Evaluating the Availability of Non -Program Essential Drugs at Defense Health Centers: The case of Ethiopian Ministry of Defense Selected Health Centers

BY; Mulugeta Worku

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DECLARATION

I declare that this thesis entitled as “Evaluating the Availability of Non-Program Essential Drugs at Defense Health Centers: The case of Ethiopian Ministry of Defense Selected Health Centers”, is my original work, prepared under the guidance of Tariku Jebena (PhD). All sources of materials used for the thesis have been all acknowledged. I further confirm that the thesis has not been submitted in part or full to any other higher learning institution for the purpose of earning any degree.

Declared by:-

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This is to certify that the thesis carried out by Mulugeta Worku Tafa, entitled: "Evaluating the Availability of Non-Program Essential Drugs at Defense Health Centers: The case of Ethiopian Ministry of Defense Selected Health Centers" and submitted in partial fulfillment of the requirements of Master of Art in Logistics and Supply Chain Management complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Statement of Certification

This is to certify that the thesis carried out by Mulugeta Worku Tafa on the topic entitled:"Evaluating the Availability of Non-Program Essential Drugs at Defense Health Centers: The case of Ethiopian Ministry of Defense Selected Health Centers" is his original work and is suitable for submission for the award of Masters of Art Degree in Logistics and Supply Chain Management.

Advisor

Tariku Jebena (PhD)

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List of Abbreviation

AIDS ……. Acquired immune deficiency syndrome

ED……. Essential Drug

EML……. Essential Medicine list

FMHACA……. Food, Medicines and Healthcare Administration and Control Authority

FMOH …… Federal minister of health

HAI……. Health Aid international

HIV …… Human immune virus

HSDP……. Health Sector Development Plan

LIAT……. logistic Indicator Assessment tool

MDSHs ……. Ministry of defense Selected Health Centers

MOE…….. Ministry of education

MOFED……. Ministry of Finance and Economic Development

MOH …… Ministry of Health

MSH …… Management Science for Health

NGO……. Nongovernmental organization

NPD……. Non-Program Drug

PFSA …… Pharmaceutical Fund and Supply Agency

PLMP …… Pharmaceutical Logistic Master Plan

PSA…….. Pharmaceutical supply Agency

RDF…… Revolving drug fund

TB……Tuberculosis

TEM …….. Tracer Essential Medicine

WHO…….. World Health organization

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Abstract

In Ethiopia, majority of the common leading causes of morbidity and mortality can be substantially reduced if essential drugs (EDs) are made available and appropriately used, where functioning of the drug management cycle is necessary. Thus, tracking changes and improvements of the pharmaceutical logistics performance is important. The aim of this study was to Evaluate the level of availability of essential medicines of Health Centers in Ministry of defense giving emphasis to non-program drugs (NPDs). A facility based descriptive cross sectional survey of the pharmacy of HCs in Addis Ababa and HCs that where found within 150 km from Addis Ababa was conducted using both quantitative and qualitative methods. seventeen HCs were included in the study.

Overall availability of non program essential tracer medicines at the day of visit across the 17 Health Centers was found to be 85.88 % .one year retrospective Bin card review showed tracer Essential medicines where available on average for 11 month(92%) in a year ,which corresponds with an average 31 days(8%) out of stock duration in year. In conclusion, overall availability of EM is encouraging but works are needed to achieve WHO target of 100%. major problem common to all HC's regarding drug management cycle Where ,drugs for essential drug list where not being selected by DTC, majority of the Centers don't use formula for quantification, procurement by brand names was common practice, non availability of computer system and software and prescribing of medicines which ware not listed on essential medicine list where found from the study.DTC in HCs should be strengthened by each pharmacy units of the HCs and other stakeholders who closely work with the HCs such as defense health directorate. Usage of statistical formula based on consumption pattern needs to be emphasized and training regarding different statistical quantification methods needs to be initiated by the main health directorate. Procurement by Brand names should be avoided by the individual Health Centers.

Key words: Drug management cycle, non-program drugs, Usage of EML, logistic management information system, LIAT.

CHAPTER ONE;INTRODUCTION

1.1.Background of the study

Health is an important indicator of the status of development of a society and country, and medicines are the cornerstone and integral part of every health care system. That is why efforts began to ensure medicines widespread availability began within a decade after the first modern medicines became available .Modern health care is unthinkable without the availability of necessary medicines. They not only save lives and promote health, but prevent epidemics and diseases too(Hertzman, 2001).

During the Alma-Ata conference in September 1978, the accessibility of essential medicines were reaffirmed as basic components of primary health care .Essential medicines are those that satisfy the priority health care needs of the population. They are selected with due regards to public health relevance, evidence on safety, efficacy, quality and comparative cost-effectiveness. They are intended to be available within the context of functioning health systems at all times in adequate amount, appropriate dosage forms with assured quality. (WHO,1978).

Access to health care can be defined as a construct that encompasses distinct dimensions, which are distinguished by sets of specific relationships Four dimensions of access have particular relevance to essential medicines, vaccines, and other health commodities; Availability, defined by the relationship between the type and quantity of product or service needed, and the type and quantity of product or service provided Affordability, defined by the relationship between prices of the products or services and the user's ability to pay for them Accessibility, defined by the relationship between the location of the product or service and the location of the eventual user of the product or service Acceptability (or satisfaction), defined by the relationship between the user's attitudes and expectations about the products and services and the actual characteristics of products and services.(MSH,2011)

Availability of EDs on the other hand is a construct of the components of the drug management cycle (selection, quantification, procurement and distribution), under the umbrella of police , legal framework and standard operating procedure , a failure in one part of the cycle lead to the failure of the whole pharmaceutical management process and Availability (MSH, 2011).

Ethiopian drug policy ensures that medicines which are required for prevention, diagnosis, treatment, mitigation and rehabilitation of diseases affecting the majority of Ethiopian people have to be identified and classified to respective levels of health service delivery. for executing this policy component the mandate is given to The Food, Medicine and Healthcare Administration and Control Authority of Ethiopia(EFMHACA) accordingly EFMHACA have prepared essential medicine list and revised the list five times in the past 20 years, Under the umbrella of EFMHACA Essential medicine list all Health Centers in Ethiopia prepare their own essential medicine list and are recommended to update their list at least every two year. (EFMHACA 2011)

Essential Medicines List is meant to guide the selection, procurement, production, distribution, use and storage of medicines. It can also serve as an informational and educational tool for health care professionals involved in diagnosis and treatment of diseases as well as dispensing of medicines. Furthermore, it can improve availability and promote rational use of medicines(EFMHACA 2011)

In Ethiopia Pharmaceuticals Supply Agency (PSA), formerly known as Pharmaceuticals Fund and Supply Agency (PFSA), was established as a semi-autonomous public institution in 2007 to supply quality assured and affordable essential medicines to all public Health Centers in the country using EFMHACA essential medicine list.

PSA supplies two category of essential drugs based on their source of fund, this are program essential drugs funded by NGO and donors and non program essential drugs funded by revolving drug fund or directly from government treasury. program drugs includes anti-malarial drugs, antiretroviral drugs, family planning drugs, and TB-drugs, as well as laboratory reagents, medical supplies and equipments and Non-program drugs are Drugs that exclude program drugs. Health Centers under ministry of defense receive both program and non program drugs from PSA using the budget allocated for ministry of defense from governments treasury for program drugs and from donors and NGO for non program drugs.(FMOH 2009)

This study will try to fill the paucity of data on the status, of the availability level and stock out duration of essential medicines particularly that of non-program drugs (NPDs) in Health Centers under ministry of defense health directorate in and around Addis Ababa.

1.2.Statement of problem

Access to essential medicines is to the fundamental right of every person. So The EDs should consequently be accessible always in sufficient quantities and in the suitable dosage forms and at a cost that a patient personally or society or country can bear. (Kar et al,2010; John Snow Inc. /DELIVER, 2004).

Availability of medicines is important as far as the reduction of mortality and morbidity associated with disease burden are concerned. However, lack of essential medicines is still one of the most serious public health problems. About 30 % of the world's population lacks the medicines they need. The situation is worse in the poorest parts of Africa and Asia where the figure rises to over 50 % (Adzimah et al., 2014; MSH 2011).

Poor availability of EDs is the key barrier to access to medicine especially in public sector where generic medicines availability is less than 60% across WHO regions, ranging from 32% in the Eastern Mediterranean Region to 58% in the European Region (WHO, 2011). In the poorest countries of Africa and Asia, as much as 50% of the population lacks such access. While some 10 million lives a year could be saved by improving access to essential medicines and vaccines – 4 million in Africa and South-East Asia alone . When medicines are not available in the public sector, patients will have to purchase medicines from the higher-priced private sector, or forgo treatment altogether. Since Health Centers in the public sector generally provide medicines at low cost or free

of charge, they are especially important for providing access to medicines for the poor (WHO/HAI, 2008).

In Ethiopia, majority of the common leading causes of morbidity (pneumonia, malaria, acute upper respiratory infections, helminithiasis, acute febrile illness, and diarrhea) and mortality (pneumonia, tuberculosis, malaria, neonatal sepsis and meningitis) can be substantially reduced if carefully selected, low-cost pharmaceuticals are available and appropriately used (FMHACA, 2010; FMOH, 2013). In this regard, efforts have been made to increase the accessibility of EDs such as increasing budget allocation by government and adoption of the pull system, but researches showed that availability EDs in public Health Centers in various part of the country is still a challenge (Abiye et al., 2013; Carasso et al., 2009; FMOH, 2011; Nigussie, 2014). In Ethiopia, studies on evaluating availability of essential medicine are limited to program Drugs such as contraceptives, anti-retroviral drugs, anti-tubercular drugs and anti-malarial Drugs (Daniel et al., 2012; Mohammed, 2006; GH Tech, 2009) Overall, studies dedicated to evaluate the availability of non program drugs in Ethiopia is limited and particularly in MDSHS is nonexistent.

According to the SWOT analysis done in the Health Centers under ministry of defense , major problems in the pharmacy departments in relation to the supply chain are the following. most of the time essential medicines for the different Health Centers are stock out, bin cards are not properly filled out, there is lack of qualified personnel at the supply position, inadequate storage space for the medicines, no standardized shelves for the medicines, there is forecasting, procurement and quantification problem for the medicines to be purchased, and finally there is no standard operating procedures for purchasing purpose. So this and other unmentioned problems mitigate efficient and effective supply chain management practice in the hospital. Therefore this study tries to evaluate Availability of EMs level ,duration of availability and duration of out of stock against their respective WHO recommended target to make judgment, to improve effectiveness and to inform decision makers about essential medicines availability in Ethiopian ministry of defense Health Centers.

1.3.Research questions

The Thesis has been initiated to seek answer for the following question;

What is the level of availability of non program essential medicines in Ethiopian ministry of defense Health Centers in and around Addis Ababa?

1.4.Objective of the study

1.4.**General Objective**

The general objective of the study is to evaluate the availability of non program essential drugs in Ethiopian ministry of defense Health Centers in and around Addis Ababa.

1.4.**Specific Objectives**

The specific objectives of the study are:

1. To evaluate the availability level of the non program essential drugs at the SHCs.
2. To determine the availability duration of non program essential drugs at the SHCs
3. To identify the most frequently stocked out and over stocked TEMs at the SHCs.
4. To asses drug supply management practices of the essential drugs at the SHCs.

1.5.Significance of the Study

The findings of this study provide evidences regarding the availability status of the essential drugs, Which Ethiopian ministry of defense logistic and pharmacy departments will use it as an input to improve quality of health care. In addition to this It will also provide all stakeholders & PSA performance level from their strategic objective which could be used to improve their customer service and fulfill their strategic objective. It will also contribute to the body of knowledge regarding status of Essential medicine availability. finally The finding of the study can also help police makers monitor and evaluate the outcome of currently implemented Ethiopian national drug police in glimpse.

1.6.Scope of the Study

The conceptual scope of this study is to only evaluate the availability level of non program essential drugs because program essential drugs in Health Centers use computerized bin card system data regarding their availability status is relatively easy to obtain. the geographical scope of the study Is Addis Ababa and Health Centers within 150km from Addis Ababa. In terms of population the study will only include level one and above Health Centers in Ethiopian ministry of defense

1.7.Limitation of the study

The limitations include lack of similar studies with similar setting and concentration. This study did not address all components of the Drug management cycle such as inventory management and human resource management, and financial management. The findings of this study were from only HCs perspective and did not include other stakeholders such as suppliers, manufacturer.

1.8.Operational Definitions of Terms and concepts

Stock out: unavailability of usable stocks in the store or a balance of zero on the bin cards at the store.

Non-program drugs: Drugs that exclude program drugs such as anti-malarial drugs, antiretroviral drugs, family planning drugs, and TB-drugs, as well as laboratory reagents, medical supplies and equipments.

Availability: defined by the relationship between the type and quantity of product or service needed, and the type and quantity of product or service provided.

Privet wing: refers to an official arrangement according to which medical service are provided on fee for service basis to inpatients and outpatients in public hospitals

Public wing: medical service's which are provided on free basis to inpatients and outpatients in public hospitals.

1.9.Organization of the Study

This study is organized in to five chapters. These chapters are constituted as follows. Chapter 1: Introduction- In this chapter background of the study, back ground of the hospital, statement of the problem, research questions, general and specific objectives, significance of the study, scope of the study, limitation of the study and definition of terms are included. Chapter 2: Literature review- this chapter of the study includes review of other author's articles, related literature about the subject matter and conceptual framework of the study. Chapter 3: Research methodology- this chapter comprises study area and study period, research design, target population, method of data collection and research instrument, method of data analysis and ethical consideration. Chapter 4: Analysis, interpretation and discussion of the results- this chapter will include the analysis and interpretation of data collected from the software package (SPSS) and discussion of the result. Chapter 5: summary of major findings, conclusion, recommendation and suggestion- this chapter will include conclusion, recommendation and suggestions for further research. Finally the study contains the reference and appendices.

CHAPTER TWO;REVIEW OF RELATED LITERATURE

The purpose of this Thesis is to evaluate the availability of non program essential drugs in Ethiopian ministry of defense Health Centers. The intention of this section is to review previous work in the area of essential medicine availability and constructs. The reviewed literature covers Essential medicine concept, Medicine selection, quantification, procurement, use ,Logistics Management Information System (LMIS), Ethiopian pharmaceutical logistic system, The importance of EM availability ,empirical study's and conceptual framework of the study will be discussed.

2.1. Theoretical literature review

2.1.1 Essential medicine concept

In the 1978, the WHO conference at Alma Ata recognized essential drugs as one of the eight elements of primary health care. The World Health Organization has defined essential medicines as those that satisfy the needs of the majority of the population and therefore should be available at all times. The rationale for the selection and use of a limited number of essential medicines is that it leads to an improved supply of medicines, more rational prescribing, and lower costs; in fact, the appropriate use of essential medicines is one of the most cost-effective strategies a country can enact. (WHO,1978) The essential medicines concept is a global concept that can be applied in any country, in the private and public sectors, in referral hospitals as well as primary health care units, and in both urban and rural areas. However, the decision about exactly which medicines should be considered as essential should be a national-level responsibility. By 2007, 86 percent of countries had national essential medicines lists, of which at least 69 percent had been updated in the previous five years. Some have state or provincial lists as well (Kathleen , March2010).

There are many reasons to support the use of a limited essential medicines list. First, fairness dictates that basic health services be accessible to everyone before more expensive services are made available to a small, usually urban proportion of the population. Second, no public-sector or health insurance system can afford to supply or reimburse all medicines that are available on the market. Because the availability of pharmaceuticals in the public sector is erratic in many countries, a regular supply of most products on the essential medicines list would result in a real improvement in public health and would increase the public's confidence in the health care system. for public-sector supply programs, advantages exist in concentrating procurement and logistics efforts on a limited number of medicines, including reduction in the number of different products that must be stocked, distributed, and monitored.(MSH, 2012)

The most logical approach for developing essential medicine list is based on the needs of patients. The first step is to prepare a list of common health problems. A first-choice treatment for each health problem on the list may be limited to one or more medicines or to various forms of nondrug treatment. This choice of treatment can be the basis for two important documents: the list of essential medicines for the specific level of care, which is a direct result of the selection; and a set of treatment guidelines for that level of care, which requires additional clinical information (diagnostic signs and symptoms and treatment algorithms). (WHO , 2017)

This approach works best for the primary health care level. The number of diseases and conditions may be too many or too complex to be practical for a hospital, although the approach could be applied at the departmental level and is commonly used at the specialist level. Medicine selection at the Health Centers level is especially valuable when the national list of essential medicines is too expensive to be practical for individual Health Centers. In addition, Health Centers-level medicine selection ensures the maximal involvement, acceptance, and compliance of the prescribers concerned (MSH, 2012)

2.1.2 Medicine selection, quantification and procurement

Drug selection: is a process of deciding the type of needed drug products for the prevalent diseases. An essential medicines list names the medicines considered optimal treatment choices to satisfy the health care needs of a given population. In its simplest form, it is used for one Health Centers (for example, a hospital, Health Centers and health post) or for a group of Health Centers to indicate which medicines should be procured and prescribed. For practical purposes, the lists can be considered supply lists, defining the range of medicines for the different levels of care and indicating dosage form and, sometimes, pack size and other specifications

The selection of medicines should be made on the basis of the national list of essential medicines, using similar criteria. The list should be made by a hospital drug and therapeutics committee that, ideally, is convened by a clinical pharmacologist, with senior clinicians and the hospital pharmacist as members. For most countries, medicine selection by committee is the preferred approach because it minimizes the opportunity for private interests to influence the decision-making process. Furthermore, the judicious selection of committee members with relevant backgrounds, previous experience, and no conflicts of interest can ensure the transparency of the decision-making process and thereby facilitate the rational selection of medicines The same basic principles apply at the hospital level. The choice of such medicines depends on many factors, such as the pattern of

prevalent diseases; treatment Health Centers; the training and experience of available personnel; financial resources; and genetic, demographic, and environmental factors. WHO recommends updating essential medicine at least every two year in order to make the list current and make prescriber adhere to the list when prescribing medicine.

Drug quantification - quantification is the process used to determine how much of a product is required for the purpose of procurement. But more specifically, quantification involves estimating not only the quantities needed of a specific item but also the financial means required for purchasing the item. Needs are estimated for a given context, so the analysis must include contextual factors, such as available funds, human resources capacity, storage space capacity, and capacity to deliver services. if quantification are computed based on Gus rather than appropriate mathematical formula needed medicines may not be available or they might tend to stock out before next procurement phase . Medicine needs can be quantified by using one or a combination of four standard methods. *The consumption method* uses records of past consumption of individual medicines adjusted for stock outs and projected changes in medicine use to project future need *The morbidity method* estimates the need for specific medicines based on the expected number of attendances, the incidence of common diseases, and standard treatment patterns for the diseases considered. *The proxy consumption method* uses data on disease incidence, medicine consumption, demand, or use, and/ or pharmaceutical expenditures from a "standard" supply system and extrapolates the consumption or use rates to the target supply system, based on population coverage or service level to be provided. *Service-level projection of budget* requirements uses the average medicine cost per attendance or bed-day in different types of Health Centers in a standard system to project medicine costs in similar types of Health Centers in the target system.(MSH, 2012)

Procurement is defined here as the process of purchasing supplies directly from national or multinational private or public suppliers; purchasing through global agencies and procurement mechanisms or regional procurement systems; or purchasing from international procurement agents. These sources may be used individually or in combination to meet the entire range of pharmaceutical needs. The pharmaceutical procurement system is a major determinant of pharmaceutical availability and total pharmaceutical costs .The major procurement methods used by health systems are open tender, restricted tender, competitive negotiation, and direct procurement, which vary with respect to their effect on price, delivery times, and workload of the procurement office. Pharmaceutical procurement practices vary widely from country to country. However, decades of experience with essential medicines programs and many more years of experience with large government-run

pharmaceutical supply services in a number of countries, as well as with regional and global pooled procurement schemes, have suggested a number of key principles, such as, Procurement by generic name, Limitation of procurement to essential drugs list ,Procurement in bulk as it offers favorable prices and reduces purchasing costs, Order quantities based on the reliable estimate of actual need to avoid stock outs of some of drugs and overstocks of others, Have a product quality assurance program, Annual audit and regular reporting on procurement performance. These practices are applicable to individual procurement agencies as well as to pooled procurement systems serving multiple health systems.(worldbank 2009)

2.1.3. Distribution and use of essential medicines

The primary distribution management goal is to maintain a steady supply of pharmaceuticals and supplies to Health Centers where they are needed while ensuring that resources are used in the most effective way. A good distribution system is a cost-effective system that provides an acceptable level of service. A well-run distribution system should—Maintain a constant supply of medicines and Use available transport as efficiently as possible. In order to maintain a constant supply of medicine the decision on distribution designs such as distribution schemes ,resupply interval and method of delivery must be optimized. Distribution schemes can be defined by which levels of the system order medicines and which, if any, passively receive medicines distributed from higher levels. The two basic alternatives are,1. Pull system: Each level of the system determines what types and quantities of medicines are needed and places orders with the supply source (which may be a warehouse in the system or a commercial supplier).This type of system improves availability of essential medicine.2. Push system: Supply sources at some level in the system determine what types and quantities of medicines will be delivered to lower levels. The resupply interval determines whether deliveries are made to user units quarterly, monthly, weekly, or at any other time. If deliveries are made weekly, average stock levels will be low and the likelihood of stock outs will decrease, but transport costs will be very high. If deliveries are made only once a year, transport costs will be low, but the average stocks and storage costs will be high The optimum resupply interval should be worked out to suit individual program needs. Most public programs use intervals of one to three months. Basically, supplies are moved between the warehouse and the receiving Health Centers in two ways or methods: collection or delivery. In the case of a collection system, the receiving Health Centers takes on the responsibility of collecting supplies from the warehouse. In a delivery system, the warehouse is responsible for delivering supplies by either in-house transport or a private-sector contract, or a combination of both. collection system Provides greater incentive to obtain supplies regularly, since the Health Centers is responsible for collecting supplies.(WHO 2017)

Rational Use of essential medicine list; The aim of any pharmaceutical management system is to deliver the correct medicine to the patient who needs that medicine. The steps of appropriate selection, procurement and distribution are necessary precursors to the rational use of medicines. Although rational medicine use in comprise components of patient, dispensers and prescriber, for the sake of this manuscript objective only prescriber component of prescribing medicines based on essential medicine list have particular relevance. Essential medicine list are intended to be used by the procurement office and by the prescribers. If the list is prepared based on consensus between drug and therapeutic committee members on criteria's such as safety, efficacy, cost effectiveness ,prevalence of disease and updated information it informs prescribers the list of medicine available in the Health Centers which in turn improves availability of essential medicines. Essential medicine list should be printed ,updated and delivered to every prescriber. For measuring Use of essential medicine list in Health Centers, percentage of prescription based on the list divided by number of prescription multiplied by hundred can be used.

2.1.4 Logistics Management Information System (LMIS)

Is a system that generates information, which is needed to make logistics decisions (John Snow Inc./DELIVER, 2004). Managing Access to Medicines and Health Technologies (MSH, 2012) provides a broader definition of Pharmaceutical Management Information System (PMIS): The PMIS integrates data collection and the processing and presentation of information that helps staff at all levels of a country's health system make evidence-based decision to manage pharmaceuticals services (MSH, 2012).Pharmaceutical logistics data are collected, processed, and reported through LMIS, increasing the likelihood of an adequate supply of EDs. An effective LMIS may be manual or computerized collecting essential data about stock status and consumption. It ensures accountability, a reduction in supply imbalances (stock outs and overstocks), and efficient, cost-effective pharmaceutical logistics. Because a pharmaceutical logistics system cannot function effectively without timely, accurate LMIS data, the LMIS is an essential tool. It provides personnel responsible for pharmaceutical logistics with the information they need to react or, more important the information they need to anticipate demand. To be effective, LIMS should be equipped with adequate trained staff, forms, equipments, and Health Centers(Shawkey & Hart, 2003).

2.1.5 standard Operating procedure

A standard Operating procedure is a document which describes the regularly recurring operations relevant to the quality of service being rendered. The purpose of an SOP is to carry out the operations correctly and always in the same manner. It should be available at the place where the work is done. An SOP is a compulsory instruction. All changes in the instructions must be documented and

reported to the authorities who are the only ones to authenticate and approve such variations. Standard Operating Procedures (SOPs) for pharmaceutical Care Delivery in all Health Centers will be expected to: Enhance the quality of the services provided by the Pharmacist, Promote uniformity in the services provided and Eliminate operational errors in pharmaceutical care delivery services among many SOP's required for providing pharmaceutical service ;SOP for Drug Lists ,for Procurement of Medicines ,for Receiving Drugs into Pharmacy , SOP for Drug Storage and SOP for Procurement, Distribution are some of the important areas if properly listed and implemented will have positive outcome on quality of pharmaceutical service provided.

2.1.6 Ethiopian pharmaceutical logistic system

Ethiopian drug policy ensures that medicines which are required for prevention, diagnosis, treatment, mitigation and rehabilitation of diseases affecting the majority of Ethiopian people have to be identified and classified to respective levels of health service delivery hence the Ethiopian food and drug administration(EFDA) is mandated, in the proclamation 661/2009, to classify and list those medicines. In line to this mandate The Ethiopian National Essential Medicine List was prepared and revised five times to this date in light of the above principle and the latest developments in fields of medicine and pharmacy.

Essential medicines lists guide the procurement and supply of medicines in the public sector hence the Ethiopian Government established an agency called Pharmaceutical Fund and Supply Agency (PFSA) with main objective of supplying and procuring essential medicines based on the list prepared by EFDA and additional objectives of PFSA include:

- ✓ Improve availability of program and non program pharmaceuticals nationwide from 55% to100%
- ✓ Establish a quality complaint system and ensure rational use of pharmaceuticals
- ✓ Improve customer satisfaction in terms of availability and quality of service at public Health Centers from 51% to 100%

PSA supplies two category of essential drugs based on their source of fund, this are program essential drugs funded by NGO and donors and non program essential drugs funded by revolving drug fund or directly from government treasury. program drugs such as anti-malarial drugs, antiretroviral drugs, family planning drugs, and TB-drugs, as well as laboratory reagents, medical supplies and equipments and Non-program drugs are Drugs that exclude program drugs such as anti-malarial drugs, antiretroviral drugs, family planning drugs, and TB-drugs, as well as laboratory reagents, medical supplies and equipments.(PSA 2018)

In the Ethiopian, the principal sources of drug funds include government (MoFED), private sector (households and employers), and external sources (donors and NGOs). Drug providers (Health Centers, drug dispensing outlets) receive funds from the payers/intermediaries (MOH, MOE, insurance companies, etc) and use them to pay for drugs. Patients (Consumers) receive drugs from the providers upon direct payment (out-of-pocket) or through insurance coverage or free of charge depending on the predetermined modalities of payment (FMOH 2007). PSA supplies two category of essential drugs based on their source of fund, this are program essential drugs funded by NGO and donors and non program essential drugs funded by revolving drug fund or directly from government treasury.

Some Government organizations operating at the Federal level receive their drug budget directly from MOFED. The Federal Government Departments and Organizations with relatively high budget for drugs include :The Federal Ministry of Health, The Ministry of Defense, The Federal Police, The Prison Commission, Ministry of Agriculture and Rural Development, Ministry of Education (the Universities of Addis Ababa, Jimma, Hawasa, Mekele and Gondar).Ethiopian Health and Nutrition Research Institute. The Federal Ministry of Health and the Regional Health Bureaus are the most important government institutions in terms of channeling drug funds.(FMOH 2007).

2.1.7 Why medicine Availability is important

Most leading causes of discomfort, disability, and premature death can be prevented, treated, or at least alleviated with cost-effective essential medicines. Mortality figures across developing regions reflect a huge burden of illness that can be substantially reduced if carefully selected, low-cost pharmaceuticals are available and appropriately used. Essential medicines significantly affect the common causes of morbidity and mortality, including acute respiratory infections, diarrheal diseases, HIV/AIDS, measles, malaria, maternal and prenatal mortality, tuberculosis, and cardiovascular and other chronic diseases. (Team, 2008)

Over the years, household and patient surveys around the world have found that pharmaceutical availability is a major determinant of where patients go for health care and how satisfied they are with that care. Availability of medicines and supplies also affects the productivity of health staff. When pharmaceutical supplies fail to arrive, patient volume drops, and health workers are left idle. Irregular pharmaceutical supply can be a greater constraint on program effectiveness than inadequate numbers or inadequate training of health workers. (MSH 2011)

Although medicines are cost-effective, they can be quite costly for an individual, a household, a government health system, or a country. At the individual and household levels, medicines represent the major out-of-pocket health expenditure; 60 to 90 percent of household health spending may go toward medicines (MSH 2011). In northern India, at least 57 percent of a family's average out-of-pocket cost of a newborn's illness was for medicines (WHO 2012). The trend of private spending by households as the principal source of worldwide pharmaceutical spending increased during the 1990s (WHO 2004c). In addition to those direct costs, income is lost when family members are sick, and this loss reinforces the poverty-illness cycle. Women are especially vulnerable because they are usually the main family caregivers.

For ministries of health in most developing countries, Medicine expenditures represent the largest expenditure over which ministries have year to- year discretionary control. This fact makes medicine expenditures both extremely important and extremely vulnerable—particularly to fluctuations in the availability of public funding as well as to various political and economic pressures, such as rampant inflation and currency fluctuations.

At the national level, pharmaceuticals represent 10 to 20 percent of health expenditures for leading industrialized countries. But for most developing countries, they may represent 20 to 40 percent of total public and private health Expenditures (WHO 2012).

Well-organized pharmaceutical logistics system ensures the continuous availability of all pharmaceuticals that are required for patient care. At the same time, an effective pharmaceutical logistics system should be able to respond to sudden increases in drug demand, ensuring that adequate supplies are available to deal with any emergencies that arise. (FMHACA 2011b). Stock availability is the ultimate measure of the other components of the logistics system, and it also gives an idea of the overall effectiveness and efficiency of the system, from forecasting and procurement to distribution, storage and inventory management. (John Snow Inc. /DELIVER 2013).

2.2 Empirical literature review

Researches done in Sub-Saharan countries showed that availability of EDs has been improved, but still far from the WHO recommended target of 100% (WHO, 1993). In Ghana, the availability of key EDs selected for the country in public Health Centers was 80%; and length of stock out duration 29.9 days (Ministry of Health of Ghana, 2009). In Tanzania, Uganda and Kenya, all of them East African countries, the availability of key EDs was 88.9%, 45.7% and 82.6%, respectively (MOHSW, 2008; Ministry of Health of Uganda, 2008; WHO, 2009).Though the availability of EDs seems high in the Health Centers of Tanzania, the same Health Centers also presented a considerable number of stock

out days. Some medicines were out of stock for 4 months with the median number of stock-out 135.6 (MOHSW, 2008). In Uganda, the length of stock-out duration in public Health Centers pharmacy was 72.9 days (Ministry of Health of Uganda, 2008). A cross sectional study conducted in Health Centers of Western Ethiopia(Abiye et al., 2013),Adama(Shebo, 2019) seka zone (Shama, 2018) and Addis ababa(Mudzteba, 2014) showed that only 55.6%,76.3%, 53.33% and85.4%. of the assessed drugs were available respectively.

a study done in Tanzania showed that from 27 surveyed Health Centers only 38% of them had EDL out of which only 52% of Health Centers procured medicines within the EDL. Study done in addis ababa Health Centers showed 95.8% of the HCs have their own EDL of which 91.3% of them selected the drugs by Drug and Therapeutics Committee (DTC), 91.7% of them reported also practicing VEN analysis and regarding documented policy or guidelines for selection, forecasting, and procurement only in 37.5%, 25%, and 37.5% of HCs, respectively were available.(Mudzteba, 2014) .Another Research done in Public Health Centers in Ethiopia ,Sheka zone, showed that 71.4% Health Centers have Documented policy or guideline for drug selection of essential drugs,57.1% of them have their own essential drugs list ,71.4%of them select their drugs by Drug and Therapeutics Committee (DTC) , 50% of Health Centers selects there essential drug by pattern of prevalent disease, 57.1% of Health Centers Purchase essential drugs form private suppliers and 71.4%of the Health Centers's practice VEN analysis for prioritizing drugs for procurement(Shama, 2018).

Research done in addis ababa Health Centers 100% of the HCs reported to determine their own NPDs resupply quantity. Resupply quantity was determined by consumption method by all 100% of the HCs while 16.7% of them used morbidity method as well. Majority 75% of them determined the resupply quantity using a standard formula; the rest 6(25%) determined it by guess. Majority 54.2 of the HCs usually purchase NPDs on quarterly basis; whereas 29.2% and 16.7% of them usually purchase perpetually and bimonthly, respectively.(Mudzteba, 2014) while among Health Centers in the sheka zone 50% buy drugs quarterly, 35.7% buy drugs bimonthly and only 14.3% buy drugs every 4month.(Shama, 2018).

Public Health Centers in Tanzania It was reported that only 33% of the Health Centers purchased EDs exclusively from Medical Stores Department. The rest 67% purchased from the private wholesalers as well - mostly by direct procurement, and there was no official guidelines that guide the Health Centers on how and when they are to procure form the private sector (Ministry of Health and Social Welfare, 2008).

Study done in addis ababa 98%of HCs have documented policy or guideline for managing and using the LMIS. 100% the HCs reported to use bin cards in store and Internal Health Centers Report and Resupply Form (IFRR) while only 8.3% of the HCs used Report and Requisition Form (RRF) to

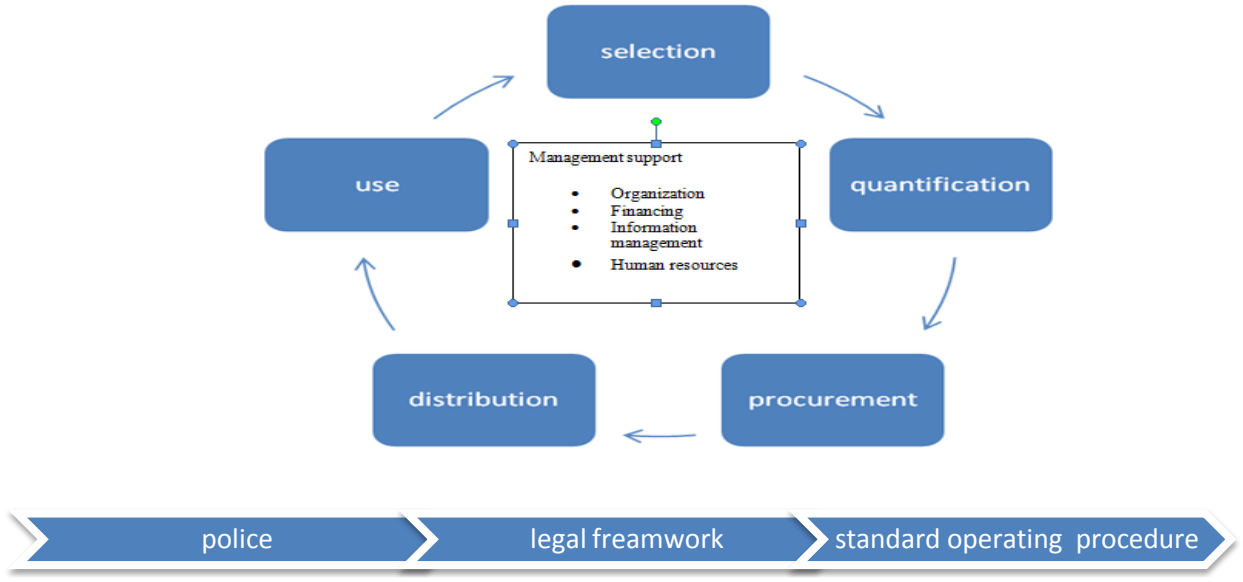
manage NPDs.(Mudzteba, 2014) while , among Sheka zone Health Centers 71.4%, of HCs had documented policy or guideline for managing and using the logistics Management information system(Shama, 2018)

A study in Tanzania reported 8% and 72% recorded balance that was less and greater than the physical count (Kagashe & Massawe 2012). Another study done in Tanzania showed that often neither minimum nor maximum levels were defined (MOHSW, 2008).while in South Sudan, only 27% of the assessed Health Centers were reported to fill forms accurately (GH Tech, 2011). A study in Adama Ethiopia reported 33% and 44% recorded balance that was less and greater than the physical count(Shebo, 2019) while the accuracy of keeping stock records, the mean discrepancy of AMX was 26% while the maximum was 270%(Mudzteba, 2014).

2.3 Conceptual Framework

Availability of essential medicines is reliant on Managing drug supply which is organized around the following basic functions of the drug management cycles: selection, quantification, procurement, distribution and use. At the Health Centers of drug management cycle is a core of management support systems: organization, financing and sustainability, information management, and human resources management. These management support systems hold the drug management cycle together. Although the individual parts of the cycle may function independently for a short time, the cycle as a whole will soon cease to operate and patient care will suffer without a functional organizational structure, adequate financing, reliable management information, and motivated staff. Finally, the entire cycle rests on a policy and legal framework that establishes and supports the public commitment to essential drug supply.

Figure 1; Drug management cycle :management science for health ,2012



CHAPTER THREE: METHODOLOGY

3.1 Study Area

The study was conducted in Ethiopian ministry of defense health Centers located in and around Addis Ababa with150km radius, Containing 17 Health Centers of which one of them is specialized Teaching hospital containing more than 600 beds and the rest 16 Centers are Health Centers containing 10 beds each .all of them are governed by ministry of defense health directorate Addis Ababa district. of the 17 health Centers 13 of them are located in Addis ababa,2 Centers in Bishoftu,1in Adama and 1 in feche.

3.2 Research Approach

There are three types of approach in research, quantitative, qualitative and mixed and accordingly their selection depends upon how the researcher wants to do his /her study. The study will utilize quantitative research approach .quantitative research approach was used because it helped to answer the research objective of answering availability level of essential medicines by allowing to reach a higher sample quickly and by eliminating opinions substituting it with (Green,2020) .

3.3 Research Design

The objective of the study is to evaluate the level of availability of non program essential drugs in ministry of defense ,Selected Health Centers. So a descriptive research type Will be employed which helps to answer the research question. An institutional based cross sectional study design will be employed to evaluate the level of availability and stock out level and stock out duration of MDSHS. All variables will be measured by using a data abstraction tool and structured questionnaire.

3.4 Population and sampling

3.4.1 Source Population

All Health Centers that are found in ministry of defense health directorate in Addis Ababa and around 150 km from Addis Ababa.

3.4.2 Target population

All level one and above Health Centers found in ministry of defense health directorate in Addis Ababa and around 150 km from Addis Ababa ware the target population.

3.4.3 Study population and study unit

All level I Health Centers and Hospital in MDHD in and around Addis Ababa, about 16-level one Health Centers and 1 General Hospital are included in the study. The study unit comprises of 17 store-men/Woman, 17pharmacy heads.

3.4.4 Sample Design and size

The study will utilize cense survey, all 16-level one health Center's and 1 General Hospitals found in ministry of defense health directorate in Addis Ababa and around 150 km from Addis Ababa are included in the study.

3.4.5 Data Collection and instrument

Quantitative data was collected by 2 data-collectors who are senior pharmacists working in black lion hospital using researcher administered-structured questionnaire and through document review by using data abstraction tool. The structured questionnaires were two types one for the storekeepers who were interviewed by the data collectors and the other for pharmacy heads who were interviewed by the principal investigator. A structured questionnaire adapted from Logistics Indicator Assessment Tool (LIAT) was used to collect quantitative data (see Annexes). LIAT is a tool developed by the USAID-funded DELIVER which is used to conduct a facility-based survey to assess health commodity logistics system performance and commodity availability at Health Centers (John Snow Inc./DELIVER, 2005). The structured questionnaire for storekeepers contained questions on availability of NPDs and LMIS whereas the structured questionnaire for the pharmacy heads contained questions on selection, forecasting and procurement of NPDs .Data was collected from April 10 /2020 up to April 20/2020 for 10 days.

3.5 Data Analysis and Presentation

The quantitative data was entered and analyzed using SPSS version 16 and Microsoft Excel 2007 and the result are presented in the form of tables and graphs. For the quantitative part, data was analyzed using Univariate descriptive analysis for each variables distribution, central tendency and the dispersion characters in level of availability ,stock out duration and availability duration are presented in the form of table, Pi chart and bar chart. Then, the verbatim phrases that represent each position was pulled out. Finally, the findings are presented by narration.

3.6 Scale Reliability and Validity

Before embarking upon data collection, pretest of the prepared questionnaires, data abstraction forms and checklist was performed in two below level one clinics; which were not included in the study, to insure the validity of the survey tools. The principal investigator supervised the data collection process and review completed questionnaires to clarify any data inconsistencies. Responses of interviews were verified by looking to what was really on the ground at the Health Centers as applicable. The data collectors were trained on the data collection instruments and processes for a session of half day.

3.7 Ethical Considerations

Before commencing data collection, ethical approval was obtained from the Ethics Review Committee of the School of commerce, Addis Ababa University. Then, the selected Health Centers were communicated with formal letter from the School of commerce, Addis Ababa University. The study was conducted in the selected Health Centers after permission from the medical director of the Health Centers is obtained. The study Health Centers were asked for consent before participating in the study. At the time of consent process, they were provided with information regarding the purpose of the study, why and how they were selected to be involved in the study, and what was expected of them and that they can withdraw from the study at anytime. The Health Centers were assured about confidentiality of the information obtained in the course of the study by not using personal identifiers.

CHAPTER FOUR
DATA ANALYSIS AND DISCUSSION

4.1 Response Rate and Demographic Data

All 17 Health Centers in ministry of defense health directorate located in and around Addis Ababa were included in the study with response rate of 100%. the pharmacy heads worked on Average for 4.7 (SD 0.6)years where as the store keepers have a 3(SD 0.3) years work experience, female respondents accounted about 52.94% response while male respondents accounted 47.05% of the response.

Table 1 Respondents demographic information

Variable	Choice	Frequency	Percent
sex	Male	16	47.05
	Female	18	52.94
	Total	34	100
Educational Qualification for pharmacy heads	first degree (BSc, BA)	12	70.58
	second degree (MSC, MA)	5	29.42
	Total	17	100
Educational qualification for head store man/woman	below college diploma	0	0
	college diploma	17	100
	Total	17	100
Year of service for pharmacy heads	2 up to 3 years	0	0
	3 up to 4 years	3	17.6
	5 up to 6 years	11	64.70
	above 6 years	3	17.6
	Total	17	100
Year of service for head store	1-2 years	0	0
	2 up to 3 years	4	23.52
	3 up to 4 years	10	58.8
	above 4 years	3	17.6
	Total	17	100

Source: Survey Result, 2020

In this section how Answers for all Research objectives and sub objectives have been Arrived is explained Along with :how data's were measured, analyzed , interpreted and Presented with their respective discussion and interpretation component.

4.2. An Evaluation of the Availability Level of Non program Essential Drugs at the SDHC

Availability level was Measured with Ordinal measures yes="Available" and NO mean "not available" through observation of 5 tracer essential medicine in all 17 pharmacy stores on the day of the visit and individual tracer medicine availability was analyzed using frequency distribution and aggregate availability of All tracer essential medicines was analyzed by calculating the mean percentage availability of individual TEM. Aggregate mean availability of less than 60 % represent poor availability 60 up 90% availability represent good availability and greater than 90% availability represent excellent availability (WHO,2018) and finally Result of the study are presented in the form of narration and table.

Overall availability of essential medicines at the day of visit across the 17 Health Centers was found to be 85.88 % .tetracycline was found to be the highest available tracer medicine being available in all Health Centers followed by Amoxacilline 500mg capsule and Mebendazole 10 mg tablet accounting 88.2% availability ,relatively lowest availability was observed in ORS Sachet and Paracetamol 500mg tablet being available in 13 Health Centers accounting 76.5%of respondents.

Table 2 ;Availability level of TEM on the day of the visit at MDSHs, Addis Ababa,2020

Name of TEM	Responses		Percent of Cases
	N	Percent	
Amoxicillin	15	20.5%	88.2%
ORS	13	17.8%	76.5%
Mebendazol	15	20.5%	88.2%
Tetracycline	17	23.3%	100.0%
Paracetamol	13	17.8%	76.5%
Total	73	100.0%	

The availability of TDs documented in this study is better than Adama 76.4% (Shebo, 2019), Gondar 72% (Fentie 2015) Addis Ababa 71.1% (Mudzteba, 2014) and Jimma 55.6% (Shama, 2018). The reason behind might be due to the fact that ministry of defense Health Centers are among federal institution who receive large budget for pharmaceutical procurement . When the result of this study compared to Tanzania(88.9%) it is lower but it is slightly higher compared with Ghana 80% (Ministry of Health of Ghana, 2009) much higher compared with south-east Nigeria 35.4% and Ugandan study 45.7%,(Ministry of Health of Uganda, 2008). This showed that the pharmaceutical availability level is good. However, the availability was far from the WHO recommended target of 100% (WHO, 1993).

4.3. Evaluation of Availability Duration of Non-program Essential Drugs at the SDHC.

To Evaluate Availability duration data collectors filled data abstraction tool by reviewing bin card for the past one year counting the number of days each tracer medicines were available and aggregate TEM availability duration was calculated by Adding individual TEM availability duration and dividing by the total number of TEM. aggregate mean availability duration of less than 200 day in year is interpreted as poor availability duration 200-345 days of availability duration as good and greater than 345 days is interpreted as excellent availability duration.(WHO 2018),Results are presented in the form of narration and table.

Availability duration of 343 days for Amoxacilline,341 days for mebendazol,338 for paracetamol, 334 days for tetracycline and ORS was observed after reviewing of bin card for the past one year making the Overall Availability duration in a year for tracer drugs 338 days Accounting 92%SD±13.488 of the year; which corresponds to 8% (31) days of stock out in year.

Table 3;Availablity duration of TEM in a Year at MDSHS, Addis Ababa,2020

TEM	Average No of days drugs ware available In a year (days)	Percentage of availability in a year(%)	Standard deviation from the Mean(SD)
Amoxacilline	343.29	93.9	11.190
Mebendazol	341.06	93.3	8.533
paracetamol	338.47	92.7	10.483
Tetracycline	334.29	91.5	17.912
ORS	334.53	91.6	19.330
MeanTotal	338.2	92.6	13.488

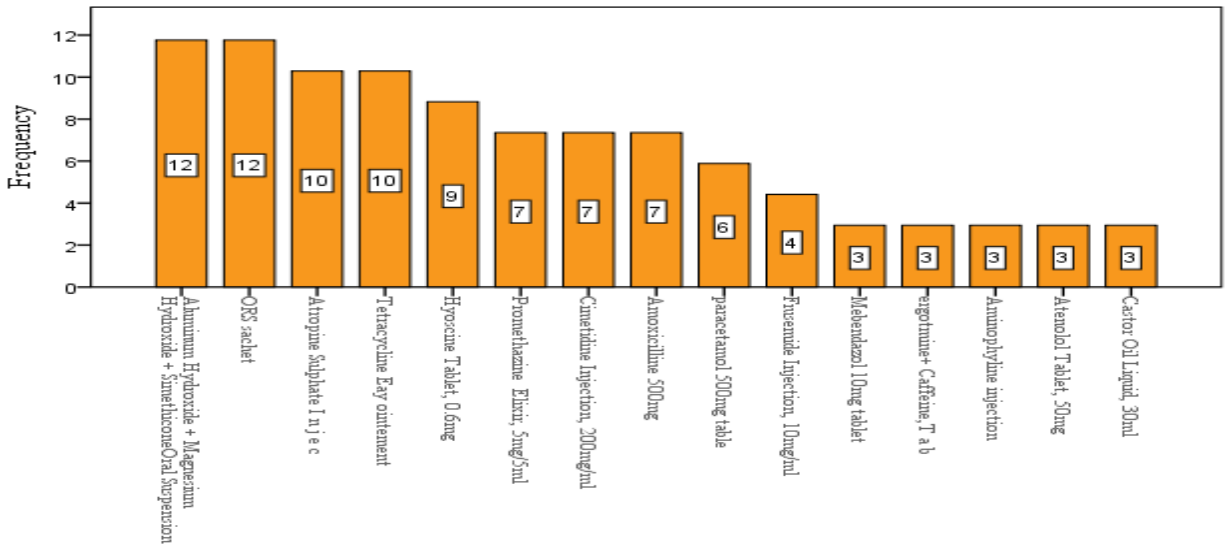
Finding of this study showed the mean stock out duration of 1 month and Tetracycline eye drop stock out and for longer time which might be because of the non availability of large stock of substitution drugs. Compared to Tanzania where Some medicines were out of stock for 4 months with the median number of stock-out 135.6 (MOHSW, 2008). and Uganda, where the length of stock-out duration in public Health Centers pharmacy was 72.9 days (Ministry of Health of Uganda, 2008) it is good and very encouraging but far from WHO target of zero stock out day.

4.4 Identification of most frequently stocked out and overstocked EMs at MDSHCs

To identify Essential medicines that are frequently over stocked or under stocked we used Two ways One is through Asking Pharmacy store heads to nominally List up to five EDs that are overstocked and under stocked frequently and Results were analyzed with Frequency distribution for Every listed EMs and Results of the Analysis are presented in forms of narration and Bar chart. Secondly through Reviewing Bin card for one year and counting and listing EMs that were out of stock and The results were Analyzed with frequency distribution for all Ems identified. Finally results of the analysis are presented in the form of narration and Bar chart.

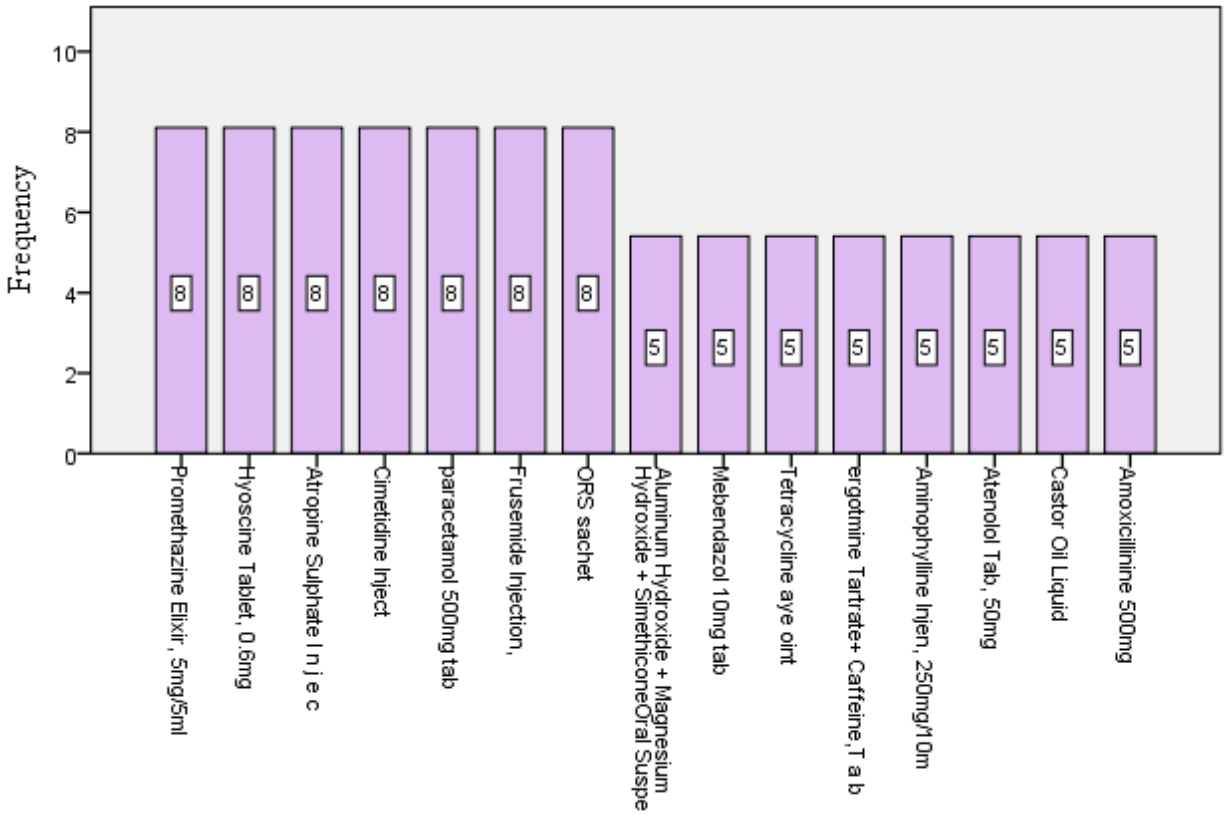
Store keepers response for most stock out essential drugs identified that Aluminum Hydroxide + Magnesium Hydroxide + Simethicone Oral Suspension and ORS Sachets were reported in 8 Health Centers accounting 12% of stock out Response followed by Tetracycline aye ointment & Atropine sulphate injection reported on 7 Health Centers accounting 10% of reported stock outs. The least reported stock out drug was Mebendazol 10mg tablet reported only on 2 Health Centers accounting 2 % of stock out Reports.

Figure 2; frequently reported stock out Essential medicines with percentage in MDSHS, Addis Ababa,2020



Hyoscine (Scopolamine) Tablet, 0.6mg, Atropine Sulphate I n j e c tion, 1mg/ml in 1 ml ampoule, Cimetidine Injection, 200mg/ml in 2ml ampoule, ORS sachet Frusemide Injection, 10mg/ml in 2ml ampoule, Promethazine Hydrochloride Elixir, 5mg/5ml and paracitamol 500mg tablet were reported to be surplus in 3 Health Centers accounting each 8% surplus rate while the reset of medications accounted 5% surplus rate.

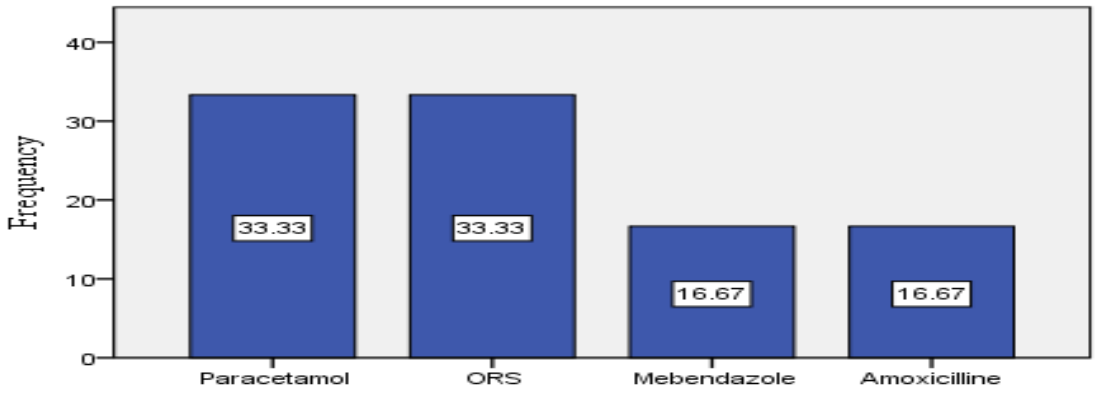
Figure 3;Frequently reported surplus Essential medicines with percentage in MDSHS, Addis Ababa,2020



Finding of response from Health Center store keepers on This study revealed that majority of the HCs reported to often encounter stock outs of some NPDs. Paradoxically some NPDs that were reported to be often stock out in some HCs were reported to be often overstocked in other HCs.ORS and aluminum hydroxide +magnesium hydroxide + simiticone syrup accounted quarter of the stock out reported on the contrary hyosine, ORS, prometazine, paracentamole and cimitdine were the most reported surplus drugs this could be due to the fact that ministry of defense Health Centers don't have central computerized information system so that Health Centers can exchange a real time information on stock status of individual Health Centers which could help transfer some over stocked drugs to stocked out Health Centers.

Observation of bin card for stock out within recent 12 months reviled that all tracer drugs except for tetracycline were stocked out at least a Once in a year with highest observation found in Paracetamol &ORS in 33.33% of the Health Centers while Mebendazol and Amoxicillin where stocked out at least once in 16.67% of bin card observation.

Figure 4;Percentage of stocked out tracer Medicine at the day of the visit, MDSHS ,Addis Ababa,2020



The Finding based on review of bin-card data that ,ORS and Paracetamol stock out encountered in quarter of the HCs could might be partially attributed to the nature of the drug being over the counter so that anyone who needs them can get them without prescription.

4.4.Assessment of drug supply management practices of the selected health Defense Centers.

4.4.1. Selection practice

For assessing selection practice pharmacy heads of respective Health Centers were presented with structured interview filled by the investigator regarding on availability of selection policy, preparing EML by their own, selecting unit of EM and EM revision interval variables.

Availability of policy for drug selection was Measured with Ordinal measures of YES if reported "available" NO if reported "not available" and analyzed with frequency distribution and measure of central tendency and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies.

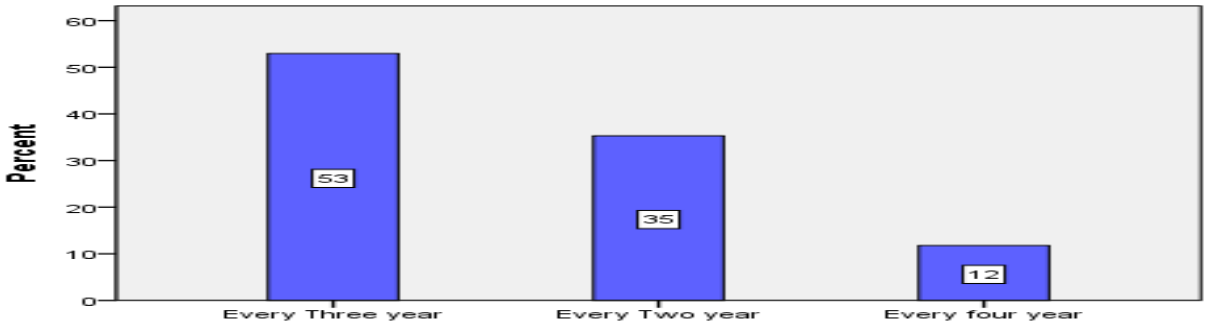
Preparing essential medicine list by their Owen was Measured with Ordinal measures of YES being the "HC prepare the list by them self's" NO being "they don't prepare their own list" and analyzed with frequency distribution and central distribution . Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. finally Results of the analysis are presented in the form of narration.

selecting unit for essential medicine list was Measured with Ordinal measures of 1 being "DTC" and 2 being "pharmacy unit" and analyzed with frequency distribution and central tendency. Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. finally Results of the analysis are presented in the form of narration.

EML revision interval was Measured with Ordinal measures of 1 being "1 up to 2 years" 2 being "2 up to 3 years" and 3 being "greater than 3 years" and analyzed with frequency distribution and central tendency. Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. finally Results of the analysis are presented in the form of narration and Bar chart.

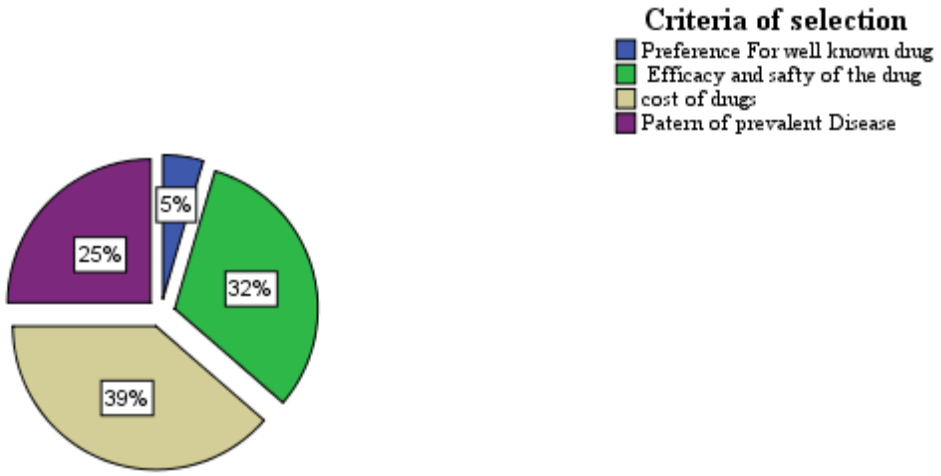
Availability of policy for drug selection was only found in (n9) 52.9% percent of Health Centers while 100% of the Health Centers prepared their own essential medicine list for 94.1% of the Health Centers the selecting unit is pharmacy department and DTC selects essential medicines in 5.9% of the Health Centers ,the analysis also found that the EML is revised Every two year (35.3%), Every Three year (52.9%) and Every four year(11.8%) of Health Centers.

Figure 5;EDL updating interval with percentage in MDSHS ,Addis Ababa,2020



Regarding the availability of National Essential Medicine list in the Health Centers the study found that (n 16)94.1% have National EML out of which 94.1% of them are national Essential Medicine list for Health Centers, where as the rest 5.9% have national medicine list for hospitals. Cost was found to be the number one selection criterion for selecting drug(n17) 38.6% of Health Centers, for the rest of the Health Centers(n14) 31.8% Efficacy and safety, 25%pattern of prevalent disease and 4.5% Health Centers based there selection criterion on preference on well known drugs.

Figure 6; Criteria for selection of Essential Medicine with Percentage in MDSHS, Addis Ababa,2020



Assessment of selection process reveled Availability of policy for drug selection was only found in more than half of HCs which is in contrast with the National Minimum Standard for Health Centers which requires all HCs to develop policies and guidelines for managing medicine selection. The standard stressed that HCs shall have written policies for the selection of Essential Medicines(FMHACA, 2011a). The fact that policies and guidelines provide guidance on appropriate and standard course of actions, it might have helped the pharmacy professionals in the HCs to get best out of the logistics system. This finding is relatively higher compared to study done In Addis Ababa Health Centers where documented policy or guidelines for selection was 9(37.5%).

Assessment of selection process also revealed that all Health Centers have prepared their own essential medicine list which is in line with WHO and EFDA recommendation of having EML for any Health Centers although in almost all of the Health Centers the selecting unit was the pharmacy department alone which could lead to increased opportunity for private interests to influence the decision-making process. Furthermore, the judicious selection of DTC committee members with relevant backgrounds, previous experience, and no conflicts of interest can ensure the transparency of the decision-making process and thereby facilitate the rational selection and Adherence of prescribing of medicines only listed on the EML. The finding is by far greater than seka zone Health Centers where only 57.1% (Shama, 2018) essential medicine list is available and comparable with Addis Ababa HC of 96% availability (Mudzteba, 2014). The assessment also found that most of EML are updated within three years which is slightly higher than who recommendation of updating the list every two year, if lists are not updated regularly it might not reflect therapeutic advances and -

changes in cost, antimicrobial resistance patterns and public health relevance which in turn lead to physician non adherence to the list (WHO 2012) regarding selection criterion for drugs even though all criterions are WHO recommended ,cost was found to be the major criteria which if not properly used as a criterion it could lead to non availability of drugs which are very effective but expensive.

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4.3.2 Quantification Practice

For assessing quantification practice pharmacy heads of respective Health Centers were presented with structured interview filled by the investigator regarding quantification policy, Determination of their own resupply quantity, Usage of formula for quantification.

quantification policy was Measured with Ordinal measures YES being “available” and NO being “not available” and analyzed with frequency distribution and central tendency Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Finally Results of the analysis are presented in the form of narration.

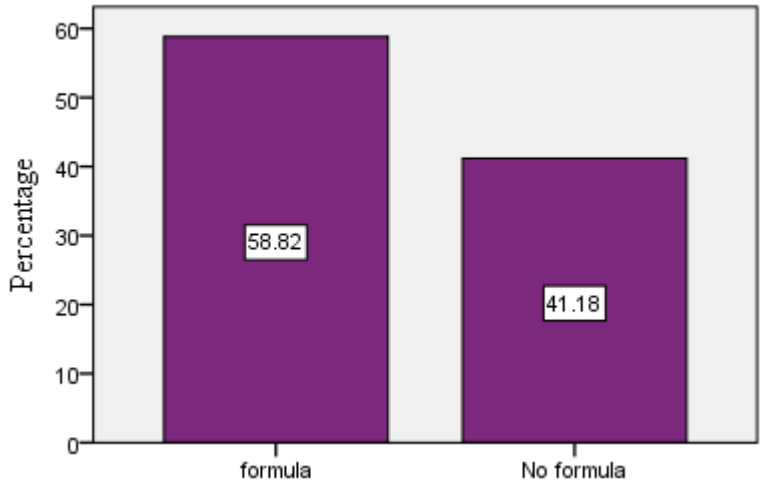
Determination of their own resupply quantity was Measured with Ordinal measures YES being the “HC prepare their resupply quantity” and NO being “HC don’t prepare their own resupply quantity” and result are analyzed with frequency distribution and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Finally Results of the analysis are presented in the form of narration.

Usage of formula for quantification was Measured with Ordinal measures YES being the “HC uses formula for quantification” and no means the “HC don’t use any sort of formula for quantifying drug needs”. and results are analyzed with frequency distribution Result of the analysis are interpreted by

Comparing with WHO or National standard and previously done similar studies. Finally Results of the analysis are presented in the form of narration and Bar chart.

Availability of documented policy for quantification was only observed in 5.6% of Health Centers the rest of the Health Centers 94.4% of don't have a documented policy or Guideline. all the Health Centers 100% determine their own resupply quantity of those Health Centers 55% of them use formula and the rest 45 % of them don't use any sort of quantification formula. the study also found that 33% of them use VEN analysis and only 22% of them use ABC analysis when budget for drugs and forecasted drug demands don't much.

Figure 7;Quantification Method Employed in MDSHS, Addis Ababa,2020



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Assessment of the quantification Practice showed all the Health Centers determine their resupply quantity which is recommended system compared to push system ,since Health Centers determine their resupply quantity issues of overstock or under stock could be minimized on the contrary the study also found that almost half of the Health Centers don't use any formula for quantifying pharmaceutical needs which could lead to overstock, expiry and shortage(John Snow Inc./DELIVER., 2004) the finding is very low compared with Addis Ababa where only less than 25% of the Health Centers use formula. the other observed process was Health Centers usage of VEN & ABC analysis which is very limited this could be due to the fact that less than half of the Health Centers use formula for quantification which in turn could lead to improper management of financial resource and unavailability of vital medicines when the need and budget don't reconcile.

4.3.3. Procurement Practice

For assessing Procurement practice pharmacy heads of respective Health Centers were presented with structured interview filled by the investigator regarding variables of: availability of procurement policy, Procurement limited to generic drugs, methods of procurement.

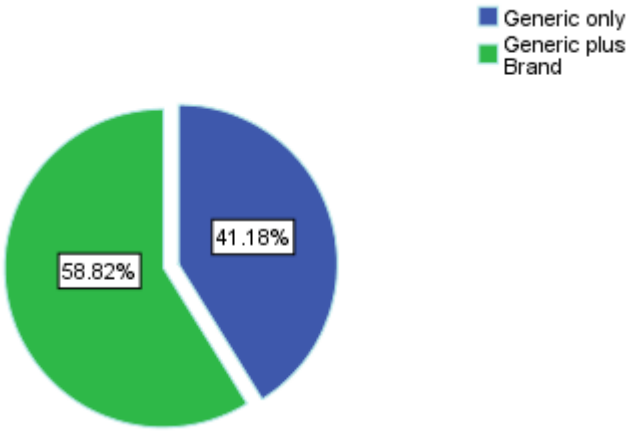
Availability of procurement policy was Measured with Ordinal measures of YES being "available" and NO being "not available" and results are analyzed with frequency distribution and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Result of the analysis are presented in the form of narration.

Procurement limited to generic drugs was Measured with Ordinal measures of 1 being "only generic procurement", 2 being "procurement of mixed brand and generic drugs" and 3 being "only brand procurement" and Results were analyzed with frequency distribution and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Result of the analysis are presented in the form of PIE chart and narration .

Method of procurement most frequently used was Measured with Nominal measures of 1 being "open tender", 2 being "restricted tender" and 3 being "direct purchase" and analyzed with frequency distribution and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Result of the analysis are presented in the form of BAR chart and narration.

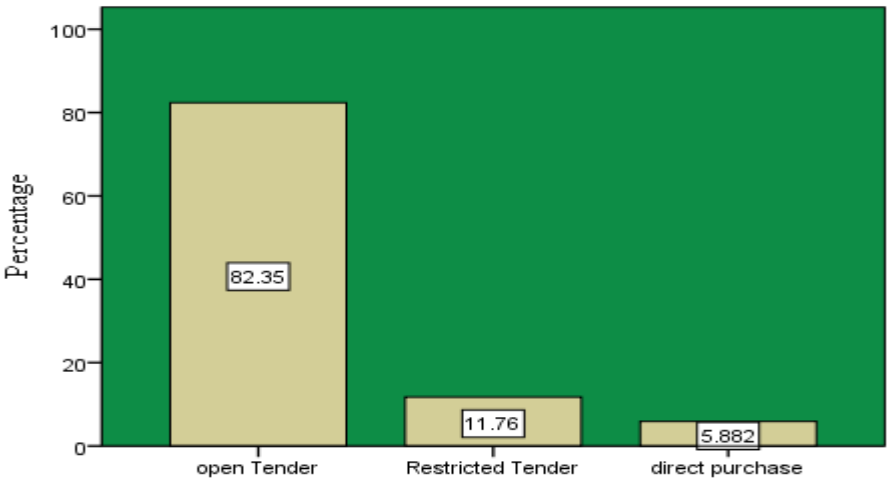
Availability of documented police for procurement was observed in 100% of Health Centers Among Them 58.8% of Health Centers make procurement limited to EML .Observation of procurement limited to Generic drugs found that 41.2 % of Health Centers procure only Generic medicines the rest 58.8% of them procure both generic and brand drugs.

Figure 8; Percentage of Procurement Made By Generic& Brand Name of drugs in MDSHS, Addis Ababa,2020



All Health Centers 100% reported purchasing from private suppliers with Purchasing interval every two month in 70.6% Health Centers and the rest 29.4% of the Health Centers reported a quarterly purchasing of essential medicines .open tender was found to be the most common way of procuring drugs (14)82.4%While 11.8% of Health Centers purchase using restricted tender and the rest 5.9% of Health Centers use direct purchase.

Figure 9;procurement method used with percentage at MDSHS, Addis Ababa,2020



Assessment of Procurement Practice reveled Availability of policy for drug Procurement was found in All HCs which is and line to the National Minimum Standard for Health Centers which requires all HCs to develop policies and guidelines for managing medicine quantification. The standard stressed that HCs shall have written policies for the Procurement of Essential Medicines(FMHACA, 2011a). This finding is significantly Higher when compared to study done In Addis Ababa Health Centers where documented policy or guidelines for quantification was forecasting 9(37.5%).

Assessment of Procurement Practice also revealed that less than half of the Health Centers are procuring drugs outside the essential medicine list which needs further improvement since no health program can afford to purchase all pharmaceuticals available on the market. A limited medicine list defining which medicines will be purchased, is one of the most effective ways to control procurement costs And It also simplifies other supply management activities and reduces inventory-holding costs as well(MSH 2012) the finding is better compared with Addis Ababa where more than half of the Health Centers procure drugs outside the EML. (Mudzteba, 2014)

The study also found that greater than half of the Health Centers procure brand and generic drugs which is inconsistent with national drug policy since brand drugs are relatively expensive scares financial resources could be limited for only purchasing small amount of brand drugs where the same amount of financial resource could buy the same type of drug with large quantity. Greater than quarter of the Health Centers set their purchasing interval of 2month this is encouraging compared to the study done in Health Centers in addis ababa (Shama, 2018)where there was no uniform purchasing pattern among HCs since Frequent procurement of drugs may lead to additional costs such as transportation and time setting optimum Established purchasing schedules could both improve efficiency and availability of essential medicine. majority of Health Centers procure using open tender which is in line with national drug policy since this method allows minimum acquisition prices for drugs.

4.3.4. Distribution Practice

For assessing Distribution practice pharmacy heads of respective Health Centers were presented with structured interview filled by the investigator regarding on Variables of: availability of policy for drug distribution, Duration of interval between ordering and receiving from PFSA , Duration of interval between ordering and receiving from private supplier and frequently used vehicles Were Assessed.

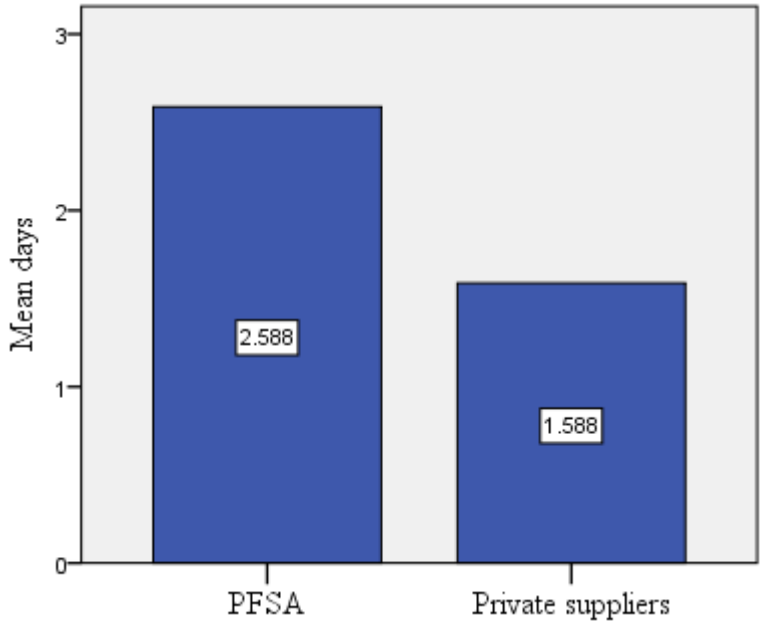
Availability of policy for drug distribution was Measured with Ordinal measures of YES if reported "available" NO if reported "not available" and analyzed with frequency distribution and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Result of the analysis are presented in the form of narration.

Duration of interval between ordering and receiving from PFSA was Measured with Ordinal measures of 1 if "less than one week", 2 if it takes "one week up to two weeks" and 3 being "two weeks up to Three weeks" and 4 being "three up to four weeks" and analyzed with frequency distribution and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Result of the analysis are presented in the form of narration and Bar chart.

Duration of interval between ordering and receiving from private suppliers was Measured with Ordinal measures of 1 if "less than one week" 2 if it takes "one week up to two weeks" and 3 being "two weeks up to Three weeks" and 4 being "three up to four weeks" and analyzed with frequency distribution and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Result of the analysis are presented in the form of narration and Bar chart.

The study found that none of the Health Centers have a documented police for distribution of drugs during the time of the visit ,Central distribution biro of ministry of defense health directorate is the sole distributer & transporter of drugs when the purchase is made from Pharmaceutical supply Agency and the responsibility for transportation goes to the Health Centers themselves 100% when the purchase is made from private suppliers.60% of the Health Centers respondents respond it took 2 to 4 weeks between ordering and receiving when procurement is from PFSA and 40% of the them respond it took less than one week to receive orders from PFSA. While The lead time was less than 1 week according to 60% of the Respondents when the purchase is from private suppliers.

Figure 10; mean interval in days between ordering and receiving from PFSA and private suppliers at MDSHS, Addis Ababa,2020



Health Centers vehicle was found to be the most widely used mode of transportation which accounted 58.6% of Health Centers respondents response followed by Health Centers Ambulance 37.9% and private transportation 3.4%.

Table 4;Type of transportation most often used in MDSHS, Addis Ababa, Ethiopia 2020

Type of Transportation		Responses		Percent of Cases
		N	Percent	
	Privet Transportation	1	3.4%	5.9%
	HC vehicle	17	58.6%	100.0%
	HC Ambulance	11	37.9%	64.7%
Total		29	100.0%	

The founding that none of the Health Centers have a documented police for distribution of drugs during the time of the visit is in contrast to the National Minimum Standard for Health Centers which requires all HCs to develop policies and guidelines for managing medicine distribution. The standard stressed that HCs shall have written policies for the distribution of Essential Medicines(FMHACA, 2011a). The fact that policies and guidelines provide guidance on appropriate and standard course of actions, it might have helped the pharmacy professionals in the HCs to get best out of the logistics system This finding is significantly lower when compared to study done In Addis Ababa Health Centers where documented policy or guidelines for distribution was 3(15%).

Regarding responsibility of transportation the study found that the responsibility for transportation is in the central distribution Health Centers when the purchase is made from PFSA which If proper delivery routes, order intervals, and delivery schedules are in place, the total cost of transport will be less hence could bring efficiency in distribution system.

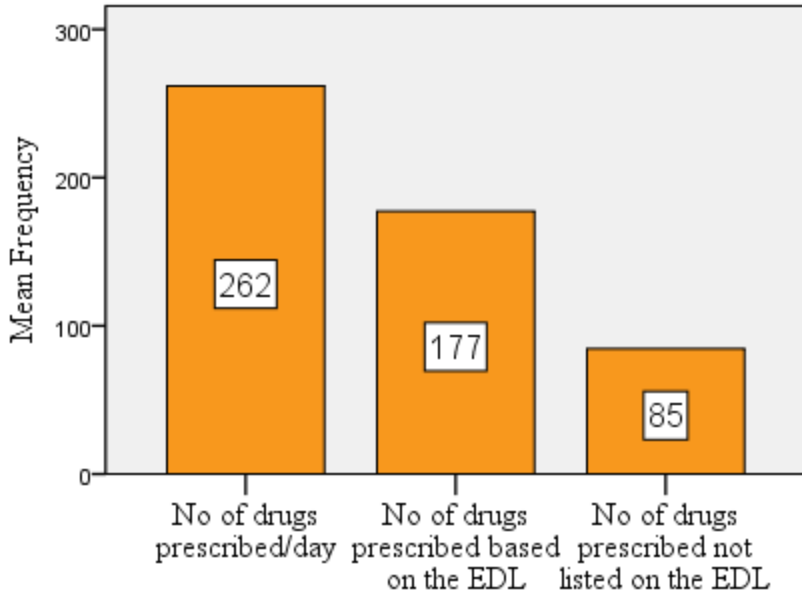
Greater than half of the respondents also reported that it takes greater than 2 up to 4 week for PFSA to Receive their order which is higher in length of time compared to private suppliers which the Health Centers reported less than a week the finding is also inconsistent with PFSA's key performance plan of delivering orders in less than two weeks since longer led time could lead to shortage of drugs in Health Centers which could in turn push them to emergency purchase and inefficiency .the finding of the study also revealed that quarter of the Health Centers use Ambulance for purchasing of drugs from private suppliers although usage of Ambulance could be out of good intention of availing essential medicines Ambulances may not respond quickly to emergency situation if they are engaged in transporting drugs, and may worsen the limited emergency medical service in the country (Germa et al., 2013).

4.3.5. Essential Drug Usage Practice

For assessing essential medicine list usage practice by the prescribers data collectors collected and counted all prescription at the day of the visit and calculated Essential Medicine Prescription rate by dividing 9hours of daily prescription with 9hours Prescription containing drugs only listed on EML for HCs. And the results were analyzed with frequency distribution and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Result of the analysis are presented in the form of narration and Bar chart.

The Average prescription prescribed in the Health Centers at the end day of the visit was found to be 131 prescription per day and the average no of drugs prescribed per prescription was 2 drugs. out of the total average drugs prescribed (234) per day the study found that 177(67.5%) drugs were listed on National Essential Medicine List for Health Centers where as 84.5(32%) drugs prescribed were not listed on the National EML for hospitals.

Figure 11:Usage of Essential medicine list by Prescribers at MDSHS, Addis Ababa,2020



Assessment of use variable indicated about quarter(33%) of drugs prescribed per day were not listed in the Health Centers essential medicine list since drugs which are not listed in the essential medicine list are not procured they tend to be not available in Health Centers pharmacy which could force patient to purchase drugs from private pharmacy which are relatively expensive which could accelerate the path to poverty. even though the result doesn't indicate lower performance level it shows significant gap exist from the ideal target of 100 percent prescribing drugs only from Essential medicine list.

4.3. 6. The Logistics management information system of the essential drugs of the selected health Centers.

For assessing LMIS practice pharmacy store heads of respective Health Centers were presented with structured interview which were filled by Data collectors regarding Variables of. availability of policy for LMIS, Availability of bin card and stoke card, Availability of updated bin card and Usage of LMIS for their intended purpose.

Availability of policy for LMIS was measured with ordinal measures of YES if reported "available" NO if reported "not available" and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Result of the Analysis are presented in the form of narration

Availability of bin card and stoke card on store on the day of the was measured with ordinal measures of YES "if available on the day of the visit" and checked NO "if not available on the day of the visit" and analyzed with frequency distribution and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Result of the Analysis are presented in the form of narration.

Availability of updated bin card for TEM on the day of the visit was measured with ordinal measures of YES if "they were updated on the day of the visit" and No if "not updated on the day of the visit" and result were analyzed with Unvariat descriptive statics and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Result of the Analysis are presented in the form of narration and table.

Duration of interval for supervision of LMIS was measured with ordinal measures of 1 being "every one month ",2 being "every two month" 3 being "every quarter" and 4 being "semi-annually" and result were analyzed with frequency Distribution and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Result of the Analysis are presented in the form of narration and Bar chart.

Usage of LMIS for their intended purpose was assessed for government requesting voucher (model20),for government receiving voucher and for Issuing vouchers. from data collectors observation and filling of data abstraction tool with Nominal Measures of YES "being used for their intended purpose" and NO " not being used for their intended purpose" and result are analyzed with frequency distribution and Result of the analysis are interpreted by comparing with WHO or National standard and previously done similar studies. Result of the Analysis are presented in the form of narration and table.

The study found that All Health Centers don't have a documented Policy or Guideline for logistic management information system. All Health Centers were found to have BIN card and stock card in store room while none of the Health Centers had BIN card in Dispensary, on the contrary updated bin card was found for 72% of tracer drugs .looking at individual tracer drugs; for mebendazol 82.4% , for ORS76.5% ,for Tetracycline76.5% for paracentamol 70.6% ,for amoxicillin in 52.9% of the Health Centers the bin cards were updated.

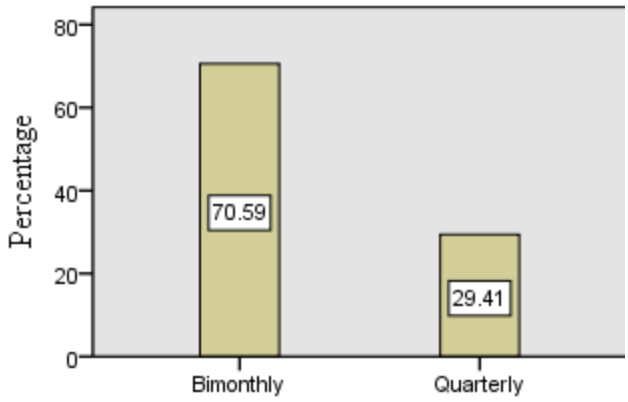
Table 5; updated bin card for tracer Essential medicine with percentage at MDSHS, Addis Ababa,2020

TEM	Average no of Centers with updated bin card (frequency)	Percentage of updated bin card (%)	Standard deviation from the Mean(SD)
Amoxacilline	9	52.9	3.4
Mebendazol	14	82.4	4.7
paracetamol	12	70.6	6.7
Tetracycline	13	76.5	2.3
ORS	13	76.5	2.4
MeanTotal	12	72	3.9

with regard to government requesting vouchers (model20), government receiving voucher (model 19) and government distribution voucher (model22) for requesting , receiving and for issuing drugs between dispensaries were being used for their purpose respectively in all the Health Centers.

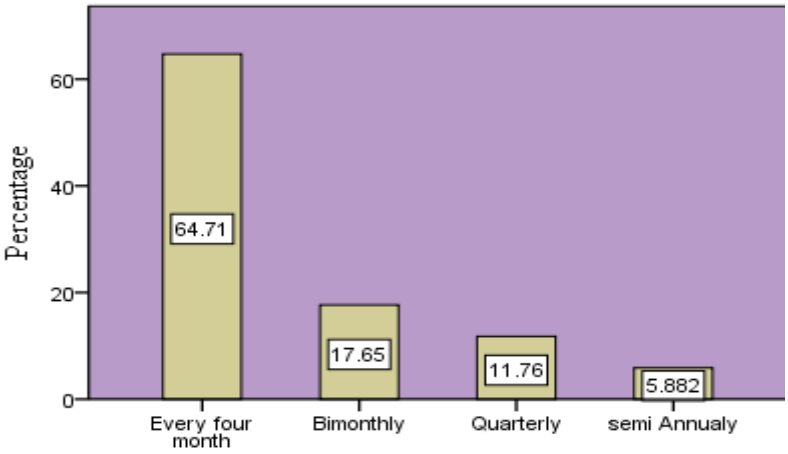
RRF & IFRR were found to be Available in all the Health Centers and all of them report to PFSA using RRF. for requesting drugs from internal store to dispensary, IFRR were being used in All the Health Centers. The study also found that 70.6% of respondents respond reporting to PFSA in every two month interval and 29.4% of the respondents respond reporting quarterly while the supposed Report sending interval reported is every two month in all Health Centers.

Figure 12;Report sending interval to PFSA with percentage in MDSHS, Addis Ababa,2020



64.7% of the Health Centers Reported on job training was the mechanism that help them learn on filling logistic form used by the Health Centers where as the rest of the respondents 35.3% respond self training was the mechanism that helped them fill logistic forms. Approximate supervision on pharmaceutical logistics was reported to be 64.7% every four month 17.6% every two month ,11.8% quarterly and 5.9% semi-Annuals. None of the Health Centers had computer software to manage LMIS.

Figure 13;Interval for supervision of pharmaceutical logistics at MDSHS, Addis Ababa,2020



Logistic management information system observation indicated availability of bin card , stock card and the usage of government requesting vouchers (model20), government receiving voucher (model 19) and government distribution voucher (model22) for requesting , receiving and for issuing drugs between dispensaries at all Health Centers is very encouraging due to the fact that a good LMIS provides the necessary information to make sound decisions in the pharmaceutical sector the contrary finding that about a quarter of drugs bin card were not updated could hinder the LMIS since updated Bin cards are important tools in the management of drug as they provide information on stock status, expiry date, and availability of products in addition to maintaining accountability (WHO, 2014).the study also found that about quarter of store keepers don't have training on filling logistic forms which could hinder the accuracy ,usage and dependability of logistic forms for decision making .finally the assessment of LMIS revealed that none of the Health Centers had a computer software for managing pharmaceutical logistics which could lead to lose of benefits of computerization such as Simplifying and speeding up complex tasks, Increasing accuracy by checking spelling, calculations, and data integrity, Updating and accessing information quickly and Automating repetitive tasks

CHAPTER FIVE
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Summary of Major Findings

Demographic characteristics showed that pharmacy heads have a mean 4.7 years experience all of them are educated with degree in pharmacy ,store keepers have mean 3 years experience all of them are educated and have diploma in pharmacy.

Descriptive analysis showed that Mean 85.88 percent of tracer drugs were available on the day of the visit with standard deviation $\pm$10 from the Mean. The highest available drug was tetracycline 100% availability in all Health Centers and the lowest available drug was paracentamol and ORS with mean availability 76.5% of the facilites. Mean stock out duration for tracer drugs was 1month with standard deviation of $\pm$5days.based on store keepers response ORS , aluminum hydroxide +magnesium hydroxide + simiticone syrup and Atropine were frequently stocked out each accounting 10% response. On the other hand hyosine, ORS, prometazine, paracentamole and cimitdine were the most reported surplus drugs 8% response.

Assessment of selection process showed 100% availability of EML, Availability of documented police for drug selection in 52.9% Health Centers, selecting unit for EML was DTC in 5.9%of the Health Centers, EML was updated in 3 years in 52.9% of Health Centers.Availability of documented policy or guideline for quantification was 5.6%.usage of formula for quantification is 55%,usage of ABC analysis was 22%,usage of VEN analysis was 33%.Assessment of procurement process showed 58.8% of Health Centers make procurement limited to EML and 58.8% of the Health Centers procure both generic and brand drugs. None of the Health Centers have a documented police for distribution of drugs during the time of the visit. Mean of 50 percent of the Health Centers respondents respond it took 2 to 4 weeks between ordering and receiving when procurement is from PFSA. Health Centers vehicle was found to be the most widely used mode of transportation which accounted 58.6% of Health Centers respondents response followed by Health Centers Ambulance 37.9% and private transportation 3.4%.finally 84.5(32%) drugs prescribed by the prescribers on the day of the visit were not listed on the National EML for hospitals.

5.2 Conclusion

Generality it can be concluded from the study the availability & Availability duration of non program essential drugs is very encouraging although much improvement is needed to reach WHO goal of 100% availability and zero stock out duration. it can also be concluded that:

- preparing written policies or guidelines regarding selection, forecasting and LMIS of NPDs was not given attention.
- overall Roll of DTC is weak and underutilized and selection criterion is highly based on cost
- Half the Health Centers don't use any kind of formula for quantification of drug needs
- Procurement by brand names is common practice in many of the Health Centers
- lead time of delivery after ordering from PFSA is slightly higher and usage of Health Centers Ambulance for delivery of drugs when purchase are made from private suppliers is common practice
- Usage of Essential medicine list by prescribers is far from the ideal target 100%
- Usage of computer software for LMIS are under looked.

5.3 Recommendations

Based on the finding of this study the following recommendations can be drawn

- Written policies or guidelines for drug selection, forecasting and LMIS should be prepared by the HCs or by ministry of defense main health directory.
- DTC in HCs should be strengthened by each pharmacy units of the HCs and other stakeholders who closely work with the HCs such as defense health directorate.
- Usage of formula and statistical formula based on consumption pattern needs to be emphasized and training regarding different statistical quantification methods needs to be initiated by the main health directorate.
- Procurement by Brand names should be avoided by the individual Health Centers procurement office and supervision of Tenders containing Brand names should be done by the health directorate.
- PFSA should improve its capacity of supply of NPDs and service that should include onsite delivery of NPDs, reducing delivery time and usage of Health Centers Ambulance should be discouraged and dedicated vehicle for procurement and delivery needs to be considered by health directorate.
- Usage of essential medicine list by prescribers needs to be improved through active participation of prescribers in drug selection process ,updating the list frequently and through printing the list and putting the list in every prescribers office.
- Usage of computer software to manage the logistics needs to be started by the main directories and individual HCs

5.4 Suggestion for Future Studies

- ✓ Further study should be done by increasing the number of tracer drugs used to get a more strong result.
- ✓ Further research should be done to a large sample to integrate a greater number of statistical analysis techniques, to improve the reliability and validity of the instrument and to generate a more significant finding.
- ✓ Similar studies should be conducted from the suppliers perspective as well as in other parts of the country

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Annex 1: Questionnaire to Pharmacy Heads of HCs

Evaluating the availability of non program essential drugs in Ethiopian Ministry of Defense Health Facilities located in and around Addis Ababa

Questionnaire for Health facilities in ministry of defense

----------, 2020

I. Verbal consent form before administering the questionnaire to the pharmacy head

"Good day. My name is_____. I am a student of logistics and supply chain management MSc program in School of commerce, Addis Ababa University. I am here to collect data about the availability of non program essential drugs in your Centers that is needed for my thesis titled *"Evaluating the availability of non program essential drugs in Ethiopian ministry of defense health Centers located in and around Addis Ababa"*. This survey is done in all health Centers. Your facility is selected because it is one of them. The research will provide an empirical snapshot availability of essential medicine at health Centers in Ethiopian ministry of defense and used not only for comparing the current availability level with WHO goal but also provide baseline information to track changes and improvements in essential medicine availability over time.

In this structured interview I would like to ask you few questions about the selection, quantification and procurement of essential drugs. The interview will take 15-20 minutes of your time.

Your participation is completely voluntary. You can refuse to answer any questions and/or withdraw from the study at any time. All of the information collected is strictly confidential. No one other than the research team will have access to your responses. Your personal identifiers such as your name and that of your health facility will not be used. The principal investigator will not refer to individual respondents or individual Centers in the report, but rather will describe the overall picture of all Centers.

Do I have your permission?

Yes ☐ No ☐ **If Yes, Continue**

II. Facility Identification

Health facility code _____

Interviewer: _____

Date of Interview _____.

How long you have worked as a pharmacy head_____

III. Selection, Quantification , Procurement and Distribution of NPDs

3.1 Is there any documented policy or guideline for drug selection? Yes ……..1 No.....0

3.2 Does the health Centers have its own essential drugs list?

Yes ……..1 No ..... 0 If no, skip to **Q.3.6**, and skip **Q. 3.15**

3.3 How often it is revised?

Annually.....1
Every 2 years.....2
Every 3 years.....3
Every 4 years.....4
Every 5 years.....5
> 5 Years.....6
Never updated.....7

If never updated, write the reason; Other (specify).....9

3.4 Who do the selection?

The pharmacy unit only.....1
DTC.....2
Other (specify).....9

3.5 What are the criteria for drug selection in the health center? **(Circle all that applies)**

Pattern of prevalent disease ..... A
Efficacy and safety..... B
Cost of the drugs C
Preference for well-known Drugs.....D
Others (specify) .....W

3.6 Is there a national essential drugs list available in the health center?

Yes ……..1 No 0

- If your answer was yes for **Q.3.2**, skip **Q.3.6** & **Q.3.7**
- If No, skip **Q.3.8** & **Q.3.15**

3.7 Which national essential drug list is used?

Drug list for Hospitals 1
Drug list for Health Centers.....2
Other (specify)_____9

3.8 Is there any documented policy or guideline for NPDs forecasting? Yes……..1 No……..1

3.9 Is there any documented policy or guideline for procurement of NPDs? Yes ……..1 No..... 0

3.10	Who determines this facility's resupply quantities of NPDs?	The facility itself .....1 Health office/health bureau.....2 Suppliers.....3 Other_____9
3.11	Do you conduct VEN analysis	Yes ……..1 No 0
3.12	Do you conduct ABC analysis	Yes ……..1 No 0
3.13	Which types of quantification methods is/are employed? **(Circle all that applies)** Consumption method .....A Morbidity method.....B Other (Please specify)..... W	
3.14	How are the facility's resupply quantities determined?	Formula .....1 Guess.....2 Other means (Specify) 3
3.15	Is the procurement limited to the essential drugs list?	Yes ……..1 No.....0
3.16	Is procurement made by generic name?	Yes ……..1 No.....0
3.17	Which purchasing pattern is **usually** used?	Monthly.....1 Bimonthly.....2 Quarterly .....3 Every 4 months.....4 Semi-annually.....5 Annually.....6 Perpetually.....7 Other (Specify)_____9
3.18	Do you purchase NPDs form private suppliers	Yes ……..1 No 0
3.19	Who is responsible for transporting NPDs to your facility when EDs are purchased from PFSA?	PFSA delivers .....A Health office/health bureau delivers .....B This facility collects .....C Other (specify) .....W
3.20	Who is responsible for transporting NPDs to your facility when EDs are purchased from private suppliers?	Supplier delivers .....A Health office/health bureau delivers .....B This facility collects .....C Other (specify) .....W
3.21	What type of transportation is <u>most often</u> used for transporting NPDs?	Facility ambulance .....1 Facility vehicle (other than ambulance) 2 Public transportation.....3 Private vehicle.....4 Supplier vehicle.....5 On foot..... 6 Other (specify).....9

3.22	On average, approximately how long does it take between ordering and receiving NPDs from PFSA?	Less than 1 week.....1 1 week to 2 weeks .....2 Between 2 weeks & 1 month .....3 1 month to 2 months .....4 > 2 months.....5
3.23	On average, approximately how long does it take between ordering and receiving NPDs from private suppliers?	Less than 1 week……1 1 week to 2 weeks……..2 Between 2 weeks & 1 month….3 1 month to 2 months……..4 > 2 months…….5

Skip this question if the answer for **Q.3.18 was no**

Annex 2: Questionnaire to Store Keeper of HCs

Evaluating the availability of non program essential drugs in Ethiopian ministry of defense health facilities located in and around Addis Ababa

Questionnaire for Health facilities in ministry of defense

July, 2020

I. Verbal consent form before administering the questionnaire to the store personnel

"Good day. My name is _____. I am working with the research team of the Department of, logistics and supply chain management School of commerce, Addis Ababa University. I am here to collect data about the availability level of non program essential drugs on your facility that is needed for the Masters Thesis titled *"Evaluating the availability of non program essential drugs in ministry of defense health Centers located in and around Addis Ababa, Ethiopia"*. This survey is done in all health Centers in ministry of defense. Your facility is selected because it is one of them. The research will provide an empirical snapshot availability of essential medicine at health Centers in Ethiopian ministry of defense and used not only for comparing the current availability level with WHO goal but also provide baseline information to track changes and improvements in essential medicine availability over time.

I would like to ask you few questions about availability of non-program drugs (NPDs) and the functioning of Logistics Management Information System. In addition, I would like to actually count the tracer drugs you have in stock today and observe the general storage and storage conditions. The interview will take 10-15 minutes of your time.

Your participation is completely voluntary. You can refuse to answer any questions and/or withdraw from the study at any time. All of the information collected is strictly confidential. No one other than the research team will have access to your responses. Your personal identifiers such as your name and that of your health facility will not be used. The principal investigator will not refer to individual respondents or individual Centers in the report, but rather will describe the overall picture of all Centers.

Do I have your permission?

Yes ☐ No ☐ **If Yes, Continue**

- *For comments/questions please contact **Mulugeta worku** (0913259490), principal investigator for the study*

***Note**: Throughout the questions **Non-Program Drgus (NPDs)** refer to drugs **excluding** program drugs such as anti-malarial drugs, antiretroviral drugs, family planning drugs, and TB-drugs, as well as laboratory reagents, medical supplies, and equipments*

II. Facility Identification

Health facility code _____

Interviewer: _____

Date of Interview_____

How long you have worked as a storekeeper _____

III. Availability of NPDs

3.1 Are there certain NPDs that you often stock out of before resupply? Yes ……..1 No 0

3.2 List the NPDs (including the dosage form and strength) you stock out of most frequently (up to 5 products)

_____.
_____.
_____.
_____.
_____.

3.3 Do you often have a surplus of certain NPDs before resupply? Yes ……..1 No 0

3.4 List the commodities you have a surplus of most frequently (up to 5 products).

_____

_____

_____

_____

_____

IV. Pharmaceutical Logistics Management Information System

4.1	Is there any documented policy or guideline for managing and using the logistics management information system (LMIS)?	Yes ……..1	No 0
4.2	Do you use and fill out the following logistics forms to manage NPDs?		
	A. stock record cards	Yes ……..1	No..... 0
	C. bin cards (in dispensary units)	Yes ……..1	No..... 0
	D. bin cards (in store)	Yes ……..1	No..... 0
	E. Internal facility report and requisition form (IFRR)	Yes ……..1	No..... 0
	F. Reporting and resupply form (RRF)	Yes ……..1	No..... 0
4.3	What form do you use for requesting/ordering NPDs <u>from suppliers</u>?	Gov't requesting voucher(Model 20).. 1 IFRR ..... 2 RRF..... 3 Facility's own form..... 4 Other (specify)_____ 9	
4.4	What form do you use for receiving NPDs from suppliers?	Gov't receiving voucher (Model 19)... 1 Other (specify)_____ 9	
4.5	What form do dispensary units use to request NPDs from store?	Gov't requesting voucher(Model 20).. 1 IFRR ..... 2 Other (specify)_____ 9	
4.6	What forms do you use for issuing of NPDs to units in the facility?	Gov't distribution voucher (Model 22) 1 Other (specify)_____ 9	
4.7	Do you report NPDs to PFSA?	Yes ……..1	No ..... 0 If no, skip to 4.13
4.8	What form do you use for reporting of NPDs to PFSA?	IFRR ..... 1 RRF..... 2 Other (specify)_____ 9	
4.9	Does the report for NPDs include the following?		
	A. stock on hand	Yes ……..1	No..... 0
	B. quantities used	Yes ……..1	No 0
	C. losses and adjustments	Yes ……..1	No 0

4.10	How often is the report for NPDs sent to PFSA?	Monthly..... 1 Bimonthly ..... 2 Quarterly..... 3 Every 4 months..... 4 Semi-annually..... 5 Annually ..... 6 Other (specify)……..9	
4.11	How often are you <u>supposed</u> to send the report for NPDs to PFSA?	Monthly..... 1 Bimonthly ..... 2 Quarterly..... 3 Every 4 months..... 4 Semi-annually..... 5 Annually ..... 6 Other (specify)_____9	
4.12	What computer software system do you use to manage NPDs in the store?	HCMIS..... 1 RX solution..... 2 Don't use software..... 3 Other (Specify)9	**If 3, skip to 4.17**
4.13	Is the software functional at this time?	Yes …….1 No..... 0If yes, skip to **4.16**	
4.14	How long the software has become not functional?	Less than 1 week..... 1 About 2 weeks ..... 2 About 3 weeks ..... 3 About 1 month..... 4 More than 1 month..... 5	
4.15	For what functions do you use the software?		
	A. To trace stock level	Yes ……..1	No 0
	B. To determine consumption	Yes ……..1	No 0
	C. To trace expiry date	Yes ……..1	No 0
	D. To determine issue quantity	Yes ……..1	No 0
	E. To determine order quantity	Yes ……..1	No 0
	F. To conduct ABC analysis	Yes ……..1	No 0
	G. To prepare reports	Yes ……..1	No 0

H. Other (Specify)_____

4.16 How did you learn to complete logistics forms/records used at this facility? (Circle that all apply)

Never learned.....A
During a logistics workshop .....B
On-the-job training C
On-the-job (self-learning) ..... D
Other (specify)_____W

4.17 Approximately, how often you get supervision on pharmaceutical logistics mostly

Quarterly.....3
Every 4 months 4
Semi-annually 5
Annually 6
Other (specify).....

Thank You for Your Cooperation!!

Annex 3: Data Abstraction-formats and Observation Check lists

Table 1: Stock Status

Preparation: *Be sure you have access to the (1) usable and (2) expired TDs, (3) Bid cards for the TDs, (4) The store personnel (to fill column 14)*

Column:

1. Name of the tracer drug (TD) that will be counted
2. Unit of count for the TD
3. Source of the TD
4. Check if the bin card is available, answer Y for yes or N for no.
5. Check if the bin card had been updated within the last 30 days, answer Y for yes or N for no..
6. Record the balance on the bin card. Note: If the answer to column 4 is N, record NA in this column.
7. Record if the facility has had any stock out of the product during the most recent 12 full months before the survey, answer Y for yes or N for no.
8. Record how many times the product stocked out during the most recent full 12 months before the survey.
9. Record the total number of days the product was stocked out during the most recent full 12 months
10. Record if the facility is experiencing a stock out of the product on the day of the visit, according to the physical inventory, answer Y for yes or N for no.

Maximum months of stock_____Minimum months of stock _____

Note: For any product that experienced a stock out in the last 12 months (including the day of the visit), please note reasons by product..

No	Tracer Drugs (TD)	Units of count	Source of TD	Bincard available?(Y/N)	Bincard updated?(Y/N)	Balance on bincard(#)	Stock-out most recent 12 months?(Y/N)	Number of stock-outs (most recent 12 months)(#)	Total number of days of stock-out(s)(#)	Stock-out today? (Y/N)
	1	2	3	4	5	6	7	8	9	10
1	Amoxicillin 500mg capsule	Box (50X1	Non-Program							
2	ORS	Sachet	Non-Program							
3	Mebendazole 100mg tablet	Packet (40x	Non-Program							
4	Tetracyclin eye ointment 1%	Tube	Non-Program							
5	Paracitamol 500mg tablet	Box (100x1	Non-Program							

Table 2 : Usage

column

1.No of prescription counted on the day of visit
2.No of drugs listed on the prescription
3.No of drugs prescribed based on EDL

No of prescription counted at End day of visit	No of drugs listed on the prescription	No of drugs prescribed based on EDL
1	2	3

Annex 4: List of Health facility Included in the Study

S.No.	Name of Health facility
1	Armed force hospital…….Addis Ababa/Torhailoch
2	Bet-mengist…….. Addis Ababa/Feil weha
3	Combat and engineering…….. Addis Ababa/mexico
4	Defense engineering college…… Bishoftu
5	Defense head office……. Addis Ababa/Ambassador
6	Defense sport……. Addis Ababa/sar bet
7	Dejene kifle Tore…… Welmera/fiche
8	Gofa…….. Addis Ababa/Gofa
9	Health science college…….. Bishoftu
10	Hidase …… Addis Ababa/6kilo
11	Information directorate…… Addis Ababa/kality
12	Kality transport directory…….. Addis Ababa/kality
13	Mider haile…… Addis Ababa/Torhiloch
14	Nazeret depo…… Adama
15	Signal…… Addis Ababa/signal
16	Tatek…….. Addis Ababa/winget/tatek
17	Tore-college…… Addis Ababa/Abo/mekanisa