, on average mean order fulfilment rate of 87% - 98% per order per year. One of the senior pharmacists said that: *‘‘There is no practice of back order in the decentralized procurement system, procurement law insists the full payment for supplies on fully delivery of ordered goods’’*.

4.2.6.2.3. The lead time on medicines supplied in the centralized and decentralized procurement system

Lead time defined as the latency between the initial and excursion of a process. In the other word, is the time between the placement of an order and time when the products are delivered and ready for use in the facility.

4.2.6.2.4. The lead time of medicines supplied in the centralized procurement system

The information's gathered from the respondents, reported that, in the centralized procurement system, an average mean days that a centralized procurement system takes to deliver medicines after order has been placed to health facility per order ranges from 3 to 8 days. One of the senior pharmacist said that: *‘When ordered products are available at MSD it needed only single day for processing and consignment will be delivered at the hospital and ready for use on the same day’*. Contrary to that, when a product is not available in the centralized procurement system it may take several months for the products to be delivered at the facility. Senior pharmacist from referral hospital said that: *‘‘When you order product that required special procurement it will takes up to six months to be delivered and most of the time the price of that product will cost more than 50% of the normal manufacturers price’’*.

4.2.6.2.5. The lead time for medicines supplied by the decentralized procurement system

The information gathered from the respondents, reports that, in the decentralized procurement system, an average mean days that, the decentralized procurement system tends to deliver medicines to health facility per order ranges from 21 to 35 days. One of the senior supplies officers said that: *‘‘Sometimes procurement of the decentralized system may take up*

to 60 days due to the lengthy procedure that have been laid down by PPRA as well as involvement of so many actors in the procurement process''.

CHAPTER FIVE

5.0 DISCUSSION OF THE FINDINGS

The WHO Medicines Strategy mentioned several challenges that limit access to effective pharmaceutical treatment. This includes, irrational use of medicines, inequitable health financial mechanism, unreliable medicines supply, and problem associated with quality of medicines and unaffordable medicines prices ²⁴. In the health facility level, availability and affordability of medicines is often considered a major factor of building trust to patient when seeking intervention for their health problems ⁹. Patients tend to equate medicine availability and affordability with quality of care leading to satisfaction with the health services.

Despite much efforts of improving access to medicines in the public health facility in Tanzania, affordability has remained low, prices are high comparing to international prices and availability of medicines in public health facilities is not sufficient ¹². This study tried to find out availability and the effects of medicines procurement prices at the centralized and decentralized systems.

The results in this survey revealed that, the percentage availability of medicines in the hospitals was fairly high, ranging from 50% to 85.7% with median availability of 72.5%. This results are the same to the study on availability and cost of essential antibiotics for paediatric conducted in Mbeya region, Tanzania 2012 ⁴⁷ and a baseline survey of the Pharmaceutical Sector in Tanzania 2002 ⁴⁸ and contrary to the study on survey of the medicine prices in Tanzania conducted in 2004 ³⁰ that concluded the availability was low. Availability of medicines in the hospitals on the day of survey were high at MNH, (85%) and fairly high (50%) at Vijibweni hospital. Through the interview from the informants, reason of stock out was contributed to; medicines were not available at MSD and a long process of procuring in the decentralized system. Contrary to this, the availability at MNH was high, with the reason of availability of Tender Board and Procurement Management Unit within the hospital that contributed in the improvement of medicines availability. The availability of Tender Board and PMU within the hospital shortens the process of medicines procurement in

the decentralized system. Tender board and procurement management unit in council's hospitals are available at municipal level, were process of decentralized procurement is lengthy due to involvement of so many actors in the procurement process.

The availability of medicines in hospitals also contributed to the human resources capacity to manage pharmaceutical activities and availability of funds for medicines procurement at the hospital ⁴⁹. This study did not assess the human capacity in management of pharmaceutical services in the surveyed hospital but might be the reason of fairly high availability of medicines at Vijibweni hospital. For the seven surveyed hospitals only one hospital, Vijibweni hospital, pharmaceutical activities were managed by pharmaceutical technician other hospitals pharmaceutical activities and services is the roles and responsibility of pharmacists. The number of pharmacists and other pharmaceutical personnel in the public hospitals is low ⁵⁰.

Regarding the availability of ciprofloxacin injection in surveyed hospitals it was found that, the medicines was available in only one hospital. The reason of unavailability of these medicines in the other six hospitals was revealed that, medicine was not stocked at MSD for the all period of survey. Ciprofloxacin injection is not even available in the MSD catalogue of 2011/2012 as well in the catalogue of 2012/2013. The reason of not stocking the injection at MSD is due to that the medicine is classified in the category of essential medicines. Ciprofloxacin injection was not available at MSD during the study period of review in this study regardless of its inclusion in the STG and NEMLIT. Ciprofloxacin injection given as intravenous injection is very useful in the management of pneumococcal pneumonia for patients with HIV/AIDS. With increasing resistance of bacteria to co-trimoxazole, fluoroquinolones such as Ciprofloxacin are effective for the treatment of urinary tract infections in Tanzania.

Analyzing stock-out days, the average median stock-out days per year was ranging from 53.7 to 119.9 days with the median of 92.7 days. The average stock-out days were low at Amana hospital with stock-out days of less than two months and high at the Temeke hospital with

stock-out days of four months. The reason of high stock-out days at Temeke hospital was contributed by the tedious and lengthy process in the decentralized procurement where medicines of interest were stock-out at MSD. The median stock out days of 97.2 days per year for the past six months is high regarding the fairly high availability during the day of survey. This means that, in the surveyed hospitals for the past six months, medicines in the basket were not available in the hospitals for more than three months. Here, the intervention is required to address this situation.

Results show that ergometrine injections, ciprofloxacin injection and frusemide tablets were not available in all surveyed hospitals for the period of one year. Currently, the guidelines for the treatment of postpartum haemorrhage do not include the use of ergometrine injection ⁵¹. This is due to its effects of non-selective smooth muscles contraction. Therefore it was not stocked in many hospitals. Change in the treatment guidelines of ergometrine injection in the management of postpartum haemorrhage is the reason of hospitals not stocking the medicines even though the medicine was available at MSD. Ciprofloxacin injection were not stocked at MSD for the all surveyed period, while frusemide tabs, misoprostol tablet, amoxicillin and co-trimoxazole suspensions were not available at MSD during the review period. Frusemide tablets are vital medicines that are required to be fully stocked at MSD and the other three, misoprostol tablet, amoxicillin and co-trimoxazole suspensions are essential medicines they should be considered after the vital items for funds utilization in procurement.

In many developing countries including Tanzania cost of medicines accounts for a large portion of the total expenditures on health care ³¹. The majority of people in developing countries do not have health insurance; hence they have to pay from their pockets. Most medicines that are provided for children and adult under the exemption in public sector are usually not fully available in the health facilities ²⁹. This resulted in patients purchasing medicines in the private sector were medicines are expensive and often unavailable to majority of the patients.

Medicines in this study were categorized by VEN analysis to vital, essential and non-essential. This type of categorization helps to set up priorities for purchasing medicines and keeping enough vital and essential medicines in stock to avoid stock-out due to insufficient funds available. In the VEN analysis system, medicines and medical products are classified according to their importance in health ⁵². Vital (V), medicines are potential life serving or crucial to providing basic health service, and therefore more funds have to be dedicated to the vital items in the resources limit situation. Essential (E), medicines are those classified as effective against less severe but significant forms of diseases. They should be considered after the vital items for funds allocation in procurement. Non essential (N) medicines are those used for minor or self-limited illness. They are least items to be stocked. In this study, the basket did not contain any medicines classified as non-essential medicines.

Price ratios of medicines in this study for 20 products that price data were available varied from 0.36 to 4.24. This means that for some medicines procurement prices were cheaper than the international and centralized procurement prices while some medicines were expensive with the prices of four times in the decentralized procurement system compared to the other procurement systems. These results are the same to the study of medicine's survey conducted in 2004 in Tanzania ³⁰ in the public health facilities. In the latter study, in the health facilities were up to 16 times. In 2009 the price monitor report, reported that, medicines prices were still higher in the private and the mission health facilities when compared to public health facilities ³¹.

Furthermore, this study revealed that, provider median procurement prices for the international reference price, MSD and decentralised systems for medicines that data on prices were available were, 40.5, 51.5, and Tsh 90.7 respectively. Although the median prices of the decentralised procurement was twice as much higher compared to other procurement systems, the statistical test was shown that there is no significance difference in prices in all procurement systems. This result is the same as the study conducted in 2011 in Jordan where the results shown that there is no significant difference in the prices of centralised procurement system when comparing to the decentralized procurement system ⁵³.

When comparing by using ratios, median price ratios of the decentralised to international reference prices, centralised to international reference prices, and the decentralised to centralised procurement prices, the ratios were, 1.92, 1.1, and 1.85 respectively. There was statistical significance difference in MPRs of decentralised to MSH-IRP and decentralised to MSD prices with p-value of 0.027. However, there was no statistically significant difference in MPRs between MSD and MSH-IRP with p-value of 0.96. This shows that the prices at decentralised procurement are higher when compared to the procurement to MSD and MSH-IRP.

Through 25th and 75th percentile of the all categories of procurement systems, it was observed that more products will be procured through the centralised procurement. The median procurement prices of the two products i.e. frusemide and amoxicillin suspension are the same across all procurement systems.

In this study in-depth interviews were conducted with key stakeholders in order to assess availability and effective implementation of the laws governing public procurement in the public sectors, implementation of medicines in the component of medicines pricing and control, and allocation of funds for procurement medicines. The interview also looks on how medicines are managed, stored, and distributed in the hospitals including the implementation of the new system of direct delivery of medicines to the health facilities. Vendor's performance was evaluated on the quality of medicines, order fulfilment rate, and supplier procurement lead time.

The study found that, public procurement law is adhered to in all the hospitals. Tender bodies and procurement management unit are in place for the management of the public procurement process. The availability of these entities in the public sectors is the indicator for the hospitals to adhere to the public procurement laws. The Tender board ensures that all procurements are conducted with honesty and fairness as well as realization of value for money⁵⁴.

This study, found that, all hospitals conducted medicines procurement through the centralized system, i.e. MSD. Procurement in the decentralized system is conducted only when medicines of interest are not available in the centralized system. Furthermore, this study found that, there are challenges of lengthy procurement process in the decentralized system contributed by bureaucracy at the municipal level as well as involvement of so many actors in the procurement process.

In the case of implementation for medicines policy, this study found that, medicines policy and pharmaceutical strategic plan were not updated since 1997, as a result stakeholders in health in the pharmaceutical uncertain on how to implement the pharmaceutical activities. There is lack of policy for medicine pricing and control and there are no guidelines to guide the process of medicines procurement. Putting in place policy for medicines pricing and control will improve medicines availability of the health facility and affordability to the individual patients ⁵⁵. Lack of guidelines outlining medicines pricing, control and procurement process, resulted to high mark-up prices in decentralized procurement, lengthy procurement process and medicines to be procured as same as other products in the decentralized procurement system.

In general, the prices of medicines at MSD in this study were found to be comparatively cheaper compared to procuring in the decentralized system. The high price of medicines in the decentralized procurement system is due to high added price mark-up by the suppliers. Most of the suppliers in the decentralized procurement system are not the prime manufacturers or importers but rather middle entities. Obviously this resulted in inflated prices of medicines.

Regarding the hidden costs which health facilities incur during procurement of medicines in both systems, this study found that, this cost was relatively low or negligible to affect medicines availability.

Regarding the source of funds, this study has revealed that, the government is the main source for allocation of funds for medicines procurement at the hospitals. It was reported that funds allocated in the hospitals are not sufficient for procurement of medicines and disbursement is erratic ⁴⁹. Other sources of funds include donors, cost sharing and Health Insurance Schemes.

Regarding management of medicines, storage, supply and distribution, this study found that, management of pharmaceutical products had remained to be the role of the pharmacist while process and procuring of medicines in the decentralized system are conducted under the management of the procurement and supply officers. This is contrary to the pharmacy law (Pharmacy Act, 2002). The pharmacy law insists that all activity regarding pharmaceutical products should be under the management of qualified personnel who is the pharmacist.

There has been an outcry of non-delivery of right quantities, delivery of expired stocks and delay in delivery of the items to the Health Facilities (HFs) which resulted in stock outs at health care facilities and the blame was directed to DMOs and MSD. In view of that, the MOHSW instructed MSD to undertake delivery of medicines and medical supplies directly to HFs instead of ending at DMOs office which was a source of misunderstanding between the Public Health Facilities (PHFs), MSD and DMOs. The system was implemented in the PHC, in year 2010. The DDs is now going to be implemented in the all hospitals by July, 2013. This system has the aim of reducing theft, late delivery and delivering near to or expired medicines. This study found that, this system is not suitable to be implemented in hospitals. Interview conducted to respondents revealed that, hospitals need frequent ordering to avoid medicines stock out. Medicines consumption at hospital is high because hospitals are referred to PHC. The storage capacity of the hospital is limited to stock many items at once therefore hospital needs frequently ordering. Implementation of the DDs to the hospital will result in high stock out of medicines.

Regarding the quality of medicines, this study revealed that, quality of medicines that are available in both procurement systems are of good quality. A quality assurance activity conducted at MSD and the post- market surveillance monitoring conducted by TFDA has reduced the number of products with poor quality in the markets.

In this study, the evaluations of vendor performance in the order fulfilment rate of the centralized procurement range from 40% to 60% per requested order and for the decentralized procurement system, order fulfilment rate ranged from 85% to 98%. This shows that the capacity of centralized procurement system to service customer is still low ²⁴. In this situation, the hospital will require to procure some of the medicines from the decentralized system where prices of medicines are relatively high ^{19,30,31}.

The lead time for the centralised procurement, ranged from 3 to 8 days, sometimes it takes a single day to deliver upon all ordered products available at MSD. This lead time is good and MSD are required to maintain. However, for the products that requires the special procurement, may takes several months for the products to be delivered, this need improvement.

The lead time for the decentralized procurement, ranged from 21 to 35 days. The procurement lead time in the decentralized procurement system is lengthy, caused by bureaucracy at municipal and the laid down procedures in the public procurement law. Therefore policy is required to guide and improve efficiency of procurement of medicines in the public health facilities.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1. CONCLUSION

The study aimed at assessing the medicines prices and availability, implementation of medicines policy regarding medicines price, assessing management and efficiency of supply and distribution system, supplier's order fulfilment rate and suppliers lead time in the centralized and decentralized procurement systems in Tanzania.

In general, the availability of medicines in the hospitals is fairly high at the day of survey. However, some vital and essential medicines were not available during the time of survey and for the past six months of review. The median stock out days of 97.2 days per year for the past six months is high regarding the fairly high availability during the day of survey. This means that, in the surveyed hospitals for the past six months, medicines in the basket were not available in the hospitals for more than three months. Thus, the intervention is required to address this situation.

This study found that, procurement at MSD prices is reasonably cheaper when compared to the other two procurement systems. Through 25th and 75th percentile range in the MPRs more products will be procured at MSD when compare if the same would be procured at decentralised and MSH-IRP procurement systems.

Public procurement law does not consider medicines as special products that need to be procured with special attention. Pharmacy law insists that, the management of pharmaceutical products should be handled by the qualified pharmacist. Pharmacist has to be fully involved in the procurement and management of pharmaceutical products in the hospitals. In the decentralized procurement system, medicines are handled by non pharmaceutical personnel, this is against the Pharmacy Act, and this may be the contributing factors for inadequate availability of some medicines in the health facilities. Lack of updating medicines policy and policy for medicines pricing and control are contributing factors to

poor performance of pharmaceutical activities in the pharmacy sector as well as lack of unified medicines procurement prices respectively.

Direct Delivery of medicines to PHC is seen to be very effective in primary health facilities, because it has improved the availability of medicines in these facilities. The implementation of this system in the hospitals will have negatively effect of the availability of medicines in the hospitals. Medicines consumption in the hospitals is greater, needs frequently ordering of medicine from suppliers. Most of the hospitals storage capacity is not sufficient to accommodate large stocks.

Low order fulfilment rate in the centralized procurement and high supplier procurement lead time in the decentralized procurement systems are contributing factors to the fairly high availability of medicines in the public hospitals and medicines stock- out. There is low order fulfilment rate at MSD and lengthy procurement process decentralized procurement system which might be the reason of fairly high availability and high stock out. Improving availability of medicines at MSD will improve the availability of medicines in the hospitals. More effort is require improving the availability of medicines in the centralized system and improving medicines procurement process in the decentralized system. Quality of products circulating in market for both centralised and decentralised procurement systems have been improved due to post-market suavellanvce monitoring conducted by TFDA.

6.2. RECOMMENDATIONS

6.2.1. Availability of medicine in hospitals

- a. The government should improve the availability of medicines in the centralized procurement system. Availability of medicines at MSD is not sufficient to fulfil the supply chain resulted in low order fulfilment rate upon order placed by health facilities.
- b. Pool procurement for the pharmaceutical products that need special procurement should be instituted in the centralized procurement system. Products that require special procurement at MSD should be consolidated from

the requesting hospitals. All hospitals are required to consolidate their requirements to MSD in advanced to enable MSD to plan for contract agreement with suppliers. This will reduce procurement prices and lead time.

- c. Delivering medicines direct to hospitals should be implemented by allowing the hospital to order medicines whenever medicines are required to be used in the hospital. Restricting ordering medicines in hospitals for every two months will have negative effect on the availability of medicines. Hospitals need frequently ordering from centralized procurement system because of the system itself is not capable for full supply of medicines and the storage facilities in the hospitals are not sufficient to accommodate large consignment of medicines at once.
- d.

6.2.2. Implementation of medicines policy

- a. The MoHSW should update the National Medicines Policy and its Strategic Master Plan. The National Medicines Policy and Pharmaceutical Strategic Plan is the framework tools that outline what are required to implement in the pharmaceutical sectors. Unavailability of these tools makes it difficult for the implementation of activities and improving services in the pharmaceutical sectors.
- b. The government should develop policy for medicines pricing and control in order to improve medicines availability in hospitals. Lack of policy for medicines pricing and control is the factor that contributes to the high procurement prices of medicines to patients. As a result many patients are unable to afford medicines for health care.
- c. The medicines policy should outline the process of medicines procurement in both the centralized and decentralized procurement systems. Lack of guidelines for medicines procurement process, medicines are procured as the same as other non medicines products.

6.2.3. Budget and allocation of funds for procurement medicines

- a. High prices of medicines in the decentralized procurement system are facilitated by lack of competitive procurement and negotiation. The government should directly allocate funds to the hospitals to enable them to procure medicines from reliable and affordable sources. This will create competitive procurement prices between the centralized and decentralized procurement systems. Allocating funds direct to hospitals and allowing hospitals to procure from the either procurement systems will bring medicines price competitive and enable negotiation in the market hence lowering the provider procurement prices.
- b. Hospitals should strengthen and diversify sources of funds such as Community Health Funds, National Health Insurance Funds and Cost sharing in order to sustain constant availability of funds for procurement of medicines.

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APPENDIXS

Annex A: List of 10 core tracer products in Health Information Management System

SN	Tracer Product	Justification for inclusion as a tracer product
1	DPT + Hep B/HiB vaccine	DPT + HepB/HiB vaccine is very good for vaccination and recommended as a standard medicine. It is used by WHO as a scale to test the state of vaccinations in all nations
2	Alu	Alu is a medicine used as a first line treatment for malaria
3	Amoxicillin or co-trimoxazole	Amoxicillin or co-trimoxazole do the same work in treating bacteria, these are very basic medicines in the rural areas.
4	Albendazole or mebendazole	Albendazole or mebendazole are basic oral medicines for treating worms among children and adult.
5	Oral Rehydration Salts (ORS)	Oral Rehydration Salts (ORS) are very essential for saving lives of children with diarrheal and vomiting
6	Egometrine or oxytocin or misoprostol	Help to stop bleeding during deliveries For pregnant women. It therefore also saves lives
7	Depo provera contraceptive	Depo provera contraceptive is commonly used to prevent pregnancy where needed
8	Normal saline or dextrose saline	Normal saline or dextrose saline is the best medicines used to balance the quantity of salt and sugar in the body
9	Disposable syringe and needles	Disposable syringe and needles are essential medical supplies
10	Malaria Diagnostic Rapid Test (MRDT)	Malaria Diagnostic Rapid Test (MRDT) is good though it fails to diagnose if one has very few parasites. Its storage is also quite difficult especially in the rural areas. It serves the rural areas where Microscopes cannot be used

Annex B: Essential medicines and Laboratory reagent that are required to be reported monthly from a health facility

SN	Description	Unit
1	Albendazole/ Mebendazole Tablets	T/100
2	Artemether – Lumefantrine Tablets	B/30 Strips
3	Amoxicillin Capsules	T/1000
4	Amoxicillin suspension	Bottle/100ml
5	Co-trimoxazole Tablets	T/1000
6	Co-trimoxazole suspension	Bottle/100ml
7	Metronidazole Tablets	T/1000
8	Fluconazole Tablets	B/100
9	Paracetamol Tablets	T/1000
10	Ferrous + Folic Acid Tablets	T/1000
11	Zidovudine 300mg Tablets	T/60
12	Nevirapine Oral solution	Bottle/100ml
13	Zidovudine 300mg + Lamivudine 150mg Tablets	T/60
14	Tenofovir 300mgmg+Lamivudine 300mg+ Efavirenz 600mg Tablets	T/30
15	Efavirenz 600mg Tablets	T/30
16	Zidovudine 60mg+Lamivudine 30mg+Nevirapine 50mg Tablets	T/60
17	Ergometrine /Oxytocin Injection	Ampoule
18	Misoprostol Tablets	B/10
19	Oral Rehydration Salts Sachets	Sachets
20	Zinc sulphate Tablets	B/100
21	Quinine injection	Ampoules
22	Benzyl Penicilline Injection	Vial
23	Magnesium sulphate Injection	Vial
24	Dextrose 5% / DNS	Bottle/500ml
25	Depo-Provera Injection	Vial
26	Combined Oral Contraceptives	Cycle
27	DPT Vaccines	Ampoules
28	Hepatitis B Vaccines	Ampoules
29	RHZE Rifampicin 150mg/Isoniazide 75mg Tablets	B/672
30	RHE Rifampicin 150mg/Isoniazide 75mg/Ethambutol 400mg Tablets	B/672

31	RH Rifampicin 150MG/Isoniazide 75mg Tablets	B/672
32	Streptomycin injection IG	Vial
33	Syringe 5cc	Box/100
34	mRDT test	Kit/50
35	UNIGOLD HIV ½	KIT/20
36	Determine HIV 1&2	KIT/100
37	FACS Count reagent	Each
38	DBS	KIT/20
39	Catgut Sutures	Each

Annex C: List of selected essential medicines in the basket and their presence in the WHO essential medicines,

National Essential Medicines, MSD catalogue and at Hospital level

SN	INDICATIONS	NAME OF MEDICINES	WHO EML	NEM L	MSD Catalogue	Presence in Hospital level
1	Anthelminthics	Albendazole Tablets	√	√	√	√
2	Anthelminthics	Mebendazole Tablets	√	√	√	√
3	Antibacterial	Amoxicillin Capsules	√	√	√	√
4	Antibacterial	Amoxicillin suspension	√	√	√	√
5	Antibacterial	Co-trimoxazole Tablets	√	√	√	√
6	Antibacterial	Co-trimoxazole suspension	√	√	√	√
7	Amoebic ides	Metronidazole Tablets	√	√	√	√
8	Antifungal	Fluconazole Tablets	√	√	√	√
9	Antipyretics	Paracetamol Tablets	√	√	√	√
10	Iron deficiency anaemia	Ferrous + Folic Acid Tablets	√	√	√	√
11	Oxytocics	Ergometrine Injection (Ampoule)	√	√	√	√
12	Oxytocics	Oxytocin Injection (Ampoule)	√	√	√	√

SN	INDICATIONS	NAME OF MEDICINES	WHO EML	NEML	MSD Catalogue	Presence in hospital level
13	Oxytocics	Misoprostol Tablets	√	√	√	√
14	Correcting sugar and water electrolytes and acids	Oral Rehydration Salts Sachets for one litre	√	√	√	√
15	Ant-malarial	Quinine injection 300mg/ml	√	√	√	√
16	Ant-malarial	Quinine Sulphate Tablet 300mg	√	√	√	√
17	Antibacterial	Benzyl Penicillin Injection	√	√	√	√
18	Correcting sugar and water electrolytes and acids	Dextrose 5% / DNS	√	√	√	√
19	Antibacterial	Gentamycin Injection	√	√	√	√
20	Ant-consultants	Magnesium Suphate Injection	√	√	√	√
21	Medical supplies	Syringe 5cc	X	X	√	√
22	Medical supplies	Catgut Sutures	X	X	√	√
23	Medical supplies	Surgical Glove	X	X	√	√
24	Medical supplies	Examination Gloves	X	X	√	√

SN	INDICATIONS	NAME OF MEDICINES	WHO EML	NEML	MSD Catalogue	Presence in hospital level
25	Antibacterial	Ceftriaxone Injection	√	√	√	√
26	Antibacterial	Chloramphenicol injection	√	√	√	√
27	Antibacterial	Ciprofloxacin Injection	√	√	√	√
28	Amoebicides	Metronidazole injection (Vial)	√	√	√	√
29	Medical supplies	Mackintosh	X	X	√	√
30	Medical supplies	Hospital Gause	X	X	√	√
31	Medical supplies	Cotton wool	X	X	√	√
32	Ant-asthmatics	Aminophylline Tabs	√	√	√	√
33	Ant-asthmatics	Salbutamol aerosol	√	√	√	√
34	Anti-diabetic	Chlorpropamide Tab	√	√	√	√
35	Anti-diabetic	Metformin Tab	√	√	√	√
36	Anti-diabetic	Insulin Human Injection(Soluble)	√	√	√	√
37	Anti-hypertensive	Captopril Tab	√	√	√	√
38	Anti-hypertensive	Hydralazine Tab	√	√	√	√
39	Diuretics	Furosemide Tab	√	√	√	√
40	Diuretics	Atenolol Tab	√	√	√	√

Annexed F: Guide questions for conducting In-depth Interview.**A. The laws governing public procurement, policy regarding medicines, medicines procurement, pricing, storing, and sources.****(Director/Medical officer in charge)**

1. Public procurement policies are based on the need to make the best possible use of public funds and require conducting all procurement process with honest and fair. The overall objectives of the public procurement process are to provide value for money to the private or government institution by ensuring that funds are spent in a transparent manner. How does your hospital implement these objectives? **Probed on;**
 - a. Presence of tender board
 - b. Presence of PMU
 - c. Others (mention)
2. A National Medicine Policy forms the basis of government's responsibility to ensure access of good quality medicines at affordable prices to the public. This is the government commitment to solve problems facing the pharmaceutical sector in the country. It forms a basis for planning, implementation, monitoring and evaluation of interventions in the pharmaceutical sector. Is there any policy regarding medicines policy, medicines pricing and procurement? **Probed on;**
 - a. Presence of National Medicines Policy
 - b. Presence of policy for medicines pricing control
 - c. Presence of guidelines for medicines procurement process
 - d. Other (mention)
3. Medicines procurement process aim at providing value for money spent. Value for money does not implies price only, other factors to consider are best quality, timed delivery, and appropriateness. How does your health facility guide this? **Probed on;**
 - a. Presence of policy for medicines procurement
 - b. Medicine's procurement guidelines

- c. Medicines pricing policy
 - d. Others (mention)
4. Medicines and related medical product are different in their management, procurement and storage when compared to the non medicines products. How does your health facility manage the procurement process, distribution and storage of medicines? **Probed on;**
- a. Involvement of pharmacist
 - b. Involvement of procurement officer
 - c. Others (mention)
5. Medicines and related medical supplies are essential in the prevention of morbidity and mortality. Where does your hospital get essential medicines and medical supplies to prevent and to treat common diseases? **Probed on;**
- a. MSD
 - b. Private wholesaler
 - c. Other sources (mention)
6. Medicines are expensive and are required to be available at your facility at all the time and the patient to access at affordable prices. What are challenges your facility face during the procurement of medicines. **Probed on;**
- a. Insufficient budget
 - b. Medicines price is high
 - c. Development of policy for price and control.
 - d. Others (mention)
7. Medicines procurement in Tanzania is characterized by the centralized and decentralized procurement systems. What do you comment on these two systems? **Probed on**
- a. Cost of procurement
 - b. Price of medicines
 - c. Delivery time
 - d. Quality of the products
 - e. Other (mention)

8. What is the comment on medicines procurement systems in Tanzania? **Probed on;**
- a. The centralized procurement system
 - b. The decentralized procurement system.
 - c. Others(mention)

**THIS PART TO BE INTERVIEWED TO THE PHARMACIST AND
PROCUREMENT OFFICER OF THE HOSPITAL**

B. Medicines procurement process, budget for medicines procurement, cost and pricing of essential medicines.

9. Procuring medicines is different from procuring other non medicines products. What are the process and personnel involved in procuring medicines from the centralized and decentralized procurement systems? **Probed on;**
- a. Involvement of hospital therapeutic committee
 - b. Involvement of pharmacist
 - c. Involvement of procurement officer
 - d. Others (mention)
10. In order to make medicines available at your hospital you are required to undergo processes of procurement or ordering so as to receive medicines for use at your facility. What are the processes involved in procurement and receiving medicines from both the centralized and decentralized systems? **Probed on;**
- a. Process of Procurement from the centralized system
 - b. The process of receiving from the centralized procurement system
 - c. Process of procurement of the decentralized system
 - d. The process of receiving from the decentralized system
11. For a patient to trust your service at this hospital you have to ensure that medicines are available at your hospital throughout the time. What are the challenges do you get during procurement and ordering of medicines and medical supplies? **Probed on;**
- a. Budget for medicines

- b. Procurement policy
- c. Procurement law
- d. Procuring at the centralized system
- e. Procuring at the decentralized system

12. Process for medicines procurement by the centralized or decentralized incurs some indirect or hidden cost. Is there any cost apart from medicine price do your hospital incurs during the procurement or ordering medicines and medical supplies? (at the centralized and decentralized systems). **Probed on;**

- a. Ordering from the centralised. **Probed on;**
 - i. Preparing the requisition
 - ii. Supplier selection
 - iii. Negotiation
 - iv. Order preparation
 - v. Stationary
 - vi. Postage
 - vii. Order Processing
 - viii. Receipts of medicines
 - ix. Inspection
 - x. Transportation
 - xi. Certification of payment of invoices
- b. Ordering from the decentralised. **Probed on;**
 - i. Preparing the requisition
 - ii. Supplier selection
 - iii. Negotiation
 - iv. Order preparation
 - v. Stationary
 - vi. Postage
 - vii. Order Processing
 - viii. Receipts of medicines
 - ix. Inspection

- x. Transportation
 - xi. Certification of payment of invoices
13. Price of medicines in Tanzania is not unified. What do you comment on the prices of medicines from your supplier? **Probed on;**
- a. MSD
 - b. Private suppliers
 - c. Others if any

C: Medicines management, distribution, supply and storage system in the centralized and decentralized procurement systems.

14. According to the pharmacy law, medicines management, distribution, supply and storage of medicines and related medicinal supplies should be under the management of registered pharmacist, enrolled pharmaceutical technician or enlisted pharmaceutical assistant. How this objective does is implemented at your hospital? **Probed on;**
- a. Procurement process
 - b. Receiving process
 - c. Storage process
 - d. Distribution process
 - e. Other (mention)

D: Order fulfilment rate, lead time, and Quality of medicines and related medical supplies

15. Medicines procurement policy in Tanzania is characterized by the centralized and decentralized procurement system. How is the centralized and decentralized procurement efficient? **Probed on;**
- a. Order fulfilment rate (%)
 - b. Backorder
 - c. Other (mention)

16. During the time of procurement or ordering of medicines from suppliers, product may not readily available at suppliers. What is the lead time for medicines procurement process at your hospital? **Probed on;**
- a. The centralized procurement system
 - b. The decentralized procurement system
 - c. Other sources (mention)
17. To ensure that you meet the goal for prevention and treatment of diseases to your patients you need to be supplied with quality medicines. What is your general comment on the quality of medicines from your suppliers? **Probed on;**
- a. From the centralized procurement system
 - b. From the decentralized procurement system
 - c. Other sources (mention)
18. What is the comment on medicines procurement systems in Tanzania? **Probed on;**
- a. The centralized procurement system
 - b. The decentralized procurement system.
 - c. Others(mention)

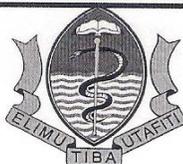
Thanks for your time

Annex G: Ethical approval to conduct study

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

Directorate of Postgraduate Studies

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DAR ES SALAAM
TANZANIA.



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E-mail: dpgs@muhas.ac.tz

Website: <http://www.muhas.ac.tz>

Ref. No. MU/PGS/SAEC/Vol. VI/

22nd March, 2013

Mr. Dedan David Jonas,
MSc. Pharmaceutical Management,
MUHAS.

RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED "ASSESSMENT OF MEDICINES PRICE, AVAILABILITY AND DISTRIBUTION THROUGH CENTRALIZED AND DECENTRALIZED PROCUREMENT SYSTEMS IN TANZANIA: A CASE STUDY OF PUBLIC HOSPITALS IN DAR ES SALAAM REGION"

Reference is made to the above heading.

I am pleased to inform you that, the Chairman has on behalf of the Senate approved ethical clearance for the above-mentioned study.

Thus ethical clearance is granted and you may proceed with the planned study.

Please liaise with bursar's office to get your research fund.

Prof. O. Ngassapa
DIRECTOR, POSTGRADUATE STUDIES

/emm

cc Vice Chancellor, MUHAS
cc Deputy Vice Chancellor – ARC, MUHAS
cc Dean, School of Pharmacy- MUHAS

Annex H: Request to allow data collection at CCBRT

MUHIMBILI UNIVERSITY OF HEALTH
AND ALLIED SCIENCES
SCHOOL OF PHARMACY

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27TH MARCH, 2013.

HOSPITAL DIRECTOR,

CCBRT,

P.O BOX 23310,

DAR ES SALAAM.

REF: REQUEST FOR PERMISSION TO COLLECT DATA FOR A STUDY TITLED "ASSESESMENT OF MEDICINES PRICE, AVAILABILTY AND DISTRIBUTION THROUGH THE CENTRALISED AND DECENTRALISED PROCUREMENT SYSTEMS IN TANZANIA". A CASE STUDY OF THE PUBLIC HOSPITALS IN DAR ES SALAAM.

Reference is made to the above heading.

Kindly, may I request you to permit **Mr. Dedan David Jonas** a student of **Msc in Pharmaceutical Management** at Muhimbili University of Health and Allied Sciences to collect data at your hospital.

The data collection activities are planned to commence on **1st April to 29th April, 2013**. The activity will involve reviewing the procurement documents for data on medicine price, ledger books for medicines availability and in-depth interview for assessing the medicine distribution system. The in-depth interview will involve interviewing the hospital Director/Hospital Incharge, the Pharmacist in-charge and the procurement officer of the hospital.

Enclose herein find an ethical clearance for the study.

Thanking you in advance

Prof. Appolinary A.R. Kamuabwa

Research Supervisor.

C.C Dean – School of Pharmacy

C.C Dedan David Jonas - Principal Investigator

Annex I: Request to allow data collection at Ilala Municipal Council

MUHIMBILI UNIVERSITY OF HEALTH

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27TH MARCH, 2013.

MEDICAL OFFICER FOR HEALTH,
ILALA MUNICIPAL COUNCIL,
P.O BOX 20950,
DAR ES SALAAM.

REF: REQUEST FOR PERMISSION TO COLLECT DATA FOR A STUDY TITLED "ASSESEMENT OF MEDICINES PRICE, AVAILABILTY AND DISTRIBUTION THROUGH THE CENTRALISED AND DECENTRALISED PROCUREMENT SYSTEMS IN TANZANIA". A CASE STUDY OF THE PUBLIC HOSPITALS IN DAR ES SALAAM.

Reference is made to the above heading.

Kindly, may I request you to permit **Mr. Dedan David Jonas** a student of **Msc in Pharmaceutical Management** at Muhimbili University of Health and Allied Sciences to collect data at **Amana hospital**.

The data collection activities are planned to commence on **1st April to 29th April, 2013**. The activity will involve reviewing the procurement documents for data on medicine price, ledger books for medicines availability and in-depth interview for assessing the medicine distribution system. The in-depth interview will involve interviewing the hospital Director/Hospital Incharge, the Pharmacist in-charge and the procurement officer of the hospital.

Enclose herein find an ethical clearance for the study.

Thanking you in advance

Prof. Appolinary A.R. Kamuabwa

Research Supervisor.

C.C Dean – School of Pharmacy

C.C Dedan David Jonas – Principal Investigator

Annex J: Request to allow data collection at Kinondoni Municipal Council

MUHIMBILI UNIVERSITY OF HEALTH
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27TH MARCH, 2013.

MEDICAL OFFICER FOR HEALTH,
KINONDONI MUNICIPAL COUNCIL,
P.O BOX 61695,
DAR ES SALAAM.

REF: REQUEST FOR PERMISSION TO COLLECT DATA FOR A STUDY TITLED "ASSESEMENT OF MEDICINES PRICE, AVAILABILTY AND DISTRIBUTION THROUGH THE CENTRALISED AND DECENTRALISED PROCUREMENT SYSTEMS IN TANZANIA". A CASE STUDY OF THE PUBLIC HOSPITALS IN DAR ES SALAAM.

Reference is made to the above heading.

Kindly, may I request you to permit **Mr. Dedan David Jonas** a student of **Msc in Pharmaceutical Management** at Muhimbili University of Health and Allied Sciences to collect data at **Sinza and Mwananyamala** hospitals.

The data collection activities are planned to commence on **1st April to 29th April, 2013**. The activity will involve reviewing the procurement documents for data on medicine price, ledger books for medicines availability and in-depth interview for assessing the medicine distribution system. The in-depth interview will involve interviewing the hospital Director/Hospital Incharge, the Pharmacist in-charge and the procurement officer of the hospital.

Enclose herein find an ethical clearance for the study.

Thanking you in advance

Prof. Appolinary A.R. Kamuabwa

Research Supervisor.

C.C Dean – School of Pharmacy

C.C Dedan David Jonas – Principal Investigator

Annex K: Request to allow data collection at Temeke Municipal Council

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Telefax: +255-(0) 22-2150465

27TH MARCH, 2013.

MEDICAL OFFICER FOR HEALTH,
TEMEKE MUNICIPAL COUNCIL,
P.O BOX 45232,
DAR ES SALAAM.

REF: REQUEST FOR PERMISSION TO COLLECT DATA FOR A STUDY TITLED "ASSESESMENT OF MEDICINES PRICE, AVAILABILTY AND DISTRIBUTION THROUGH THE CENTRALISED AND DECENTRALISED PROCUREMENT SYSTEMS IN TANZANIA". A CASE STUDY OF THE PUBLIC HOSPITALS IN DAR ES SALAAM.

Reference is made to the above heading.

Kindly, may I request you to permit **Mr. Dedan David Jonas** a student of **Msc in Pharmaceutical Management** at Muhimbili University of Health and Allied Sciences to collect data at **Temeke and Vijibweni hospitals**.

The data collection activities are planned to commence on **1st April to 29th April, 2013**. The activity will involve reviewing the procurement documents for data on medicine price, ledger books for medicines availability and in-depth interview for assessing the medicine distribution system. The in-depth interview will involve interviewing the hospital Director/Hospital Incharge, the Pharmacist in-charge and the procurement officer of the hospital.

Enclose herein find an ethical clearance for the study.

Thanking you in advance

Prof. Appolinary A.R. Kamuabwa

Research Supervisor.

C.C Dean – School of Pharmacy

C.C Dedan David Jonas – Principal Investigator

Annex L: Request to allow data collection at Muhimbili National Hospital

MUHIMBILI UNIVERSITY OF HEALTH

AND ALLIED SCIENCES

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27TH MARCH, 2013.

DIRECTOR GENERAL,
MUHIMBILI NATIONAL HOSPITAL,
P.O BOX 65000,
DAR ES SALAAM.

REF: REQUEST FOR PERMISSION TO COLLECT DATA FOR A STUDY TITLED "ASSESESMENT OF MEDICINES PRICE, AVAILABILTY AND DISTRIBUTION THROUGH THE CENTRALISED AND DECENTRALISED PROCUREMENT SYSTEMS IN TANZANIA". A CASE STUDY OF THE PUBLIC HOSPITALS IN DAR ES SALAAM.

Reference is made to the above heading.

Kindly, may I request you to permit **Mr. Dedan David Jonas** a student of Msc in **Pharmaceutical Management** at Muhimbili University of Health and Allied Sciences to collect data at your hospital.

The data collection activities are planned to commence on **1st April to 29th April, 2013**. The activity will involve reviewing the procurement documents for data on medicine price, ledger books for medicines availability and in-depth interview for assessing the medicine distribution system. The in-depth interview will involve interviewing the hospital Director/Hospital Incharge, the Pharmacist in-charge and the procurement officer of the hospital.

Enclose herein find an ethical clearance for the study.

Thanking you in advance

Prof. Appolinary A.R. Kamuabwa

Research Supervisor.

C.C Dean – School of Pharmacy

C.C Dedan David Jonas – Principal Investigator

Annex M: Consent form**CONSENT TO PARTICIPATE IN THE STUDY OF ASSESMENT OF MEDICINES PRICE, AVAIALABILTY AND DISTRIBUTION THROUGH THE CENTRALIZED AND DECENTRALISED PROCUREMENT SYSTEMS IN TANZANIA: A CASE STUDY OF PUBLIC HOSPITAL IN DAR ES SALAAM REGION.**

Greetings!

My name is **Dedan Jonas** from Muhimbili University of Health and Allied Sciences. I am involved in a study on assessment of medicines price, availability and distribution through the centralized and decentralized procurement systems in Tanzania: a case study of public hospital in Dar es Salaam region

Purpose of the Study

Seven hospitals will be involved in this study to assessment of medicines price, availability and distribution through the centralized and decentralized procurement systems in Tanzania: a case study of public hospital in Dar es Salaam region.

Participation

If you agree to join the study, you will be involved in filling the price and medicines availability forms and participate in the in-depth interview.

Confidentiality

All information we will collect from you will be treated confidentially and will not be used for any other purpose other than this study.

Risks

We do not expect that any harm will happen to you because of joining in this study.

Rights to Withdraw and Alternatives

Taking part in this study is completely your choice. If you choose not to participate in the study or if you decide to stop participating in the study you will continue to be treated normally. You can stop participating in this study at any time, even if you have already given your consent and if for any reason you would wish to come back into the study after withdrawal, we will be ready to accept you to continue with the study. Refusal to participate or withdrawal from the study will not involve penalty or loss of any benefits to which you are otherwise entitled.

Benefits

If you agree to take part in this study you will be among those who will contribute towards strengthening the medicines purchasing system of Tanzania. Your information and other’s participating in the study will collectively be used by policy makers in strengthening the system which would benefit other Tanzanians. You will receive the new information about this study upon completion.

Who to Contact

If you ever have questions about this study, you should contact the following:

Mr Dedan Jonas (principal investigator)

Muhimbili University of Health and Allied Sciences, P.O. Box 65013, Dar Es Salaam

Mobile phone: 0754297786,

Or

Prof. Appolinary Kamuabwa (study supervisor)

Muhimbili University of Health and Allied Sciences, P.O. Box 65013, Dar Es Salaam

Tel: +255755576985

Or

Also if you will have any questions about your right as a participant, you may contact, Prof. Mainen Moshi, Director of Research and Publications (MUHAS). P.O Box 65001, Dar Es Salaam. Tel: 2150302-2

If you agree to participate in this research. *Write the word ‘yes’ if you agree.....*

I, _____ have read the contents in this form. My questions have been answered. I agree to participate in this study.

Signature of participant _____

Signature of investigator _____

Date of signed consent _____