ASSESSMENT OF AVAILABILITY, AFFORDABILITY AND PRESCRIBING PATTERNS OF ESSENTIAL MEDICINES IN PUBLIC HEALTH FACILITIES IN TANGA REGION, TANZANIA.

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Master of Science in Pharmaceutical Management Dissertation

Muhimbili University of Health and Allied Sciences,

July 2011

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By

Michael Kishiwa Francis

A dissertation submitted in partial fulfillment of requirement for the degree of Master of Sciences in Pharmaceutical Management of Muhimbili University of Health and Allied Sciences.

Muhimbili University of Health and Allied Sciences

July 2011

CERTIFICATION

The undersigned certify that they have read and hereby recommend of examination of dissertation entitled "**Assessment of Availability, Accessibility and Prescribing Patterns of essential medicines in public health facilities in Tanga region, Tanzania,**" in fulfillment of the requirements for the degree of Master of Science in Pharmaceutical Management of Muhimbili University of Health and Allied Sciences.

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Dr. Kennedy Mwambete

Supervisor

Date: 24th October, 2011

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Dr. V. Mgoyella

Co-Supervisor

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled "**Assessment of Availability, Accessibility and Prescribing Patterns of essential medicines in public health facilities in Tanga region, Tanzania,** in partial fulfillment of the requirements for the degree of Master of Science in Pharmaceutical Management of Muhimbili University of Health and Allied Sciences.

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Co-Supervisor

Date……………………………………………………………

DECLARATION AND COPYRIGHT

I, Michael Kishiwa Francis, hereby solemnly declare that this is my original work and it has not been presented nor will be presented to any other University for similar or any other degree award.

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Michael Kishiwa Francis

Date……………………………………………………………

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Dedications

I dedicate the results of this study to my late Mother and Farther, my Sons Ferdinand and Felix and to my lovely wife. Ahsanteni sana.

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ABREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ARI	Acute Respiratory tract Infection
EDL	Essential Drug List
HAI	Health Action International
HIV	Human Immune- deficient Virus
HT	Hypertension
ILS	Integrated Logistic System
LGA	Local Government Authority
LIC	Low – income Country
MDG	Millennium Development Goal
MIC	Middle – income Country
MOHSW	Ministry of Health and Social Welfare
MSD	Medical Store Department
OPD	Outpatient Department
PHF	Public Health Facility
RMO	Regional Medical Officer
STG	Standard Treatment Guidelines
STI	Sexually Transmitted Infection
TB	Tuberculosis
WHO	World Health Organization

ABSTRACT.

Objective: To determine and assess the availability, affordability and prescribing pattern of essential medicines in public health of Tanzania. *Setting:* Availability, affordability, and rational use of medicines were assessed in primary health care centers in six different geographical areas of Tanga region.

Methods: This was a cross-sectional survey in accordance with the WHO guidelines for monitoring and assessing the pharmaceutical situation in developing countries, which was conducted between May and June 2011 in Tanga. For this survey, a total of 30 public health facilities were selected from the six different geographic areas identified in Tanga and 600 clients were interviewed during the study.

Results: The mean average number of medicines prescribed by physician was 2.9 per prescription. The number of prescriptions containing an antibiotic was 66.61% on average. The number of prescriptions containing injectable medicines was 25.72%, with a considerable variation among facilities. Adherence of prescribers to standard treatment guidelines showed only 70.08% of prescriptions were in accordance with the national guidelines for treating various disease conditions. About 61.75 % of the 14 items monitored was available in Public health facilities. Average mean of 66.55% of the medicines prescribed by the physician were dispensed by the health facility medicine dispensing unit. The study revealed a mean stock – out duration of 80.85 days. The correct medicine labeling criteria for prescriptions were met in 62.29% of the analyzed prescriptions. Adequate patient knowledge about the dispensed medicines was met only for 83.85% of patients. Of the 30 facilities, only 19 (63.3%) reported to have the tools in hand and this was proved by physical observation. Medicine availability of 71.43 % and average stock- out duration of 54.37 days per year and good quality of storage condition were observed at the zonal medical store in the region.

Conclusion: The prescribing patterns of essential medicines in the region were varying across district with the quite low number of medicines per prescription. The use of antibiotics and injectable medicines were considerable low in most health facilities. The overall availability of medicines in the region is still very low. The stock-out duration of essential medicines is still very high in the region. Affordability of essential medicines in the region was good with an overall ratio that indicated the medicines are affordable

in public health facilities. The quality indicators show that storage condition of medicines in the region was satisfactory with very low number of expired medicines on the shelves. Furthermore most health facilities have updated STG and NEML that are used by health care providers.

CHAPTER ONE:

1. INTRODUCTION:

In Tanzania devolution has a far reaching impact on the health sector, whereby Local Government Authorities (LGAs) have become responsible and Ministry of Health and Social Welfare (MOHSW) has withdrawn from direct service provision at district and municipal levels. The main strategy of the health sector in Tanzania has been a focus on partnership for delivering the Millennium Development Goals (MDGs) by strengthening the effort to reduce child and maternal mortality and to control important infectious diseases, as well as, effort to improve the environment and access to clean water. The health sector strategic plan intends to embark on the primary health service development program, implementing a referral system, improving quality of life and human resources for health of which will improve the accessibility and qualities of health services and contribute to achieving the MDGs [6]

As in many other countries, the Tanzanian Ministry of Health and Social Welfare (MOHSW) has a mission to provide access to a sufficient quantity of safe, effective and high quality of drugs that are affordable for the whole population. In the 1990s, the first National Health Policy was adopted with development of the national drug policy. The Tanzania national drug policy is based on making essential medicines available and affordable to those who need them, ensuring the safety, efficacy and quality of all medicines and improving prescribing and dispensing practices by health workers and the public [1].

A national essential medicine list has been adopted and updated recently, and essential drug production is governmental-subsidized in order to increase the availability and affordability of drugs. Drug procurement is also centralized to Central Medical Stores Department (MSD) which is the Government agency responsible for procuring most of the imported medicines for the public. Other private companies and Wholesalers import medicines as alternative supply to

the private sector. At present the national regulatory is well developed and functioning. Essential medicines are estimated to be available and affordable for more than 75% of the population.

Rational use of medicines is defined in act whereby patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, and at affordable prices (WHO 2001). Essential drugs offer a cost- effective solution to many health problems in developing countries. They should be selected with due regard to disease prevalence, be affordable with assured quality and be available in appropriate dosage forms. Prescribers can only treat patients in a rational way if they have access to an essential drug list and essential drugs available on a regular basis [3]

In developing countries the cost of medicines accounts for a relatively large portion of total healthcare costs. As the majority of people in developing countries do not have health insurance [4] and medicines that are provided free through the public sector are often unavailable [5], medicines are often paid for out of pocket at the time of illness. Consequently, where medicine prices are high, people may be unable to procure them and therefore forego treatment or they may go into debt. For this reason, the World Health Organization (WHO) has designated affordable prices as a determinant of access to medicines (together with rational selection and use, sustainable financing, and reliable health and supply systems) [6].

In several international treaties, access to healthcare has been established as a right [7], [8]. States have a legal obligation to make essential medicines available to those who need them at an affordable cost. Determining the degree of affordability of medicines, especially in low- and middle-income countries (LICs and MICs), is an important, yet complex undertaking as affordability is a vague concept. In the public sector, where medicines are free, availability is low even for medicines on the National Essential Drugs List (EDL). The free market by definition does not control medicine prices, necessitating price monitoring and

control mechanisms. Mark ups for generic products are greater than for Innovator Brands (IBs). Reducing the base price without controlling markups may increase profits for retailers and dispensing doctors without reducing the price paid by end users. To increase access and affordability, promotion of generic medicines and improved availability of medicines in the public sector are required [9].

The study on drug prescribing patterns at medical outpatients' clinic in Southwestern Nigeria reveals that inappropriate drug prescribing is a global problem [10].

Other studies have also evaluated the drug dispensing practices and patients knowledge on drug use among the outpatients, thus identified and analyzed the problems in drug prescribing and dispensing. Studies in Nepal for example show that the average number of drug per prescription was 2.5. Only 13% (n=10591) of drugs were prescribed by generic name. Antibiotics and injections were 23.3% and 3.1% respectively [11]. Generally misuses of medicines occur in all countries. But the irrational practices are especially common and costly in developing countries. Such practices include; polypharmacy, the use of wrong or ineffective drugs, under use or incorrect use of effective drugs, use of combination products which are often more costly and offer no advantage over single compounds and common overuse of antimicrobials and injections [12].

The majority of Tanzanians cannot easily access the medicines they need; a major reason for poor access is the price of medicines. To understand more about what people pay for medicines in Tanzania, the Ministry of Health and Social Welfare in collaboration with the World Health Organization (WHO) and Health Action International (HAI) Africa conducted a countrywide survey on medicine prices in 2004. Following the dissemination of results of this survey, it was recommended to conduct medicine price monitoring twice yearly in order to generate further evidence for effective policy decisions. Findings from that

survey showed that medicines were more available in the private sector health facilities than in the public and faith based and the prices of medicines in health facilities in the private and faith based sectors were generally higher than in the public sector [13]

On the other hand, the survey revealed that affordability of key drugs for children was 51%, adults 86%, stock out duration of 28 days was 75%, the use of antibiotics for non-pneumonia Acute Respiratory Infection (ARI) was 90%, the average prescription of more than one antibiotic was 6%, average number of drug per encountered was 1.8, percentage of patients receiving injection was 14%, prescribing according to EDL was 98, 5% and percentage of expired drugs in health facilities was 13%. The general analysis of the survey data showed a considerable improvement in the performance of the pharmaceutical sector [14].

Inappropriate or incorrect dispensing can undo many of the benefits of the health care system. Dispensing is often overlooked by health planners during the development of health care delivery. It is usually considered of secondary importance to diagnosis, procurement, inventory control, and distribution. This oversight is unfortunate, because poor or uncontrolled dispensing practices can have a very detrimental impact on the health care delivery system. All of the resources required to bring a drug to the patient may be wasted if dispensing does not ensure that the correct drug is given to the right patient in an effective dosage and amount, with clear instruction, and in packaging that maintains the integrity of the drug. Since the dispenser is often the last person to see the patient before the drug is used, it is important that the dispensing process be understood as it affects drug use and availability. Dispensing is a critical and integral part of the drug use process. Up to now, the importance of dispensing has been neglected in training and in essential drugs programs. The incredibly short dispensing times seen in many of the country indicator surveys reflect the serious situation that exists. [15].

1.2 PROBLEM STATEMENT

The MOHSW has been conducting a pilot study in Tanga to adopt the direct medicines delivery system in the public health facilities. The pilot study began in October 2009 with the MSD delivering the medicines direct to the health facilities and monitoring the reporting and requesting systems for essential medicines. Currently all public health facilities request the medicines from the Medical Store Department through their District office. The MoHSW trained most of health workers in Tanga Region on the integrated logistic system (ILS) in 2008, which is used for requesting and reporting of essential medicines by the public health facilities.

Despite the progressive success in the pharmaceutical supplies in the public health facilities in Tanzania, there are evidences of poor access to essential medicines, poor prescribing habits among health workers, including irrational use of medicines, high number of medicines per prescription, high number of medicines in stock and high number of injectable formulations and antibiotics per prescription.

1.3 RATIONALE

The Tanzania Pharmaceutical sector is complex because it involves several stakeholders and government agencies. There is a need for systematic monitoring of the impact of country strategies and activities on access and use of medicines. In its operational package for monitoring and assessing the pharmaceutical situation in country, WHO has developed three levels of indicators and corresponding data collection tools. Level I indicators provide a rapid means of obtaining information on existing infrastructure and key processes of each component of pharmaceutical sector. Level II indicators provide systematic data to describe the degree of attainment of the national policy objectives on access and rational use of quality medicines [15]. This study will focus on level II indicators which are designed to provide countries with a practical and feasible tool to develop systems for monitoring the pharmaceutical situation in their country. It entails methods for regularly monitoring and assessing national drug policies while minimizing the investment of time, people and money. It is intended to demonstrate that in the long term, regular monitoring is not difficult and can be done in a cost-effective manner. It will also encourage country to allocate a portion of its budget for project grants to support monitoring and evaluation of the result of its pharmaceutical policy and development of a plan of action.

However the Tanzanian MOHSW has not dedicated considerable financial and human resources to monitoring the efficiency of the pharmaceutical sectors in terms of rational use of medicines.

Therefore the objective of the present study was to evaluate physician prescribing patterns, the availability and affordability of medicines, the quality of drug supply and the availability of information in public health facilities in Tanga region in Tanzania using WHO tool. Basing on the results of this study proposal, we intended to propose possible interventions for the improvement of the pharmaceutical sector in Tanzania.

1.4 OBJECTIVES

1.4.1 BROAD OBJECTIVE

To evaluate the availability, affordability and prescribing patterns of essential medicines in public health facilities in Tanga, Tanzania

1.4.2 SPECIFIC OBJECTIVES

1. To assess the physician prescribing patterns in public health facilities.
2. To investigate on the availability of essential medicines by the clients in public health facilities.
3. To investigate on the affordability of essential medicines in the public health facilities.
4. To determine the quality of essential medicines supply system in the public health facilities in the region
5. To assess the availability and use of guidelines and SOPs in public health facilities.

1.5 RESEARCH QUESTIONS

1. Are the essential medicines used rationally in the public health facilities?

2. Are the essential medicines available and affordable to the general public from these health facilities?

3. What are the factors influencing accumulation and/or presence of expired essential medicines in public health facilities?

4. Is there a reliable supply chain of essential medicines in the public facilities?

5. Are there means/tools to disseminate information on use and accessibility of essential medicines among public health facilities?

CHAPTER TWO

2 RESEARCH METHODOLOGY

2.1 STUDY DESIGN

This was a descriptive cross-sectional survey that aimed to determine the availability, affordability and prescribing patterns of essential medicines in the public health facilities in Tanga region, Tanzania. This study aimed to measure the outcome and impact of the direct delivery system of essential medicines in public health facilities. The study method followed the WHO essential Drug Monitoring program guidelines for monitoring and assessing the pharmaceutical situation in countries.

2.2 Study area

The survey of public health facilities was conducted in Tanga region, Tanzania while the pilot for direct delivery system of essential medicines was done at Medical Store Department (MSD) in Tanga. The sample was drawn from Tanga City, Lushoto District, Korogwe District, Handeni District and Pangani District.

2.3 Regional profile

Tanga Region is situated at the extreme northeast corner of Tanzania between 4° and 6° degrees below the Equator and 37° - 39° 10' degrees east of the Greenwich Meridian. The region occupies an area of 27,348 Sq. Kms. being only 3% of total area of the country. Tanga shares borders with Kenya to the North, Morogoro and Coast region to the South, Kilimanjaro and Arusha to the West. To the east the Indian Ocean borders it.

Administratively, the region is divided into 8 districts namely, Lushoto, Korogwe, Muheza, Handeni, Kilindi, Pangani, Tanga, and Mkinga. Mkinga is a new District split from Muheza. Handeni district, which used to occupy 48% of the total land area of the region, is now split to form a new district of Kilindi. However the Region has nine Local Government Authorities (LGAs) due to the fact that Korogwe district constitute two Local Government Authorities (LGAs).

The total area available for agriculture activities is 17,000 Sq. Kms about 62% of the total land area. The population of Tanga is estimated to be 2,076,435 in 2008 as extrapolated from 2002 Census. This is based on the projection of 2002 census (Source; Annual RMO report-2008).

The health problems in Tanga region do not differ much from the disease spectrum encountered in any other regions except for few diseases like Plaque which is mostly in Lushoto, Onchocerciasis which is more prevalent in Lushoto, Korogwe, and Muheza and Filariasis most commonly in Coastal areas. The leading causes for morbidity and mortality are (according to frequency of OPD statistics)

- Malaria
- Respiratory Tract Infection
- Diarrhoea Diseases
- Intestinal Worms
- Skin Diseases
- Anaemia
- Eye Infections
- Maternal and Perinatal Conditions
- HIV/AIDS Related Problems and STI's
- Non Communicable Diseases (HT, diabetes)

The leading Causes of death are

- Malaria
- TB/AIDS Related Problems
- Pneumonia
- Anaemia
- Diarrhoea Diseases
- Maternal and Perinatal Problems

There are health facilities in most of the villages in Tanga Region and the large population (75%) has an access to health facility within a distance of 5 Km. On the other hand, about 25% of Tanga population has no access to a health facility.

There are also growing numbers of private health facilities but mostly in urban areas except for faith-based facilities which are mostly in rural areas. By the end of June 2009 there were 13 hospitals with 1,465 beds. Five hospitals are public and 8 hospitals are private (2 private for profit). At the same time there are 33 health centers with 705 beds. Nine health centers are faith based; two private and 22 are government owned. There were 267 dispensaries, 214 governments, 31 private for non-profit, and 22 are private for profit.

There is currently a very good mix of public and private services and even working relationship as partnership, is improving.

Generally the infrastructure in public health facilities is improving due to increased funding from government and partners (donors) and also from cost sharing which plays a crucial role in running the facilities. However, many buildings and other infrastructure still need reconstruction, major repairs or extension to meet the expected standards.

Irrespective of high coverage of vaccination, utilization rate of OPD services is low throughout the region as shown below. Moreover, deliveries by skilled personnel (49%) are still low but bed occupancy rates (76%) are on the increase.

Table 2.1: Important Health Indicators

Indicator	2002	2003	2004	2005	2006	2007	2008
Utilisation of OPD	1.058	1.044	1.12	0.82	0.75	0.8	0.77
Vaccination DPT Hb3	86.0%	89.8%	88%	90.6%	92%	87.5%	84.8%
Delivery by Trained Personnel	39.5%	39.9%		48.7%	47%	49%	46.1%
Bed Occupancy Rate	61%	68.1%		69%	70%	76%	78%

Source; Annual health report 2008

Other important health indicators

- HIV prevalence among blood donors   9.8%
- HIV prevalence among pregnant women   4.8%
- Antenatal care coverage   91.9%
- Maternal Mortality Ratio   239.6 per 100,000 live births
- Health centre to population ratio   1:58,601
- Dispensary to population ratio   1:7,325
- Hospital bed to population ratio   1:902

2.3.1 Human Resource for Health

- Specialist Doctors   15
- Medical Officers   21
- Assistant Medical Officers 75
- Registered pharmacists   13
- Nursing Officers   151
- Nurse midwives   400
- Clinician to population ratio 1:16,894

Generally there is a shortage of trained personnel despite the recent government efforts to address the employment issue.

2.4 Study population

The study population was covered 8 Districts in which the sample was drawn from clients and health care providers in public facilities located within Tanga city, Lushoto District, Handeni District, Pangani District and Korogwe District, Muheza District, Mkinga District and Kilindi District

2.5 Sampling procedure

The study was conducted in Tanga Region which is divided into 8 districts. And each district is subdivided into divisions, wards and villages. A simple random sampling procedure was employed.

For the Region situation analysis, a minimum of 30 health facilities were selected and the capital regional hospital was included. The study was targeting 30 public health facilities which were selected randomly (5 Hospitals selected by convenient, 5 health centers selected by convenient and 20 dispensaries selected randomly) depending upon the size and make up of each selected district. One warehouse, the zonal medical store in Tanga was included as the sole government agency for medicine supply in the public health facilities. The sampling considered possible constraints, such as transport, time and budget ceilings.

2.5.1 Indicators used

In its operational package for monitoring and assessing the pharmaceutical situation in country, WHO has developed three levels of indicators and corresponding data collection tools. Level I indicators provide a rapid means of obtaining information on existing infrastructure and key processes of each component of pharmaceutical sector. Level II indicators provide systematic data to describe the degree of attainment of the national policy objectives on access and rational use of quality medicines. In this study the following level II indicators were used;

2.5.2 Availability and storage indicators:

- o Percentage of essential drugs available at health facilities
- o Percentage of drugs prescribed that are dispensed at health facilities

- Percentage of premises stocking one or more drugs that were past their expiry date
- Percentage of drugs adequately stored (Storage scored 0 – 11)
- Mean stock-out duration (Annual number of days on which a drug was not available in the pharmacy)
- Affordability of drugs (ratio of treatment cost of pneumonia to the lowest government weakly salary)

2.5.3 Prescribing Indicators:
- *Average number of medicines per prescription at public health facility dispensaries*
- *% patients prescribed antibiotics in public health facilities*
- *% patients prescribed injections in public health facilities*
- *% prescribed medicines on the essential medicines list at public health facilities*
- *% medicines prescribed by generic name (INN) at public health facilities*
- Percentage of prescriptions following standard treatment guidelines

2.5.4 Pharmacy dispensing indicators:
- Percentage of prescriptions where drug labeling was adequate (i.e. Medicine name, dosage and quantity dispensed)
- Percentage of prescriptions where patient knowledge was adequate (i.e. patient was able to recognize the medicine, its indication and use)

2.5.5 Information availability indicators:
- Percentage of facilities with STG available
- Percentage of facilities with essential drug list available

2.5.6 INCLUSION CRITERIA

- Areas /centers within Tanga
- All willing health facilities
- Health facilities that procure drugs from MSD
- Most rural health facilities with difficulties to reach
- Degree of urbanization

2.5.7 EXCLUSION CRITERIA

- Logistical constraints, such as transport, budget, time and security in some parts of the region such as crossing reserves.
- Nomadic populations where there very few health facilities that are operational.
- Areas or health facilities beyond the study area

2.5.8 SELECTION OF PUBLIC HEALTH FACILITIES

In order to assess the above outlined indicators for accessibility, availability and rational use of essential medicines, a total of 30 public health facilities were selected from the five districts. These facilities were catering to general outpatients and each had a pharmacy/medicine dispensing area. One of these facilities was the main (regional hospital) public hospital in the area. Of the other facilities, at least one was to be primary/ rural health center or lowest-level public health facility. The sampling was done centrally but some were identified as replacements if the facility selected in sampling was not available, had too few patients, or had totally inadequate records.

2.5.9 Selecting facilities

Public health facilities catering to general outpatients and have a medicine dispensing unit were selected

Total for region: 30 Public Health Facility (PHF) were involved in this study as follows:

- The main or biggest public hospital in the area (Bombo, Lushoto, Magunga, Handeni and Pangani)

- Five rural health center or lowest-level PHF (Pongwe, Mwera, Soni, Kabuku and Majengo)
- Twenty middle-level PHF selected.

2.5.10 Making random selection

2.5.10.1 Capital city

The following criteria were used in selecting health care facilities to be involved in the study.

i. The selection of the first facility from the list of all PHF in the capital city was done conveniently (the main/biggest hospital)

ii. The selection of the second facility was done by identifying all the health centers and randomly selecting one

iii. The remaining middle-level primary and public health facilities that are not hospitals or lowest-level public health centers were numbered

iv. Calculation of the sampling interval was done for systematic sampling, For example if there were 30 facilities in the capital city and four are to be chosen, the sampling interval was to be: 30/4 = 7.5

v. Then the identification of the 3rd, 4th, 5th and 6th facilities was performed by

1. Choosing a random whole number between 1 and 7.5, for instance 3.
2. The 3rd facility was to be the one numbered 3
3. Adding the sampling interval to the randomly chosen number: 7.5 + 3 = 10.5 (round up) = 11
4. Continuing until all 6 facilities from the capital city are chosen

2.5.11 Selecting warehouse

One regional warehouse in the area was selected purposively for inclusion in the survey. The zonal medical store department was employed in this study as is responsible with supplying the public sector with essential medicines.

2.5.12 Sampling patients for data collection

To measure the rational medicine use indicators, general outpatients encountered from health facilities were used. The patients to be recruited were restricted to general illnesses that represent a mix of health problems and ages with regard to the top ten disease patterns in the region.

Note: The indicators from the facility survey had limitations when used to well or healthy – child visits, pre- and post-natal visits, specialist consultations or even separate adult clinics for adults and pediatric cases. Therefore in this study we took caution on such cases.

2.5.13 Chorological sampling method

    a. Calculating the sampling interval was done by dividing the total number of days covered by the outpatients list by the number of patients to be selected: e.g. 365/30=12.2 days

    b. Each day covered by the outpatient list was numbered

    c. A random selection of one patient encountered between day 1 and day 12 was done

    d. Selection of each subsequent encountered by adding the sampling interval to the previous total and round up was done.

To choose a patient encountered from the patient list for each selected day, we picked a random number between 0.0 and 1.0, multiply this number by the number of patient encountered on the list and round upwards.

2.5.14 Prospective sampling

The interview of 20 patients leaving (exit interview) the dispensing area or leaving the health facility after they had been treated and received medicines to see how many of the prescribed medicines were dispensed, if the medicines were adequately labeled, if

patients were able to explain how to take their medicines and how much the patient paid out-of-pocket for medicines and in-non diagnostic fees was done. Clients leaving the health facility were randomly selected and interviewed to collect the necessary information.

2.6 **Preparation of the survey**

The coordination and oversee of the survey was done under the charge of Muhimbili University of Health and Allied Sciences (MUHAS). This was coordinated by a knowledgeable qualified Pharmacist with experience in conduct survey. The University was responsible with the following tasks:

- o Communicating with government regional officials and other local agencies to gain approval for the survey and to request personnel who will do the survey.
- o Communicating with officials and health facilities to be visited for the field test and for the actual survey
- o Selecting geographical areas and identifying facilities to be surveyed;
- o Allocating budget and requesting financial and technical support.
- o Arranging the field test exercise at Ngamiani Health center and Makorora health center in Tanga City

Before the survey was done, the tailoring of indicators was done centrally according to the regional disease conditions. The tailoring of indicators involved the following;

1. Identification of basket of key medicines and paediatric medicines

A list of 14 key medicines used to treat common health problems was selected to measure availability **Annex III,** presence of expired medicines, medicine price and stock-out duration. The selected key medicines were basic requirements at all levels of health care. When selecting the medicines, a list of 14 most common conditions treated at primary health care level was developed and the choice of medicines used to treat these conditions was made. The chosen medicines were:

- on the national essential medicines list
- The most important therapeutically and based on national treatment guidelines or at least on the consensus of experts
- the most widely used of the medicines meeting the above criteria

- Medicines expected to be available at all primary health care facilities at all times.

2. Reviewing language so as it fits terminology commonly used and ensure the use of uniform criteria for evaluating items on the checklists for conservation and handling conditions

3. For affordability, identification of treatment of choice for pneumonia and additional condition with treatment of choice was done using the STG and EML

4. Defining of the requirements for adequate labeling on medicine dispensed and standard patient knowledge was done

5. Defining what will be considered as an antibiotic, and injection

6. Developing guidelines on categorizing generic versus brand medicines

7. Identification of the acceptable guidelines and medicines lists and obtained 1 copy of each.

8. Defining 1st-line antibiotics for mild/moderate pneumonia and identify any optional conditions and medicines that will be used to measure recommended or non recommended practices

2.6.1   The Field test

The field test was done at Ngamiani Health center and Makorora Heath Centers with the aim to review the survey forms and check for the completeness and computation of the calculations.

2.6.2   Notifying the health facilities

To obtain permission from officials responsible for public health facilities, in some cases verbal permission was sufficient; in others a formal letter was sent to the District medical officers (DMOs) –(**Annex I**)

2.7   DATA PROCESSING, ANALYSIS AND REPORTING

The data were checked for completeness and consistency before making the final calculations and analysis. A double checking of data coding and entry was done. The final calculations were performed manually or using the excel data sheet in

which the formula were set. Data were entered into the survey forms and calculations based on the instructions and formulas on each form. The differences between and among group were considered statistically significant at $p<0.05$

2.7.1 Computation of indicator data

1. Availability of key medicines in public health facility dispensaries and warehouses supplying the public sector

Purpose: To measure current availability of key medicines to treat common health problems in public health facility dispensaries, private drug outlets and warehouses. Essential medicines to treat common diseases should be available in all these facilities, especially in public sector facilities providing health services for the poor. Physical availability is a basic measure of access to essential medicines.

Prerequisites: List of 14 key essential medicines to treat the most common health problems.

Source of data: Survey of 30 public health facility, and 1 warehouse.

Process: Go through the shelves and identify which of the listed essential medicines are available at the facility at the time of the survey. Only count in stock medicines in the facility at the time of the visit regardless of whether or not they are available at an offsite storage facility.

Calculation: % of key medicines available in a facility = % in stock = number of key medicines available in a facility ÷ number of key medicines reviewed x 100 National average = sum of % of key medicines available for all facilities ÷ number of facilities sampled.

2. Percent of prescribed medicines dispensed or administered to patients at public health facility dispensaries

Purpose: To measure the degree to which facilities are able to provide needed medicines.

Source of data: Sample of 20 prospective outpatient encounters at 30 public health facility.

Calculation: % of medicines dispensed = number of medicine dispensed ÷ number of medicines prescribed x 100. National average = sum of % of medicine dispensed for all public health facility dispensaries ÷ number of public health facility dispensaries sampled.

3. Stockout duration at public health facility dispensaries and warehouses supplying the public sector

Purpose: To measure availability over the past 12 months of key medicines to treat common health problems. An adequate logistic system ensures that essential medicines remain in stock at all times.

Prerequisite: List of 14 key essential medicines to treat the most common health problems.

Adequate medicines stock recording system(able to access stock records for at least 6 months).

Source of data: Survey of 30 public health facility dispensaries and 5 warehouses.

The review period should, as far as possible, cover one year and never less than six months.

Calculation: Equivalent number of days per year each medicine is out of stock = number of days each medicine is out of stock x 365 divided by number of days covered by the review for that medicine.

Average stock-out duration in each facility = average number of stock-out days = sum of the equivalent number of days per year all medicines are out of stock divided by number of key medicines reviewed.

National average = sum of average stock-out duration in all facilities number of facilities sampled.

Limitations: Results on this indicator will be influenced by the quality of stock records.

4. Percent of adequate record keeping at public health facility dispensaries and warehouses supplying the public sector

Purpose: To determine the extent to which stock records are maintained. The presence of adequately maintained and accurate stock records contributes to proper management, estimation of needs and the reorder of medicines.

Prerequisite: List of 15 key essential medicines to treat the most common health problems.

Source of data: Survey of 30 public health facility dispensaries and 5 warehouses.

Calculation: % adequate stock records = number of incidences where there are adequate records for at least 6 months ÷ number of key medicines reviewed

National average = sum of % adequate stock records for all facilities divided by number of facilities sampled.

Limitations: This indicator does not permit verification of whether the records are accurate.

5. Affordability of treatment for adults and children under 5 years of age at public health facility dispensaries

Purpose: To measure affordability of basic pharmaceutical treatment as an indicator of access to essential medicines. In most developing countries, a majority of the population pays for treatment out-of-pocket. Affordability is expressed as the ratio of the cost of treating moderate pneumonia or another condition to a standard unit of measure. For this survey, the lowest daily government salary is used. Countries may also identify an optional second unit of measure (e.g. poverty line, basket of food, etc.).

Prerequisite: Lowest government daily wage or the lowest daily wage of any appropriate majority group. Standard treatment of moderate pneumonia and other disease conditions (without hospitalization is required) for adults and children.

Source of data: Survey of 30 public health facility dispensaries and 30 private drug outlets.

Calculation: Total cost of treatment = number of units needed to complete the treatment x unit price. Equivalent number of day's wages = total cost of treatment ÷ lowest daily government salary. Ratio of cost of treatment and optional standard unit of measure = total cost of treatment ÷ optional standard unit of measure. National average = sum of equivalent number of day's wages at all facilities ÷ number of facilities sampled. National average = sum of ratio of cost of treatment and optional standard unit of measure at all facilities divided by number of facilities sampled.

6. Price variation of key medicines in public health facility dispensaries

Purpose: To assess affordability based on the variation of price among pharmacies in the country.

Prerequisite: List of predetermined medicines to treat relevant health problems and their respective preparations.

Source of data: Survey of 30 public health facility dispensaries

Calculation: Average minimum price of a specific medicine = sum of unit prices in each facility divided by number of facilities where the price could be recorded.

7. Average cost of medicines at public health facilities and private drug outlets

Purpose: To measure average cost paid by patient for medicines at public health facilities and private drug outlets as an indicator of access to essential medicines. In most developing countries, a majority of the population pays for treatment out-of pocket.

Prerequisite: Patient consent to the interview.

Source of data: Sample of 20 prospective outpatient encounters at 30 public health facility pharmacies

Calculation: Average cost = amount paid for medicines divided by number of patients reviewed.

National average = average cost for all public health facility dispensaries ÷ number of public health facility dispensaries sampled.

8. Average transportation cost to the facility

Purpose: To assess geographic accessibility in terms of how much does it cost to the patients to get to the pharmacy where they get their medicines.

Prerequisite: Patient consent to the interview.

Source of data: Sample of 30 prospective outpatient encounters at 30 public health facility pharmacies and 30 private drug outlets.

Calculation: Average cost = amount spent in transportation to get to the facility divided by number of patients/costumers interviewed.

National average = average cost for all public health facility dispensaries divided by number of public health facility dispensaries

Note: The average cost can be compared to the minimum government daily salary.

9. Presence of expired medicines in public health facility dispensaries and warehouses supplying the public sector

Purpose: To determine if expired medicines are being distributed or sold. In some countries, expired medicines are distributed or medicines are allowed to go out of date on pharmacy shelves. See section on selecting key medicines for this study.

Prerequisite: List of 14 essential medicines to treat the most common health problems.

Source of data: Survey of 30 public health facility dispensaries and 1 warehouse.

Calculation: % of expired key medicines in stock = number of key medicines with any samples beyond expiry date divided by number of key medicines in stock x 100

National average = sum of % of expired key medicines in stock at all facilities divided by number of facilities sampled.

10. Adequacy of conservation conditions and handling of medicines in public health facility Pharmacies/dispensaries and regional warehouse supplying the public sector

Purpose:　　　　To determine status of conservation conditions and handling of medicines in public sector facilities, both of which are factors that affect quality of medicines.

Prerequisite:　　Checklist of minimum criteria for adequate conservation conditions and handling of medicines at facilities.

Source of data:　Survey of 30 public health facility dispensaries and 1 warehouse.

Calculation:　　Conservation condition and handling of medicines = total number of "true" responses to items on the conservation condition and handling of medicines checklist ÷ 10 x 100.

National average = total score of all facilities ÷ number of facilities sampled.

11. Percent of medicines adequately labeled at public health facility dispensaries

Purpose:　　　　To assess quality of dispensing practice. If medicines are to be used properly, they should be labeled appropriately by the person dispensing them.

Prerequisite:　　An adequate label includes the name of the medicine, how much is to be taken and the frequency of administration.

Source of data:　Sample of 30 prospective outpatient encounters at 30 public health facility dispensaries. See page 28 for sampling instructions.

Calculation:　　% of medicines adequately labeled = total number of medicines adequately labeled ÷ total number of medicines dispensed x 100.

National average = sum of % of medicines adequately labeled at all public health facility dispensaries ÷ number of facilities sampled.

12. Percent of patients knowing how to take medicines at public health facility dispensaries

Purpose: To assess if patients have adequate knowledge about how to take their medicines.

Prerequisite: Adequate knowledge includes knowing the appropriate dosage and duration of each medicine.

Source of data: Sample of 30 prospective outpatient encounters at 30 public health facility dispensaries. See page 28 for sampling instructions.

Calculation: % of patients knowing how to take medicines = number of patients who know how to take medicines ÷ number of patients sampled x 100.

National average = sum of % patients knowing how to take medicines at all public health facility dispensaries ÷ number of facilities sampled.

13. Average number of medicines prescribed in public health facilities

Purpose: To determine the prevalence of polypharmacy, this is one measure of unnecessary prescribing.

Prerequisite: Outpatient treatment records covering the past 12 months or, if unavailable, current treatment records sufficient to randomly select 30 outpatient encounters.

Source of data: Sample of 30 outpatient encounters (retrospective or prospective) at 30 public health facilities.

Calculation: Average number of medicines per encounter = total number of medicines prescribed ÷ number of patient encounters reviewed.

National average = sum of average number of medicines per encounter from all public health facilities ÷ number of facilities sampled.

14. Percent of patients prescribed antibiotics in public health facilities

Purpose:	To determine the prevalence of antibiotic prescribing, since over-prescribing of antibiotics is one common type of inappropriate medicine use.
Prerequisite:	Understanding of which medicines should be counted as antibiotics. Definitions of medicines considered as antibiotics must be agreed upon at the national level. Antimicrobial agents are not always classified in an identical way. Indicators for antibiotic use can be sensitive to certain medicines, especially in places with high incidence of parasitic infections, such as malaria or tuberculosis. Medicines such as antiprotozoals and anthelminthics are also usually placed in a different category of antibiotics. How to classify topical antibiotics widely used in areas where trachoma, bacterial conjunctivitis and bacterial skin infection are common will also need to be considered.
Source of data:	Sample of 30 outpatient encounters (retrospective or prospective) at 30 public health facilities
Calculation:	% of patients prescribed antibiotics = number of encounters in which one or more antibiotics is prescribed ÷ number of patient encounters reviewed x 100.
	National average = sum of % of patients prescribed antibiotics in all public health facilities ÷ number of facilities sampled.

15. Percent of patients prescribed injections in public health facilities

Purpose:	To determine the prevalence of injection use, since over-prescribing of injections is one common type of inappropriate medicine use.
Source of data:	Sample of 30 outpatient encounters (retrospective or prospective) at 30 public health facilities.
Calculation:	% of patients prescribed injections = number of encounters in which one or more injection is prescribed ÷ number of patient encounters reviewed x 100

National average = sum of % of patients prescribed injections in all public health facilities ÷ number of facilities sampled.

16. Percent of prescribed medicines on the essential medicines list at public health facilities

Purpose: To measure the degree to which prescribing practice conforms to the national essential medicines list (EML). The essential medicines concept is one of the main strategies being promoted in medicines policy. More and more countries are formulating national EMLs. For most, this should be the basis for all public medicines procurement and prescribing.

Prerequisite: A current national essential medicines list officially endorsed by the ministry of health. If there is no current officially endorsed EML, then this indicator should not be measured.

Source of data: Sample of 30 outpatient encounters (retrospective or prospective) at 30 public health facilities.

Calculation: % of prescribed medicines included on the EML = number of prescribed medicines included on the EML ÷ total number of medicines prescribed x 100.

National average = sum of % prescribed medicines included on the EML at all public health facilities ÷ number of facilities sampled.

17. Percent of medicines prescribed by generic name (INN) at public health facilities

Purpose: To measure the degree to which prescribing practice conforms to the principles of generic prescribing.

Prerequisite: A clear understanding of what is meant by the term generic medicine.

Source of data: Sample of 30 outpatient encounters (retrospective or prospective) at 30 public health facilities.

Calculation: % of medicines prescribed by generic name = number of medicines prescribed by generic name ÷ total number of medicines prescribed x 100.

National average = sum of % medicines prescribed by generic name at all public health facilities ÷ number of facilities sampled.

18. Availability of standard treatment guidelines at public health facilities

Purpose: To determine if prescribers have available to them the key source of therapeutic information they need in daily practice.

Prerequisite: Identify STGs for pneumonia and another condition officially endorsed by the government, WHO or other international, academic or professional organization.

Source of data: Survey of 30 public health facilities.

Calculation: National average = number of facilities with both STGs available ÷ number of facilities sampled.

19. Availability of EML at public health

Purpose: To determine if prescribers and/or dispensers have available to them the key source of pharmaceutical information that should be the basis for all medicine prescribing and dispensing.

Prerequisite: A current essential medicines list officially endorsed by the ministry of health, region, district or health facility as appropriate.

Source of data: Survey of 30 public health facilities.

Calculation: National average = number of facilities with at least one current EML available ÷ number of facilities sampled.

For the case of this study, the summary forms were used to calculate and analyze data, make graphs and tables, and prepare reports. The summary forms automatically computed values, including a summary of indicators, once data were entered and could also generate several graphics automatically.

Statistical data analysis was performed using SPSS version 17 computer package to look into correlation, association, linear regression and differences among the various investigated parameters.

CHAPTER THREE

3 RESULTS

This chapter reports the results obtained from the survey of 30 public health facilities and 1 warehouse in Tanga region. The survey was conducted from April to mid June 2011. The public health facilities involved were 5 hospitals, 5 health centers, 20 Dispensaries and the zonal Medical store department. A total of 600 clients varying from male and female of different ages were interviewed during the exit interview and other official health care providers. The list of all health facilities visited is included in the **annex II**

The results of this study are categorized according to the specific objectives answering the research question in hand.

3.1 Physicians' prescribing pattern in public health facilities

The regional average number of drugs per prescription was 2.9 ranging from 2.0 to 3.4 in evaluated public health facilities and the number of medicines per prescription was more than 4.0. The number of prescriptions containing an antibiotic was 66.61% on average ranging across facilities from 47.06% in some to 93.33% in other health facilities.

The number of prescriptions containing injectable medicines was 25.72% on average, with a considerable variation among facilities ranging between 5.0% and 60.87%.

Adherence of prescribers to standard treatment guidelines showed only 70.08% of prescriptions on average followed national guidelines for treating various disease conditions (range across health facilities was 48.98% to 94.23%)

Table 1 shows the summarized results of prescribing indicators in the public health facilities.

Table 3.1: Summary of prescribing indicators in health facilities

	PRA (%)	PRI (%)	EML (%)	GN (%)
Mean	66.61	25.72	70.08	64.15
Median	64.86	22.88	67.31	62.02
Minimum	47.06	5.00	48.98	38.64
Maximum	93.33	60.87	94.23	90.38

PRA - patient receiving antibiotics

PRI - patient receiving injection

EML - % of prescribed medicines on Essential Medicine List

GN - (%) of medicines prescribed by Generic name

3.2 Accessibility of medicines (Availability, affordability, Price of key medicines and percent of medicines dispensed)

The average mean of, 61.75 % (ranging from 14.29 to 94.65%) of the 14 items monitored was available in Public health facilities. In only 26.7% (n= 8) of surveyed health facilities the availability of essential medicines was less than 51 % (0-50%). About 66.55% of the medicines prescribed by the physician were dispensed by the health facility medicine dispensing unit. The stock – out duration (i.e. the annual number of days during which a medicine was unavailable in the pharmacy) was 80.85 days. However in one health facility (Majengo Health Center in Korogwe) the mean stock-out duration went up 5 months. **Table 2** shows the summarized results of the accessibility indicators (Availability, affordability, Price of key medicines and percent of medicines dispensed).

Figure 3.1: percentage of availability essential medicines categorized by districts.
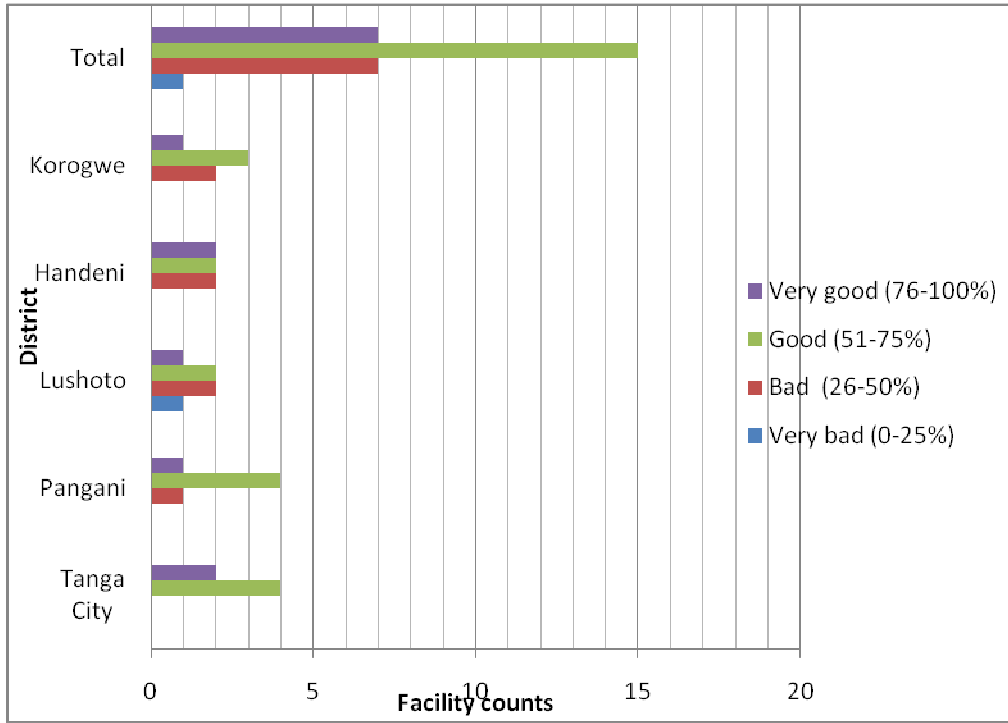
Figure 3.2: The number of stock out days in each district surveyed.
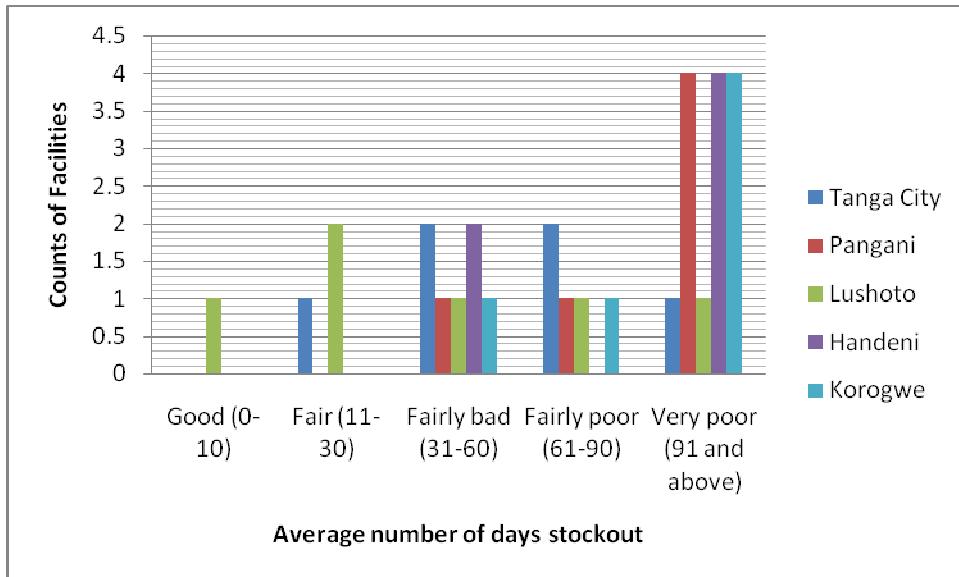
Table 3.2: Summary of access indicators in public health facilities

	KMA (%)	ASO(Days)	ACC1 (%)	ACC2 (%)	ANMP	MDP (%)
Mean	61.75	80.85	71.67	66.00	2.92	66.55
Median	64.29	77.08	70.00	70.00	3.00	66.67
Minimum	14.29	.00	50.00	40.0	2.0	46.00
Maximum	94.65	151.98	90.00	100.0	3.4	100.00

ASO - *Average stock out duration*

KMA - *% key medicine available*

ACC1 - *Adequate conservation conditions and handling of medicines in the storeroom*

ACC1 - *Adequate conservation conditions and handling of medicines in the dispensing unit*

ANMP - *Average number of medicines per prescription*

MDP - *% medicines dispensed or administered to patient*

Due to health financing policy, exemption policy and price controlling policy in Tanzania, prices of medicines are identical throughout the region. A complete course of treatment for pneumonia costs on average 1.55% (697.50 Tshs) of the lowest daily government salary. The equivalent number of day's wages in dispensary, health centers and hospitals were 0.11, 0.22 and 0.27 respectively.

Table 3.3: Affordability of treatment (pneumonia with no hospitalization)

Type of PHF	ENDW	Frequency	Percent
Dispensary	0.11	20	66.7
Health centers	0.22	5	16.7
Hospital	0.27	5	16.7
	Total	30	100.0

Lowest daily government salary (monthly salary by 30) = 4500/= Tshs.

ENDW - *Equivalent number of day's wages*

3.3 Pharmacy dispensing practices

The quality of information about medicines use offered to patients was measured using 2 indicators, via quality of drug labeling and patient knowledge (**Table 4**).The correct medicine labeling criteria for prescriptions (medicine name, dosage and quantity) were met in 62.29% of the prescriptions on average. Majority of the patients (83.85%) demonstrated adequate knowledge on the dispensed medicines (able to recognize the drug, its indication and use).

Table 3.4: Pharmacy dispensing indicators

	AL	PK
Mean	62.29	83.85
Median	63.61	80.00
Minimum	15.00	66.67
Maximum	100.00	100.00

AL - *% of medicines adequately labeled*

PK - *% of patient knowing how to take the medicines*

3.4 The quality of medicines supply system in the public health facilities in the region

A rapid assessment of zonal medical store department (MSD) warehouse showed that the number of expired medicines was not observed in the warehouse and the situation was good, with sufficient medicine availability of 71.43 % and average stock- out duration of 54.37 days per year and good quality of storage condition (average score of 10). Of the 14 medicines surveyed that were on the essential medicines list (EML) of Tanzania, five were out of stock at the zone warehouse at the time of the survey: Artemether-Lumefantrine, Erythromycine, Glibenclamide, Phenobarbitone and Atenolol. Generally there were no expired medicines in the zonal warehouse at the time of visit

Figure 3.3: Trends of medicine supply in a year at MSD office -Tanga
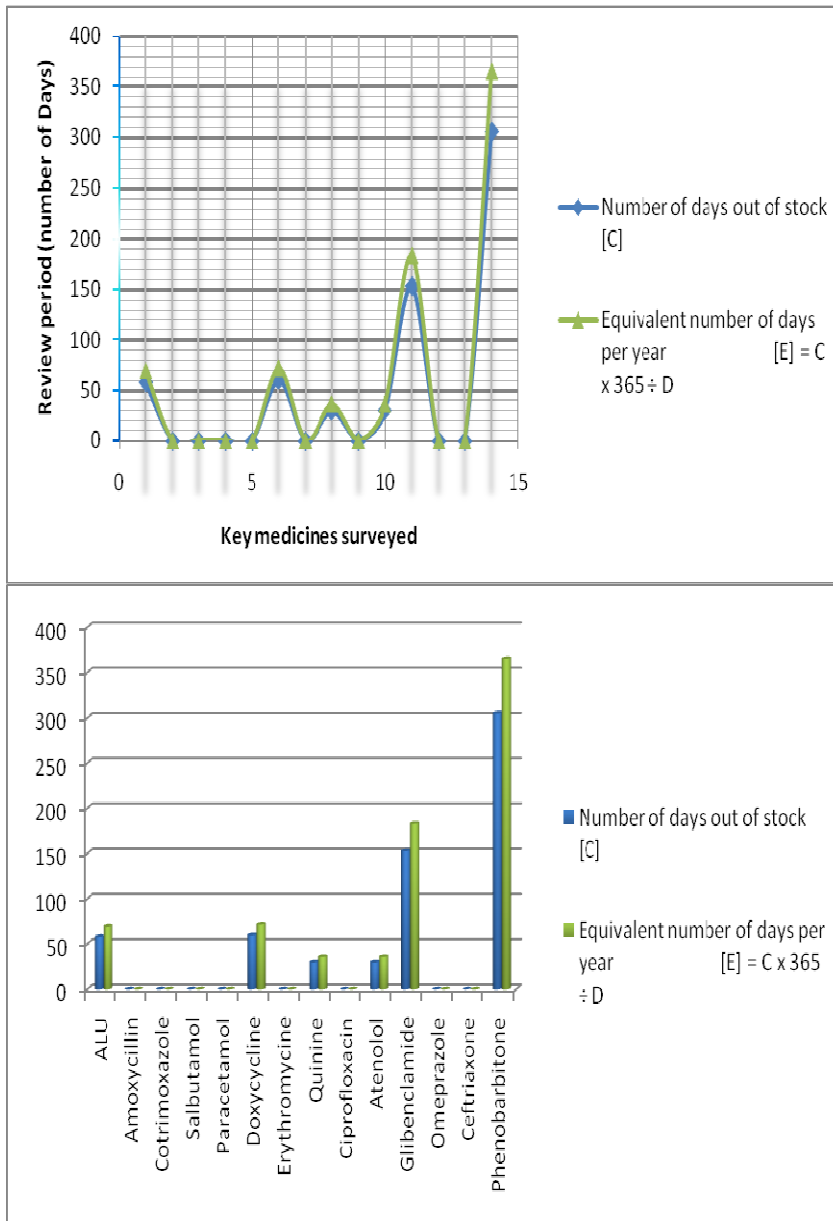
The storage indicators showed only 4 health facilities had more than 21% of expired medicine on their shelves and the average score for quality of storage was 7 on a scale from 0 to 11. The main problems encountered at the facility level included inadequate storage equipment (only 26% have adequate equipment) and temperature control (only 30% of facilities have cold chain storage with chart and only 48% have some method to control temperature.

Figure 3.4: Percent of expired medicines on shelves

Percent of expired medicines

	Tanga City	Pangani	Lushoto	Handeni	Korogwe	Total
Good (0-20%)	5	5	5	6	5	26
Poor (21-40%)	1	1	0	0	1	3
Worse (Above 41)	0	0	1	0	0	1
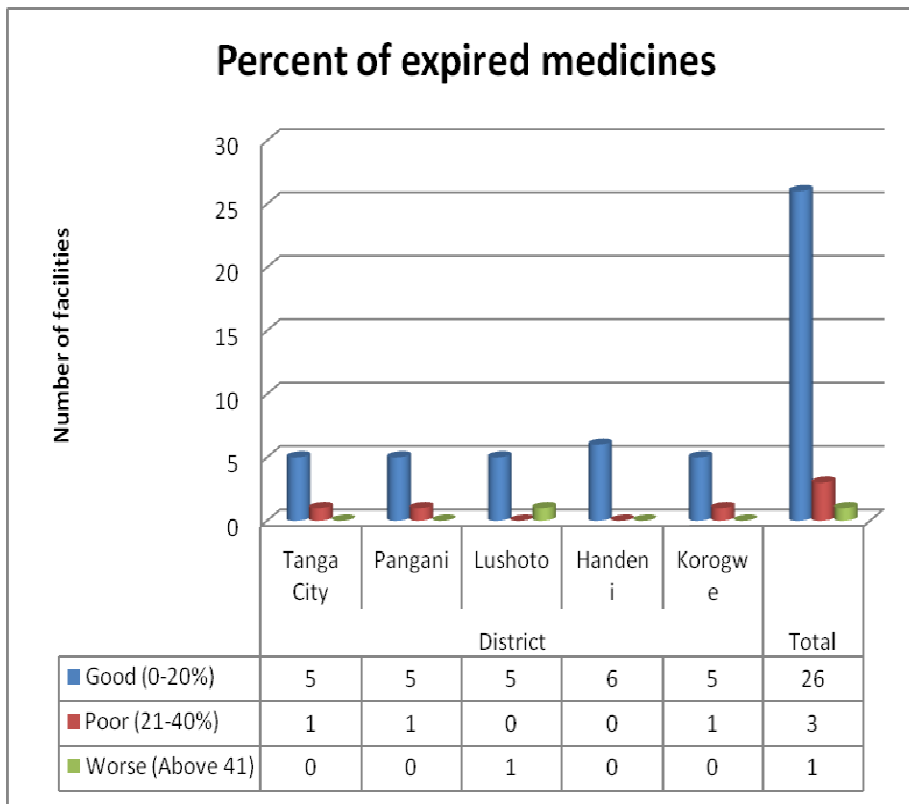
Figure 3.5: Average score for quality of medicines

Score for quality of medicines

	Tanga City	Pangani	Lushoto	Handeni	Korogwe	Total
Poor (0-5 score)	2	1	1	0	1	5
Good (6-7.5 score)	2	2	1	3	3	11
Very good (7.6-10 score)	2	3	4	3	2	14
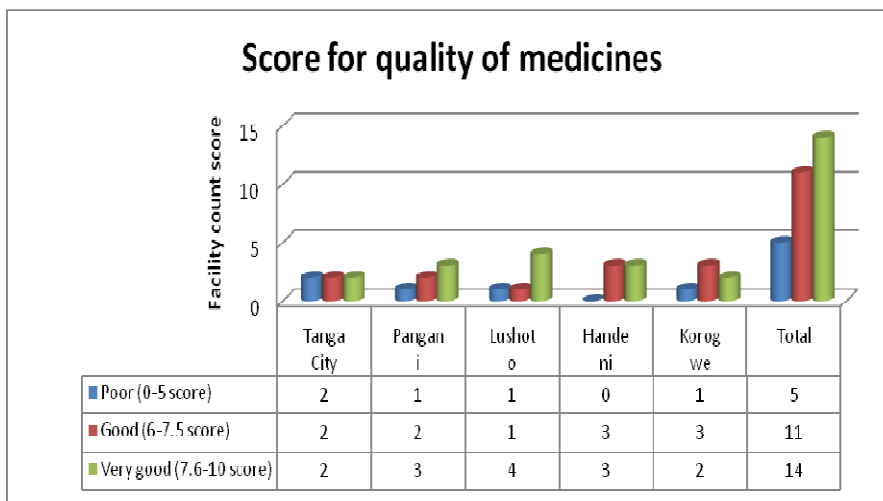
3.5 Availability of basic information in facilities

Table 5 shows the availability of the national treatment guidelines (STG) and Tanzania national medicines list (NEML). Out of 30 surveyed health facilities, 19 (63.3%) had updated STG and NEML in place this was proved by physical observation. The other 11 (36.7%) had no tools in place and this was noted as the tools were missing.

Table 3.5: Availability of STG and EML

Response	Frequency	Percent
No	11	36.7
Yes	19	63.3
Total	30	100.0

CHAPTER FOUR

4 DISCUSSION

The WHO level 2 indicators enable the evaluation of several aspects of the pharmaceutical sector such as patients' access to medicines of good quality, rational prescribing and dispensing, availability of reference information in the primary health care settings as well as the quality of warehouses [15]**.**

Physicians prescribing habits showed that the average number of medicines prescribed per prescription was 2.9 overall. The number of medicines per prescription was lower in some health facilities. One possible explanation for this finding is the easier access to health care in the town where people might visit the physician more often and have less complicated problems. When compared to the national average number per prescription of 1.8 in 2008, there is an absolute increase of number of medicines per prescription. It was observed that some prescriptions had even more than 4 medicines prescribed which indicates the presence of Polypharmacy in public health facilities.

As in many other developing countries [5], use of antibiotics and injectable formulations was high in the region. The high number of prescriptions for antibiotics (66.61%) could be attributed to the fact that in the majority of the health facilities, the data collected only covered a period of 1 month (May to June) during which the change of weather might have influenced the findings. It was observed that there was increased number of disease conditions such as acute respiratory tract infection in most parts of the region. A team testing the roll-out of fast, accurate tests for malaria in Dar es Salaam, Tanzania, had also found that antibiotic prescriptions for fever rose by nearly a quarter, from 49 to 72 per cent, raising fears that the behavior will contribute to growing antibiotic resistance [16]. The study also had suggested that the increase in absolute use of antibiotics is a mathematical consequence of knowing that fewer patients have malaria as there are no diagnostic tools for other diseases such as typhoid or pneumonia. The findings from this study reveals still the use of antibiotics is high and further study

should be done to find out the reasons so as to plan interventions to reduce antibiotic use.

The prescription of injectable medicines was also moderate low (25.72%) but varied greatly between primary health care. The World Health Organization (WHO) estimates that at least 16 billion medical injections are administered annually in developing and transitional countries. WHO categorizes up to 50 percent of medical injections in developing countries as unsafe, and considers over 70 percent of them unnecessary. What is striking about injection use is the considerable variation between districts from 5.0% to 60.87%. The indicator for percentage of injections has slightly decreased as compared to the national percentage of 29% in 1992 field tests when data were collected [15,17].This may indicate that health workers know that they should not give as many injections as they do. In one facility, the health care provider explained the use of injection as the only alternative when other oral medicines are missing at the facility. This explains the huge variation of 5% to 60.87% use of injections in that at some other facilities oral medications were missing and also patient behavior to trust in injection use as the perfect treatment. This was confirmed by the average percentage of essential medicine availability of 61.75% and 71.43% at health facilities and MSD zone office respectively. The equivalent numbers of day's essential medicines were stock- out of 80.75 and 54.37 days per year at health facilities and MSD respectively also may indicate as the factor towards use of injection medicines.

Apparently, patients and/physicians still consider that injections are more effective than oral medicines. Further investigation is needed to understand the causes of high variability.

The availability of essential medicines in the primary health facility was fairly good and on average 61.75% of 14 key medicines surveyed on the list was available at the health facility. This is less than the overall average of 65% that was obtained in the study of in-depth assessment of medicine supplies in Tanzania in 2008. Availability of key medicines selected was 71.43% on average at the zone medical store which is the main source of essential medicine supply in public health facilities. This study reveals that the

capacity of the MSD to supply medicines to the public health facility has remained stagnant as compared to the assessment made in 2008 by the MOHSW had also showed the availability of medicines at the Central MSD was 72% on average [18]. This is confirmed by the finding that on average 66.55% of the medicines prescribed by the physician were dispensed by the health facility dispensing unit/pharmacy at the health facility. There is a need to improve the service level of the MSD to provide sufficient essential medicine supply in public health facilities.

Presence of essential drugs at all times in health facilities is an important factor in provision of quality health care. The historical availability of key drugs to treat common health problems shows an adequate logistic system that ensures essential drugs remain in stock at all times. The current situation of 80.85 and 54.37 days stock-out of essential medicines at public health facilities and medical store department gives an indication that one of the key medicines was not available for more than 2 months in health facilities and more than a month at MSD. Though this shows there is an improvement of supply as it was reported before in 2008 where the average stock out of medicines in health facilities was 135 days per year in health facilities [**Error! Reference source not found.**], still there is a need to strengthen the supply system to minimize the stock-out duration. One of the efforts is the direct delivery system of medicines that has been mentioned to contribute towards improvement of stock-out in most health facilities. The main cause of stock outs at most health facilities have been reported to be the same that quantity delivered were not in conformity with the order, error in forecasting and delay in delivering the consignment. This study proposes to carry more study to investigate the causes of stock out since the directly delivery system for medicines has been operating in health facilities.

Affordability of medicines was relatively good (1.55% of the lowest daily wage for unskilled government worker) compared to the study done in 2010 that indicated the lowest paid government worker, who, however, earns more than the majority of the population, had to spend on average 1.4 days wages to pay the public sector user fees for a monthly asthma therapy [19].

In this study, affordability was calculated in terms of the number of days the lowest paid unskilled government worker would have to work to pay for one treatment course for an acute condition or one month's treatment for a disease condition. At the time of the survey, the lowest paid unskilled government worker earned Tshs 4500 (US$2.9) per day. Since there is no price regulation for medicines in Tanzania, end-consumer prices vary significantly between but also within all five districts (from facility to facility), sometimes by many multiples. However it has been suggested by WHO that in order to make medicine financing sustainable, out-of-pocket expenses should be reduced, for example by expansion of health insurance systems, and innovative external funding sources have to be sought [20,23,2421]. The end –user cost of medicines was found to almost uniform in the region. This was because Tanzania introduced a patient cost-sharing (user-fee) scheme in the public sector in 1994; exemptions apply to pregnant women, children under five years of age, the elderly above 60 years and other justified cases. However, the user fee rates were found to be fixed in dispensaries and health centers where facilities charge flat rates of TSHs. 500 and 1000 respectively. Varying prices for medicines and services were observed in district hospitals where the end-consumer medicine price has been found to be comparatively low as compared to the Survey of the medicine prices in Tanzania in 2005. Furthermore in Tanzania, Community Health Funds at district level have been introduced (42 out of 114 districts covered in 2004), and the National Health Insurance scheme for civil servants was launched in 2001. The majority of the population, however, is not covered by any health insurance yet [21, 22,25].

It should be also mentioned that only 10% of the region population is covered by health insurance and community health fund.

The observed very low quantity of expired medicines (only 10/30 health facilities had more than 1 expired drug on their shelves) and their storage (average score 7.0 on a scale from 0 to 11) confirm the fairly satisfactory quality of the pharmaceutical storage systems. No further investigation was carried as to understand the cause of expired medicines on shelves and it is proposed to carry out a study to understand the reasons leading to availability of expired medicines in public health facilities.

It has further been found that 36.7% (11 out of 30) of facility pharmacies did not have any STG and EML. The situation explains in part why EML and STG are not relied upon by prescribers in making choices of medicines. Since the EML and STG currently in use were last revised in 2007 and there were insufficient copies to be distributed to health facilities. The practitioners in these facilities have been using the STG and EML copy of 1997 and seemed had lost confidence in its use. In this regard there is a need for a regular update and producing sufficient copies of the EML and STG and these documents have to be widely distributed to all HFs. Furthermore, there is need to incorporate the EML & STG concept in all health training institutions in the country to create awareness to students and inculcate a culture of rational use of medicines during their practices.

CHAPTER FIVE

5 CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

The prescribing patterns of essential medicines in the region were varying across district with the quite low number of medicines per prescription. The use of antibiotics and injectable medicines were considerable low in most health facilities. However medicine labelling among facilities varied great with the satisfactory adequate information. The knowledge of the patients on the use of medicines dispensed was quite good.

The availability of essential medicines across the region was low in health facilities compared to that at the MSD. The overall availability of medicines in the region is still very low. The stock-out duration of essential medicines is still very high in the region.

Affordability of essential medicines in the region was good with an overall ratio that indicated the medicines are affordable in public health facilities. Exemption policy to the vulnerable group was confirmed in pregnant mothers, children under the age of 5 years and elderly patients. It was also evidence that Community health fund and health insurance schemes are in operation and still highly advocated by the region.

The quality indicators show that storage condition of medicines in the region was satisfactory with very low number of expired medicines on the shelves.
Furthermore most health facilities were found with STG and NEML that were updated and used by health care providers.

5.2 RECOMMENDATION

- The recording procedures for diagnosis and treatment of patients are inefficient and do not allow a good follow up of the prescribing patterns of the doctors. Patient diagnosis must be linked to patient treatment in order to allow an efficient monitoring of prescribing habits and to provide a reliable regional disease pattern map. Both types of information should be at least recorded in the physician logbook. A better solution is to write the diagnosis (or its code) on the prescriptions. Pilot studies should be planned to demonstrate the utility of this procedure.

- The knowledge of the patients concerning the medicines they received must be improved in order to guarantee a more rational use of medicines. Medicine information booklets (e.g. explaining the rights of the patients or the rational use of antibiotics and injectables) should be prepared and disseminated. Media campaigns might also be considered as effective means of educating the population on rational use of medicines. The cause of poor counselling by the pharmacists/dispensers should be investigated with proposals for intervention. Written information should always be provided with all necessary details (name, dosage, duration of therapy, time of intake, expiry date) to assure a rational use of medicines. The need to develop a new repackaging system should be thought for uniformity.

- Further studies should be undertaken to understand better the reasons for the high rate of prescribing antibiotics and injections and the poor adherence to standard treatment guidelines by physicians. Appropriate administrative and educational strategies should be developed and implemented to improve prescribing habits. Subsidies to the medicines should be targeted in a way that does not lead to irrational medicines use owing to the very low price of the medicines.

- Essential medicines availability in some facilities of the region needs to be increased and stock-out duration in some facilities should be reduced at least from 151 days to 14 days. Some training in management, effective procurement systems and organization of the public Zone Medical Stores Department should be considered in order to further decrease the medicine stock-out duration in public health facilities.

CHAPTER SIX

6 REFERENCES

1. MOHSW 2008. Health Sector Strategic Plan III, July 2009 – June 2015, "Partnership for Delivering the MDGs". Dar es Salaam: The United Republic of Tanzania.

2. Managing Drug Supply pg 57

3. Sunnil Karande, Punam Sankhe & Mudhuri Kurkarni. Patterns of prescription and drug dispensing. Indian, pediatr 2005; 72 (2): 117-121

4. Dror DM, Preker AS, Jakab M (2002) The role of communities in combating social exclusion. In: Dror DM, Preker AS, editors. Social reinsurance - a new approach to sustainable community health financing. Washington (D.C.); Geneva: The World Bank Group and the International Labour Office.

5. Cameron A, Ewen M, Ross-Degnan D, Ball D, Laing R (2009) Medicine prices, availability, and affordability in 36 developing and middle-income countries: a secondary analysis. Lancet 373: 240–249.].

6. World Health Organization (2008) Access to medicines. Available: http://www.who.int/trade/glossary/story002/en/ Accessed 22 April 2009.

7. United Nations (1948) the universal declaration of human rights, article 25. Available: http://www.un.org/Overview/rights.html#a25. Accessed 22 April 2009.

8. United Nations (1966) International covenant on economic, social and cultural rights, article 12. Geneva. Available: http://www.unhchr.ch/html/menu3/b/a_cescr.htm. Accessed 22 April 2009.

9. Babar ZU, Ibrahim MI, Singh H, Bukahri NI, Creese A. Evaluating drug prices, availability, affordability, and price components: implications for access to drugs in Malaysia. PLoS Med. 2007 Mar 27;4(3):e149.

10. Enwere OO, Falade CO,Salako BL. Drug prescribing pattern at the medical outpatient clinic of a tertiary hospital in Southwestern Nigeria. Pharmacoepidemiol Drug Saf 2007; 16: 1244- 9.

11. Saurav Ghimire,Sushil Nepal, Sushil Bhandari, et al. A prospective surveillance of drug prescribing and dispensing in a teaching hospital in Western Nepal. JPMA 59:726; 2009.

12. Blum NL. Drug Information Development. A case study Nepal. Rational Pharmaceutical Management Project. United States Pharmacopoeia (online) 2000.

13. MoHSW, WHO, HAI; Medicine price monitor Nov – Dec 2006

14. MoHSW/WHO. Baseline survey of the pharmaceutical sector in Tanzania 2002. Role of Dispensers in Promoting Rational Drug Use. A session guide.

15. WHO.int/medicinedocs. How to investigate drug use in health facilities

16. http//www.allafrica.com.

17. WHO 2008 World Health Organization (WHO). Injection Safety Programme. (www.who.int/injection_safety/en/; accessed 29 September, 2008

18. MOHSW 2008. In-depth assessments of the medicines supply system in Tanzania. Dar es Salaam: Ministry of Health and Social Welfare

19. Tanzania Standard Treatment Guideline and National essential medicines list, 2007

20. Christine Häfele-Abah et al 2010: Improving access to high-quality low-cost essential medicines in Tanzania– assessing an NGO's contribution.

21. WHO 2004. WHO policy perspectives on medicine - equitable access to essential medicines: a framework for collective action. Geneva: World Health Organization

22. United Republic of Tanzania (URT), 2005. Survey of the medicine prices in Tanzania. Ministry of Health in collaboration with the World Health Organization. Available from: http://www.afro.who.int/en/tanzania/tanzania-publications/cat_view/1501-english/1235-clusters-andprogrammes/ 760-health-systems-a-services-hss/788-essential-medicines-edm/1883-reports-of-medicineprices- surveys.html [accessed May 2010]

23. World Health Organization (2000) Global comparative pharmaceutical expenditures with related reference information. Health Economics and Drugs EDM Series No. 3. Geneva: World Health Organization.

24. World Health Organization (2004) WHO medicines strategy 2004–2007 - countries at the core. Available: http://www.who.int/medicinedocs/collect/medicinedocs/pdf/s5416e/s5416e.pdf Accessed 28 April 2009.

25. Van Doorslaer E, O'Donnell O, Rannan-Eliya RP, Somanathan A, Adhikari SR, et al. (2006) Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data. Lancet 368: 1357–1364.

7 ANNEX

7.1 I: Letter to facilities

Dear_____

Pharmaceuticals are important in maintaining and providing health services to the population. It is also important to know if the population has access to essential medicines of good quality and whether or not these medicines are being used properly. Your facility has been selected as one of the facilities to be included in a regional survey to assess the pharmaceutical situation in region. On ……………….. of the visit, our staff will be visiting your facility to gather some information on the availability of some key essential medicines and how these are being used. While at your facility, our staff will need to access list all areas where access is needed, i.e. the last 12 months of outpatient records, the last 12 months of stock records.

Thank you for your cooperation.

……………………….

Sincerely,

7.2 ll: LIST OF PUBLIC HEALTH FACILITIES VISITED

		District				
SNO.	**Name of Facility**	**Tanga City**	**Pangani**	**Lushoto**	**Handeni**	**Korogwe**
01	Bombo Hospital	1	0	0	0	0
02	Bushiri Disp	0	1	0	0	0
03	Chekelei Disp	0	0	0	0	1
04	Chogo Dispensary	0	0	0	1	0
05	Depot Dispensary	1	0	0	0	0
06	Funta Dispensary	0	0	1	0	0
07	Handeni Hospital	0	0	0	1	0
08	Kabuku H/C	0	0	0	1	0
09	Kimanga Disp	0	1	0	0	0
10	Kirare Dispensar	1	0	0	0	0
11	Konje Dispensary	0	0	0	1	0
12	Kwamndolwa Disp	0	0	0	0	1
13	Kweditilibe Disp	0	0	0	1	0
14	Lushoto Hospital	0	0	1	0	0
15	Lwengera Disp	0	0	0	0	1
16	Magamba Disp	0	0	1	0	0
17	Magazini Disp	0	0	0	0	1
18	Magunga Hospital	0	0	0	0	1
19	Majengo H/C	0	0	0	0	1
20	Mapojoni Dispens	1	0	0	0	0
21	Masaika Dispensa	0	1	0	0	0
22	Mkwanja Disp	0	1	0	0	0
23	Mponde Vuga Disp	0	0	1	0	0
24	Msanja Disp	0	0	0	1	0
25	Mwera H/C	0	1	0	0	0
26	Pangani Hosp	0	1	0	0	0
27	Pongwe HC	1	0	0	0	0
28	Soni H/C	0	0	1	0	0
29	Tongoni Disp	1	0	0	0	0
30	Vuga Dispensary	0	0	1	0	0
	Total	6	6	6	6	6

7.3 Key Medicines Surveyed

	List Key medicines Selected	
		Strength
01	ALU Tablet	120/20 mg
02	Amoxycillin Capsule	250 mg
03	Cotrimoxazole Tablet	400/80 mg
04	Salbutamol Tablet	4 mg
05	Paracetamol Tablet	500 mg
06	Doxycycline capsule	100 mg
07	Erythromycine Tablet	250 mg
08	Quinine Tablet	300 mg
09	Ciprofloxacin Tablet	500 mg
10	Atenolol Tablet	50 mg
11	Glibenclamide Tablet	5 mg
12	Omeprazole Tablet	20 mg
13	Ceftriaxone Vial	250 mg
14	Phenobarbitone Tablet	30 mg

8 APPENDICIES

8.1 QUESTIONAIRE

General information: Public health facility pharmacy/dispensary

Facility   Date

Region   investigator

1. Does the law require a pharmacist to be present during hours of operation of public/government pharmacies/drug outlets?

   Yes   No

2. Is the pharmacist present at the time of visit?

   Yes   No

3. Who is dispensing during the time of visit? (check all that apply)

   Pharmacist   Pharmacy aide/health assistant

   Nurse   Untrained staff

4. Availability of Medicines

Key Medicines to treat common conditions	In Stock (Yes = 1, No =0)	Expired Medicines on shelves (Yes =1, No=0)
01. ALU		
02. Amoxycillin		
03. Cotrimoxazole		
04. Salbutamol		
05. Paracetamol		
06. Doxycycline		
07. Erythromycine		
08. Quinine		
09. Ciprofloxacin		
10. Atenolol		
11. Glibenclamide		
12. Omeprazole		
13. Ceftriaxone		
14. Phenobarbitone		
15.		

5. Affordability: Price of key medicines.

Key Medicines to treat common conditions	Preparation unit	Lowest unit price of medicines paid by patient	Lowest unit price of the medicine paid by facility
01			
02			
03			
04			
05			
06			
07			
08			
09			
10			
11			
12			
13			
14			
15			
Paedriatric Medicines			
01			
02			
03			
04			

6. Affordability of treatment – moderate pneumonia for adults and children under 5 years of age
(Equivalent number of days' wages)

Medicine/INN and preparation [A]	Number of units needed to complete treatment [B]	Unit price (one vial, tablet, or capsule)[C]	Total cost of treatment [D]	Equivalent number of days wages [F]
Moderate pneumonia (without hospitalization)				
Adult treatment of choice				
Child <5 treatment of choice				
Other adult condition (without hospitalization)				
Adult treatment of choice				
Other pediatric condition (without hospitalization)				
Child <5 treatment of choice				
[E] = Lowest daily government salary (divide weekly salary by 7 or montly salary by 30)=				

7. Average stock out duration and adequate record keeping

Key Medicines to treat common conditions	Records cover at least 6 months within the past 12 months Yes = 1, No = 0	Only collect data for medicines with records covering at least 6 months within the past 12 months		
		Number of days out of stock	Number of days covered by the review (at least 6 months)	Equivalent number of days per year
01				
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				

8. Adequate storage conditions and handling of medicines in storeroom and dispensing area

SN	Checklist	Storeroom (True = 1, False = 0)	Dispensing Area/Room (Tue = 1, False =0)
01	There is a method in place to control temperature (e.g. Roof and ceiling with space between the minimum hot climates, air conditioners, fans, etc.)		
02	There are windows that can be opened or there are air vents.		
03	Direct sunlight cannot enter the area (e.g. Window panes are painted or there curtains/blinds to protect against the sun).		
04	Area is free from moisture (e.g. Leaking ceiling, roof, drains, taps, etc.)		
05	The is a cold storage in the facility		
06	There is a regularly filled temperature chart for the cold storage		
07	Medicines are not stored directly on the floor		
08	Medicines are stored in the systematic way (e.g. Alphabetical, pharmacological)		
09	Medicines are stored first -expiry-first out (FEFO)		
10	There is no evidence of pests in the area		
11	Tablets/capsules are not manipulated by naked hand.		

9. Average number of medicines per prescription

Pati ent sex M/F	Age 1) less than 5 2) older children 3) Adults 4) More than 60	Number of medicines prescribe d	Number of medicines dispensed or administered	Number of medicines adequately labeled	Patient knows how to take medicines Yes=1, No = 0	Amount patient paid for purchased medicines	How long does it take the patient get to the health facility today?	How much did it cost him/her to come here
01								
02								
03								
04								
05								
06								
07								
08								
09								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

10. Average no. of medicines dispensed, adequate labelled and patient knowledge

Type R/P	No. of medicines prescribed	No. of medicines dispensed	Number of medicines adequately labeled	Patient has adequate knowledge (yes =1, no =2)
01				
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

11. Average number of medicines prescribed per prescription.

Indicators:		Average number of medicines per prescription				% prescribed medicines on EML	% medicines prescribed by generic name
		% patients prescribed antibiotics/injections					
Type R/P	Age 1) less than 5 2) older children 3) Adults 4) More than 60 [A]	Patient sex M/F [B]	Number of medicines prescribed [C]	Antibiotic prescribed Yes=1, No=0 [D]	Injection prescribed Yes=1, No=0 [E]	Number of prescribed medicines on EML [F]	Number of medicines prescribed by generic name (INN) [G]
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
[A]=Sum of cases		$[B1]$ = Sum females =	$[C1]$ = Sum of C =	$[D1]$ = Sum of D=	$[E1]$ = Sum of E =	$[F1]$ = Sum of F =	$[G1]$ = Sum of G =
[A1+2]=Sum of paediatric cases		$[B2]$ = % females = $B1 \div A1 \times 100$ =	$[C2]$ = Average number of medicines = $C1 \div A1$ =	$[D2]$ = % receiving antibiotics = $D1 \div A1 \times 100$ =	$[E2]$ = % receiving injections = $E1 \div A1 \times 100$ =	$[F2]$ = % EML = $F1 \div C1 \times 100$ =	$[G2]$ = % INN = $G1 \div C1 \times 100$ =
[AP]= % of paediatric cases=A1+2 $\div$ A x 100=							

12. Guidelines (STG) and Essential medicines List (EML)

District   Date

Facility   Investigator

Standard treatment guidelines (STG) available	Yes=1, No= 0
STG for Malaria	
STG for HIV/AIDS	
STG for PMTCT	
STG for TB/HIV	
Essential Medicine List (EML) updated within last 5 years available	Yes=1, No= 0
National EML	
District EML	
Facility specific EML	
Other EML (describe)	

Zonal warehouse supplying the public sector

Indicator: Adequate conservation conditions and handling of medicines

Facility ………………………………… Date……………………………

Region ………………………………… Investigator………………………

Checklist Storeroom	True=1, False=0 [A]
1. There is a method in place to control temperature(e.g. roof and ceiling with space between them in hotclimates, air conditioners, fans, etc.).	
2. There are windows that can be opened or there are air vents.	
3. Direct sunlight cannot enter the area(e.g. window panes are painted or there are curtains/blindsto protect against the sun).	
4. Area is free from moisture(e.g. leaking ceiling, roof, drains, taps, etc.).	
5. There is a cold storage in the facility.	
6. There is a regularly filled in temperature chart for the cold storage.	
7. Medicines are not stored directly on the floor.	
8. Medicines are stored in a systematic way(e.g. alphabetical, pharmacological).	
9. Medicines are stored first-expiry-first out (FEFO).	
10. There is no evidence of pests in the area.	
	[A1] = Sum of A =
	[A2] = Score = A1 ÷ 10 x 100 =

Zonal warehouse supplying the public sector

Indicator: Average stockout duration
        Adequate record keeping

Facility …………………………………..   Date……………………………………….

Region…………………………………   Investigator ………………………….

Key medicines to treatcommon conditions [A]	Records cover at least 6 months within the past 12 months Yes=1, No= 0 [B]	Only collect data for medicines with records covering at least 6 months within the past 12 months		
		Number of days out of stock [C]	Number of days covered by the review (at least 6 months) [D]	Equivalent number of days per year [E] = C x 365 ÷ D
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
	[B1] = Sum of B =			[E1] = Sum of E =
	[B2]= % adequate records =B1 ÷ 15 x 100 =			
[F] = Average number of stockout days = E1 ÷ B1 =				

Zonal warehouse supplying the public sector

Indicator: % key medicines available
          % medicines expired

Facility ………………………………   Date…………………………………

Region ………………………………..   Investigator…………………………

Key medicines to treat common conditions [A]	In stock Yes=1, No=0 [B]	Expired medicines on shelves Yes=1, No=0 [C]
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
	[B1] = Sum of B =	[C1] = Sum of C =
	[B2] = % in stock = B1 ÷ 15 x 100 =	[C2] = % expired = C1 ÷ B1 x 100 =

8.2   INFORMED CONSENT AGREEMENT (ENGLISH VERSION)

Invitation

Good morning/Good afternoon.

My name is ………………………………………………………………………….

From Muhimbili University of Health and Allied Sciences

You are being invited to take part in a research project, which aims to evaluate the availability, affordability and prescribing patterns of essential medicines in public health facilities.

Your decision to take part in the study is voluntary and you may refuse to take part or to stop taking part at any time and you may refuse to answer any question asked.

This study has been given approval from the Directorate of research and publication committee of Muhimbili University of Health and Allied Sciences and permission to do research has been obtained from the Regional Medical Officer.

Procedure

If you agree to participate, you will be interviewed today. The interviewer will ask you about availability, accessibility and prescribing patterns of essential medicines in your facilities. The interview will take about 30 to 45 minutes.

Benefit

The information you provide will help us to design a better possible interventions for the improvement of the pharmaceutical sector in Tanzania and address the challenges and concern facing pharmaceutical sectors in Tanzania. Your information will be useful to researchers, policy makers, communities and other people in the pharmaceutical sectors.

Risk/Discomfort

Some of the questions may be sensitive and personal, so you might feel uncomfortable at the same time we are going to take your time.

Alternative

The only alternative is not to take part in this study.

Study withdrawal

You can stop being a study participant at any time. During the interview, you can stop the interview by asking the interviewer to stop. The interviewer may stop you from

being in the study if he or she believes you're unable to answer questions because of tiredness.

Cost/Compensation

This exercise is voluntary, therefore there will be no payment given to the patients. Only incentives will be given for those who will participate.

Confidentiality

All the information you provide will be confidential. Code number will identify the information you provide in research record. We will not use your identity in any report or publication about this research.

Questions

In case you have any question(s) you can ask the principle investigator in this study Mr. Michael Kishiwa Francis whose phone number is 0713 550583 and Dr. Kennedy Mwambete - 0787- 508782

They will be glad to answer any question at any time.

Acceptance

If you have understood and ready to participate please sign below;

Signature of the respondent/or witness……………………………………….

Date………………