



College of Health Science

School of Pharmacy

Department of Pharmaceutics and Social Pharmacy

Inventory Management Performances of Key Essential Medicines in Public Health Facilities at South West Shewa Zone Oromia Region, Ethiopia

By: Alemayehu Gutasa (Bpharm)

A thesis submitted to College of Health Science, School of Pharmacy, Department of Pharmaceutics and Social Pharmacy, Presented in Partial fulfilment of the requirement of Degree of Master of Science in Health supply Chain Management

Advisor: Tariku Jebena (PhD)

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Addis Ababa University

School of Graduate studies

This is to certify that the thesis prepared by Alemayehu Gutasa, entitled: “**Inventory management performances of key Essential medicines in public health facilities at south west Shewa, Oromia Region, Ethiopia.**” and submitted in partial fulfilment of the requirement of Degree of master of science in health supply chain management complies with the regulation of Addis Ababa University and meets the accepted standards with respect to originality and quality.

Signed by Examining Committee:

External Examiner: Tesfaye seifu (Bpharm ,Msc) Signature_____and Date_____

Internal Examiner: Zelalem Tilahun (Bpharm ,Msc,) Signature_____and Date_____

Advisor: Tariku Jebena (PhD) Signature_____and Date_____

Chairman of the Department

Declaration

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Name: Alemayehu Gutasa

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This thesis has been submitted for examination with my approval as university

Advisor: Tariku Jebena (PhD) Signture_____

Addis Ababa, Ethiopia
February , 2022

Abstract

Background: key essential medicines are those pharmaceuticals which must be available in sufficient quantities at all times for the management of most common disease. However, different studies shows that In Ethiopian public health facilities, stock outs of key Essential medicines is common. Hence this study was aimed at assesing key essential medicines Inventory management performance at public health facilities found in south west Shewa zone of Oromia region, Ethiopia.

Methods: Mixed method design were employed from June 1/2021 to June 30/2021. The quantitative data were collected through semi structured questionnaires, and observational checklists. The qualitative data were gathered through key informant interviews with the responsible professionals. The quantitative data from the questionnaire were analyzed using the Excel spreadsheet version 16 to calculate, stock out rates, inventory accuracy rate, percentage of acceptable storage condition, percentage of facility submitted report on time and percentage of facility that receive exact quantity drug ordered. Chi square test was conducted to determine significant variables. Whereas the qualitative part of the study was transcribed, summarized manually and analyzed using thematic analysis.

Results: Inventory accuracy rate for key essential drugs was found to be 76% and 72.5% in hospitals and health centers respectively. Out of twenty five key essential medicines assessed, the overall mean stock out was 24.99%. On average, 93.3% of bin card were updated. Only three health facilities under study met the acceptable storage criteria and the reporting rate of the facilities was determined to be 88.8 %. The causes of stock out were shortage of supply at Ethiopian pharmaceutical supply agency and in the market, lack of trained human resource, lack of communication and budget constraints.

Conclusion and Recommendations: Over all, Inventory management performances of key essential medicines needs improvement. and shortage of supply at EPSA and on the market, inappropriate storage and reporting practice and lack of automation were the reasons for stock out within review period. Thus, health facilities should work in harmony with stalkholder to ensure uninterrupted supply of Key essential medicines .

Key words: Inventory management performances,public health facilities, key Essential Medicines

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List of Abbreviations

EML	Essential Medicine List
EPSA	Ethiopian Pharmaceutical Supply Agency
EPSS	Ethiopian Pharmaceutical supply services
IPLS	Integrated Pharmaceutical Logistics Logistic System
KPI	Key Performances Indicator
LIAT	Logistic Indicator Assessment Tool
LSAT	Logistic System Assessment Tool
MOH	Ministry Of Health
ORHB	Oromia Regional Health Bureau
PFSA	Pharmaceutical Fund And Supply Agency
PMS	Pharmaceutical Management System
RDF	Revolving Drug Fund
SC	Supply Chain
SCC	Supply Chain Council
SCOR	Supply Chain Operation Reference Model
SDG	Sustainable Development Goal
UHC	Universal Health Coverages
ZHD	Zonal Health Department

1. INTRODUCTION

1.1. Background of the study

“Promoting wellbeing and ensuring health lives for all at all age” is one of the Sustainable development goals and founding concept of the World health organization (WHO) and the universal deceleration of human rights (WHO, 2016). Realizing this goal requires the existence of a well-functioning health care system. Pharmaceuticals are important integral part of a quality health care service delivery. According to WHO annual report of 2017 on toward access to 2030 nearly ten million deaths globally (four million in Africa and south east Asia alone) could be avoided, if accessibility of essential medicine is maintained (WHO, 2018).

Without Quality assured, safe and effective key essential medicines with adequate amount at all times, providing health care is impossible (WHO, 2016). To improve access to essential medicine, WHO has a frame work such as rational selection, sustainable financing, reliable health and supply of quality products, which is in line with sustainable development goals (WHO, 2018).

Therefore, pharmaceuticals logistics management is core component of health sector for health programs and services. Thus, effective and efficient logistics management not only help secure essential commodity, but also determine the fate of any public health programs (Dessalegn and Tiruneh, 2015).

Furthermore, a properly functioning pharmaceutical logistics system benifits public health facility programs by ensuring availability of essential commodity. so all stalkholder and decision makers should increase their attention to improvement of health commodity logistics system (USAID/DP, 2011; Lee et al, 2011).

Ultimately effective health commodity logistics management can lead to lower the total amount of resources required to provide the required level of customer service through increased product availability and reduced order cycle time while minimising costs (Banomyong and Supatn, 2011). however, many countries do not monitor their pharmaceuticals logistics performances , even for limited indicator due to financing and impact of stock out (Behera and Kannan, 2018).

In Ethiopia the ministry of health (MOH) initiated a comprehensive supply chain strategic planning process, emphasizing the integration of all products into one supply chain to strengthen logistics system. The Ethiopian pharmaceutical supply and services (EPSS) Mandate is “*To avail affordable and quality pharmaceuticals sustainably to all public health facilities*”(FDRE Proc, 2009).

With the introduction of Integrated pharmaceutical logistics system (IPLS), EPSS established an IPLS that accommodates all health program commodities at all levels of public health facilities to connected with accurate and timely data for decision making. IPLS is the prime mechanism by which all public health facilities obtain essential and vital health products from next level. The system contains not only physical flow of products but also the flow of information for decision making (PFSA, 2016).

Integrated pharmaceutical logistics sytem purpose is to streamline pharmaceuticals reporting and distribution by integrating the supply chain management of all types of pharmaceuticals (medication, medical supplies and equipment, and laboratory chemicals and reagents) for all programs. With three main components, policies and guidelines for logistics management information system (LMIS), direct distribution to facilities, and inventory management of pharmaceuticals, IPLS measures progress and performance through a set of indicators for each component (EPSA, 2018).

Furthermore, In Ethiopia EPSA major strategic initiative were to enhance efficiency in selection, quantification and procurement of essential medicines and scale up integrated information management system for health commodity logistics and services intends to respond early to the majority of health problems of the community; with the target of continous supply of essential health commodity to both urban and rural that are of assured quality, safety, efficacy and cost-effective with their proper use (MOH, 2021).

1.2.Statements of the problem

World health Organization annual report reveal the cost of pharmaceuticals is the second highest expenditures after staff costs in most countries health care system (Murray and Michael, 2015). Around fourty to sixty percent of public health budget is allocated for medicine and supplies in many countries. Despite huge money has been invested, almost one third of the world population lack essential medicine (MSH, 2012).The main reason behind is inadequate management of pharmaceutical logistics sytem. World Bank indicates that in most developing countries, a high percentage of medicine losses and westage occur in the public health facilities storage and distribution system (Mir et.al., 2017).

Public health facilities are deeply dependent on the availability and timely arrival of these products from their key suppliers to ensure the quality of patient care; however, assessments conducted at different levels of the supply chain and by different institution identified frequent interruption of essential medicines this attributed to dissatisfaction of health providers, patients, and the community at large (WHO, 2018; EPSA, 2018).

Even though large investments has been made, the availability of essential medicines remains big challenge in developing and middle incoming countries (Barasa, 2018; Mahmic-Kaknjo et. al., 2018). This is due to lack of well-functioning logistics systems (Monique, 2019). In Ethiopian public health facilities Inadequate supply of quality and affordable essential health commodity , poor storage, weak stock management (Gurmu and Ibrahim, 2017; EPSA, 2018). Study shows In Ethiopia health care facilities were problematic in data quality of stock records and requisition reports (Tilahun, 2016).

Moreover, limited availability, poor inventory management of EMs in the country (Kefale and Shebo, 2019), poor report quality and inventory record accuracy is among big challenges in which public health facilities logistics system are facing (Tiye and Gudeta, 2018). Regular monitoring and comprensive quantitative survey with more focused performance assessment for adequate optimization of supply chain is necessary (Mir et. al., 2017; EPSA, 2015).

1.3 Objectives

1.3.1. General objective

To assess inventory management performance of key essential medicines in public health facilities found at South West Shewa zone of Oromia region, Ethiopia.

1.3.2. Specific objective

- To assess availability and stock out duration of key essential medicines in public health facilities at south West Shewa zone.
- To measure key essential medicines logistics management Information system Performances of public health facilities in South West Shewa zone.
- To evaluate essential medicines storage management performances of public health facilities found in South West Shewa zone.
- To explore the challenge associated with Inventory managements performances of public health facilities found in South West Shewa zone.

1.4 Research question

- 1.What is the extent of key essential medicines availability and stock out duration in public health facilities at South West Shewa?
2. What is the actual trends of LMIS performances of key essential medicines in public health facilities at South West Shewa?
- 3.What is the extent of a proper pharmaceutical's storage performances in public health facilities at South West Shewa?
- 4.What are the challenge associated with Inventory managements performances of public health facilities at South West Shewa?

1.5. Significance of the study

The rationale of conducting this survey was to reveal all the observed gaps and for provision of a baseline data to those public health facilities, researchers, academicians and students. More population growth means more health programs, which need more supplies, need large warehouse, need more inventory management through trained manpower and well organized system. Addressing these gaps ultimately results in good patient / client satisfaction, saving a large amount of money that could be lost and saving the lives of patients by availing key essential medicines at the public health facilities whenever they are needed. Furthermore the study benefits anyone who wants to improve inventory management of health facilities.

1.6. Scope of the study

The study is limited to key essential medicines inventory management performances at public health facilities in South West Shewa zone and includes , availability ,storage conditions, and LMIS performances and inventory management challenges. With the target population of public health facilities such as hospitals and health centers and six months logistics data until the date of data collection were collected from ART sites of public health facilities.

1.7 Operational definition of terms and concepts

The following definition is to ensure uniformity throughout the study.

Program drugs: are those pharmaceuticals that are used for treatment of malaria, TB, antiretroviral and family planning and related i.e. which are dispensed for free.

Stock out: a situation of demand requisition cannot be fulfilled, unavailability of usable stocks with zero balance.

Essential medicines: those pharmaceuticals which must be available in sufficient quantities at all times for the management of most common disease.

Tracer drugs (Key Essential Medicines): Those medicines, identified as Essential, Vital and used for life saving purpose selected by federal ministry of health of Ethiopia, and expected to be available throughout the week, 24 hour. and 365 day in a year in public health facilities.

Performance: logistics performance defined by key indicators.

Public Health facilities: These are health facilities owned and managed by the government of Ethiopia, under regional health bureaus.

Training: Training is a short term Pharmaceutical SC training which might improve the logistics information system, e.g. (IPLS) training.

Data Quality is all about completeness, accuracy, and timeliness of reports to make informed decision making. and designed to improve LMIS data quality (John Snow, Inc, 2017).

Timeliness: If public health facilities submit their approved RRF report to the next higher level.

- a) Public hospitals and health Centre's should submit RRF to the EPSA or zonal health department until the 10th day the month following the reporting period.
- b) Public health centers served via Woreda health office should submit RRF to the Woreda health office until the 5th day of the month.

Bin Card update: The bin card is updated if it had to be updated within the previous 30 days; unless otherwise, last updated with the zero balance and the public facility has not received any of that products. If the bin card contains an item that did not have a transaction for more than 30 days considered as not updated.

Supervision: is all about the direction, guidance, and control of the drug supply unit intending to accomplish their assigned work by higher officials.

2. LITERATURE REVIEW

Introduction

The first section focuses on concepts and nature of pharmaceutical supply chain management, logistics performances of key essential medicines, and construct of pharmaceutical logistics management in public health facilities. The next section of this chapter elaborates empirical review of key essential Inventory management performances of public health facilities ,which examines various research studies and reports done from local to global level.

2.1. Review of Concepts and Theories

2.1.1 The Nature of Pharmaceutical logistics Management

Pharmaceutical supply chain management practice should be applied to achieve maximum efficiency since it deals with essential medicines. Moreover, health sector supply chain management (SCM) is important to decrease the cost of medication and equipment, in ensuring full supply, in preventing wastage, increase demand of quality health care and increasing the performance of the hospital in giving services to the patients resulting in turn in improved customer satisfaction (Lang and Cheng, 2012).

Health commodities logistics involves around four activities; the major activities in the cycle, heart of the cycle, quality monitoring of the activities and logistics environment (policies and adaptability of the system). Pharmaceutical logistics activities includes five basic functions selection, quantification and procurement, inventory management, storage and distribution and serving the customer. Management support systems ; the planning and organization of services, financial and information management and human resource management.these management support systems hold the management cycle together. The overall cycle rests on a policy and legal framework that establishes and supports the public commitment to supply essential medicines (USAID | DP, 2011).

One of the main components of pharmaceutical logistics system is quality monitoring because it can describe the logistics performance and point to areas that need improvement. It should be included in every step of the cycle (SIAPS, 2015).Overall, the main purpose of Pharmaceutical

Logistics system is to achieve the Six Rights (Right product, Right Quality, Right Quantity, Right cost, Right Time, Right Place (USAID | DP, 2011).

2.1.2. The Availability of key Essential Medicines

Essential medicines are selected because of their public health relevance, evidence on efficacy and safety, and comparative cost-effectiveness. This means it is in line with the sustainable development goals (SDGs) and includes the following four elements (WHO, 2017).

The first one is appropriate selection and use of key essential medicines; It is linked to the development of national standard treatment guideline and national EML. The second is affordability and availability problems includes lack of financing, improving affordability, quality and safety. the third is improving medicines use, and the last is developing new essential medicines. So collaborative efforts of the governments, healthcare providers, policy makers, the pharmaceutical industry, donors as well as civil society organizations and international agencies must address these challenges (Wirtz et al, 2017).

Improving availability, access and affordability of highly-priced essential medicines public health facilities are critical steps towards the achievement of UHC. A cooperation and consistently aligned approach between organizations responsible for both medicines selection and financial coverage is recommended. EML should be updated regularly and this process seeks to identify potential additions and deletions of medicines, and changes in formulations and doses (WHO, 2020).

2.1.3. Inventory Management of key Essential medicines

The IPLS has three major components these includes; inventory control, policies and guidelines for LMIS, and storage of pharmaceuticals. Besides, each component has its own set of indicators for measuring improvements and performances of the system (Tilahun, 2016). Inventory management in the health facilities are one of the core components of pharmaceutical logistics that affect the availability of essential medicines. poor inventory management of pharmaceuticals in public health facilities results in wastage of financial resources, and stock losses.

The main inventory management objectives is to maintain steady supply of pharmaceutical to the facilities where they are needed while ensuring the resources effectively used. Quality monitoring of storage and distribution includes collection of data, as well as supervision and feedback stock availability, order fulfillment, inventory accuracy, space utilization and safety (USAID/DP, 2011).

2.1.4.Storage condition of key Essential medicines

Well organized, well built, well located and, well secured storage condition is the essential part of pharmaceuticals supply chain to ensure the physical integrity and safety of the products. An effective building provides the correct environment for the storage of commodities and assists the efficient flow of supplies, improves quality and decrease costs (MSH, 2012).

Maintaining adequate storage conditions is essential for ensuring availability of life saving medicines and major IPLS related pharmaceuticals management improvement initiatives. If proper storing procedure ensured, customers can be assured high quality product. A well-organized warehouse will streamline its different activities; The storage area has to be dry, wellventilated, out of direct sunlight, well-lit, complete with safety equipment, clean, of adequate space, and with standard pallets and shelves (PFSA, 2015).

2.1.5. Logistics management information systems of key Essential medicines

Information is the driver of the logistic process, including inventory control; it is impossible to make quality inventory decisions without complete and timely data (USAID/DP, 2011). LMIS is the system of records and reports to collect, organize, and present logistics data. LMIS ensures logistics professionals to collect the data to make informed decision that will promotes client service though it is difficult to practice. It makes logistics professionals to collect the data needed to make informed decisions that will ultimately improve customer service and it can be manual or computerized (USAID/DP, 2011).

Even though implementation of automated LMIS is costly and time consuming, it can greatly facilitates the work of logistics managers and it needs planning and good management for ultimate outcomes. For any logistics system, the three key essential LMIS data items are quantity of stock on hand, consumption data and losses or adjustment (USAID/DP, 2011).

The quality and timeliness of the LMIS records and reports have a sound impact on the sustainable accessibility of essential medicine (WHO, 2016). The HF store managers are required to fill the report and RRF every two months and submit it to their respective EPSA hub. Based on their report and request, EPSA branches refill public health facilities requests with the required pharmaceuticals (PFSA, 2015).

The electronic recording systems also minimize errors and improve recording accuracy, save time and can easily retrieve the long lasting key essential data, which enhances the (LMIS) performances through reducing errors and improving reporting rate. According to PFSA, all health facilities need to report and request all programs drugs every two month from starting from one to 10th day of the reporting month using RRF format (PFSA, 2015).

2.2. Review of Empirical Studies

According to study in Ethiopia, on availability of essential medicines and inventory practices in health centers of Adama town, shows the availability of tracer drugs on the day of the survey was 76.3%. Average length of days out of stock for tracer drugs during the past one year from each HC was 40.6 days. Out of tracer drugs seen at HCs, ORS was stock outed for 144 days while paracetamol stock outed only for 1.4 days (Kefale and Shebo, 2019).

According to the survey conducted in Ethiopia to assess pharmaceutical management practices and performance in public health facilities, the average stock out rate for hospitals was 27.3%; for health centers 24.9%. More over, the average use of bin cards for tracer items was 90% at hospitals, 55% at health centers. Between 68% and 81% of bin cards at health centers were up-to-date, while bin card accuracy was in the range 42%-79% for health centers. The availability at health facility level was about 79% (EPSA, 2018).

Another study conducted on inventory management of essential medicines in health centers, East Shewa shows the average stock out of key essential medicines was around 27.25 % with the average stock out length of 35.31 days (Gurmu and Ibrahim, 2017).

Study done on inventory management practices influence on availability of essential medicines in kenya, the average number of medicines available in the whole county was 72.2 (63.35%) out of

114 medicines, with a range of between 48.25% and 78.95%. The mean day out of stock was 51.30 days (Barasa, 2018).

Another study on the pharmaceutical logistics management system in south sudan reveal that, 24 % of health facilities received the quantity of medicines they ordered to refill. Concerning product availability, 25 % of the health facilities had stock levels that ensures product availability and 27 % of the public health facilities reveal stock out of one or more drug at the time of visit (Dick et. al., 2011).

According to the study conducted by Kefale and Shebo (2019) the discrepancy of TDs between physical count and on bincard for which physical inventory less than the balance on bincard ranges from 0 to 33.3% (Kefale and Shebo, 2019). Another study on in black lion hospital on IPLS implementation, addis abeba, Ethiopia, bincard accuracy (82.4%) with respect to physical count taken during at the time of day visit for three items (Sisay, 2017).

The study conducted on IPLS in selected health facilities of Ethiopia showed, the average availability of bin cards for the selected products was 83.9% for hospitals, 75.4% for health centers, on average, hospitals had an updated bin card for 43.8% of the product while health centers had an updated bin card for 32.9% (Alemu et al, 2020).

Study on pharmaceutical logistic system in south sudan shows that among the health facilities included in the study, 39% of the health institution had LMIS tools such as logistic formats and 27 % of them experienced accurate logistics records (Dick, et.al., 2011).

Assessment on IPLS revealed that bin cards, IFRRs and RRFs were available among 25 (96.2%) of the health facilities. Sixteen (61.5%) public health facilities update bin card regularly, and 22 (84.6%) of them complete and send IFRR to their respective facility stores, while 24 (92.6%) of the facilities were sending RRF to PFSA bimonthly (Tilahune, 2016). On average the exact accuracy of request and resupply form (RRF) data for hospital and health center was 45.6% and 37.1%, respectively (Alemu et al, 2020). The IPLS survey by (EPSA ,2018) to assess IPLS implimentation reveal that, close to two-thirds of primary hospitals (63.3%) were implementing Dagu (HCMIS) compared to just 18.5% of health centers.

Study on influence of inventory management practices on availability of medicines in public health facilities in Kenya, 62.5% of respondents reported that FEFO method of issuing medicines is popular one (Barasa, 2018). The study conducted on assessment of supply chain management performance of anti TB at diredawa, revealed that half of the health facilities (50%) practiced acceptable storage condition (Tola et. al., 2020). According to Study conducted on the logistics management of essential medicines in south sudan shows, 35 % of the health facilities maintained acceptable storage condition (Dick et .al., 2011).

Another study conducted in southern region of Ethiopia on supply chain management performances in public health facilities, reveals that most of the public health facilities ,26(86.7%) were stored and organized their pharmaceuticals in a manner accessible for first to expire first out (FEFO) and FIFO 27(90%) principles (Damtei .et al, 2020).

The study conducted in health center of East Shewa , Ethiopia on essential medicines, around five (25%) of the health facilities have met acceptable storage conditions (Gurmu and Ibrahim , 2017). Other study on logistics performances of ART drugs in health facilities of Eastern Ethiopia, only 50% of the public facilities had adequate storage space for existing products (Gabreil, 2017). According to EPSA, (2018) the percent of hospitals and health centers with acceptable storage conditions (meet 80% of criteria) 71%, and 45% respectively.

2.3. Identified Literature gap

In Ethiopia, the assessment studies revealed that stock out of key essential medicines, in adequate inventory management and infrastructure, were major constraints to pharmaceuticals logistics management system in the country. As the matter of fact Inventory management performances in public health facilities in Ethiopia with similar setting and concentration are limited. The study is comprehensive in terms of; level of facilities, logistics parameter employed and categories of medicines included which represent the whole programs. The study address all challenges in different dimension within Inventory management performances in detail, which provides valuable and integrated information for effective and critical decision. This study will try to fill the empirical gap found from literatures on the status and performances of key essential in public health facilities and track the future changes.

2.4. Conceptual framework of the study

The focus of this study is to assess key Essential medicines Inventory management performance in public health facilities of south west Shewa zone. Based on the purpose of the study, conceptual model developed to indicate interconnection between dependent and independent variables.

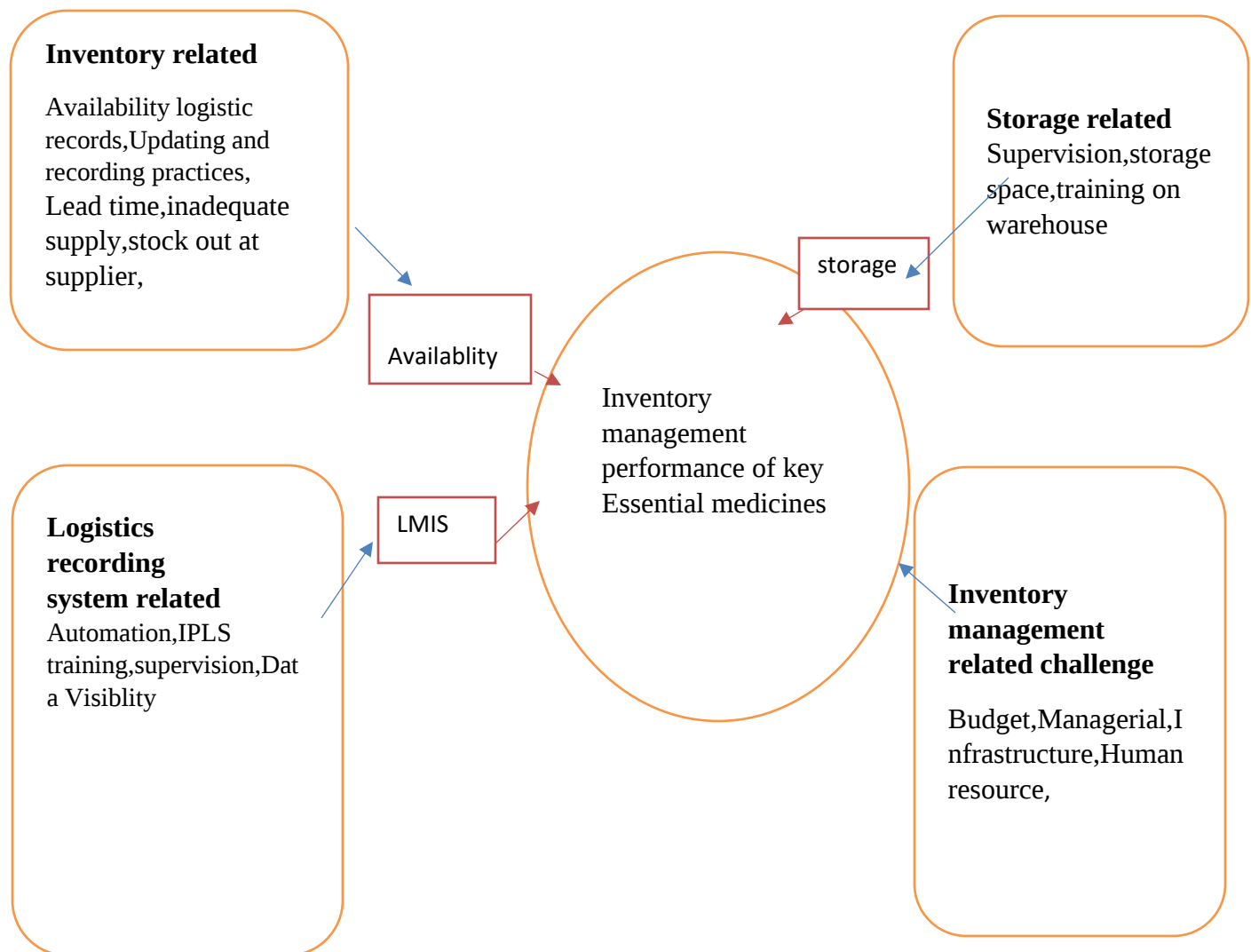


Figure 1. Conceptual framework

Source: Conceptual framework of Inventory Management performances (Source :Rogers ,2011)

3. METHOD OF THE STUDY

3.1 Description of study area

This study was conducted in public health facilities of south west Shewa zone of Oromia region, located 116km south west of capital Addis Ababa , from june 1,2021 to June 30, 2021. It comprises 11 rural districts namely; Ameya,Waliso, Kersa Malima, Sodo dachi, Tole, Ilu, Goro, Dawo, Wonchi, Saden sodo, Bacho and Waliso town, with a total population of 1,110,011 residing in 268 villages (National Census,2010). There are two higher general hospitals and three primary hospitals and a total of 56 health centers. The Ethiopian pharmaceutical supply agency Addis Ababa hub one is the main supplier of medicines for these public health facilities.

3.2. Research approach

This research was conducted based upon mixed approaches. The quantitative approach was used to assess the Inventory management performance by using key performance indicators,whereas qualitative was used to gather the information that cannot be captured by former.

3.3. Research design

Concurrent-explanatory design were employed to assess the inventory management performance of key essential medicines.

3.4 Units of Analysis

The units of analysis for this study was public health facilities that stock 25 Key Essential medicines (ART sites) in south west Shewa zone of Oromia region.

3.5 Population

The source populations were all health facilities, essential medines, health professionals, ZHB,RHB, EPSA and logistics documents. The study unit was selected public health facilities selected stalkholder, selected key essential medicines, selected bin cards and RRF.

3.6. Sampling Procedure

The determination of sampling for health centers was based on (USAID/DELIVER, 2008) in which at least 15% of the total health facilities are recommended in case of resource constraints. By taking inclusion and exclusion criteria into account sample size was calculated from total number of hospitals and health centers. Accordingly, the total number of health centers and hospitals in the zone gives 61. Thus, based on the LIAT guideline, the sample size became 9 (i.e., 15% of 62=9). As the facilities differ in terms of setting and scope of services, further stratification to lower-level facilities (health centers) and higher-level facilities (hospitals).

The hospitals were further stratified as a district hospital, and zonal general hospital. Accordingly, two district hospitals, and two zonal hospital were included. The health centers were clustered based on districts. According to Ethiopian health care system, only one health center per district provides HIV treatment service. Therefore, eight health centers which manage ART drugs were purposively included for consistency of the information from the woreda from which hospitals were not selected. Accordingly a total of 12 facilities were taken from the total of 61 public health facilities beyond the minimum requirement.

With regard to type and amount of key essential medicines included from each facility for the study were based on the tracer medicines. These drugs were obtained by referring to MOH and EPSA (MOH, 2019). Twenty five bin-cards from each health facilities for the 25 key essential medicines were reviewed. Moreover, facility RRF report of program drugs were used and purposive sampling for store manager(store keeper) were interviewed per facility for semi structured questionnaire.

Key informant was recruited from facility head, pharmacy head, store manager, ZHD, ORHB supply Case team and EPSA's sides to maximize the range of variation on the subject of study and data was collected by principal Investigator to maintain consistency throughout the interviews. The participant of the KI were selected based on their position of information ,accordingly, four store manager/storekeepers and four pharmacy heads and two health center manager , two Medical director, one Zonal logistic Officer, one ORHB, supply case team and one EPSA hub one from Capacity building were included. The key informants identified different types of problems, and the findings were then thematically analyzed by categorizing based on the the themes of the data.

Since ART (Antiretroviral Therapy) drugs were in the list of twenty five key essential medicines, health facilities which is not expected to manage these drugs were excluded, to maintain consistency of information (Tujo and Gurmu, 2020).

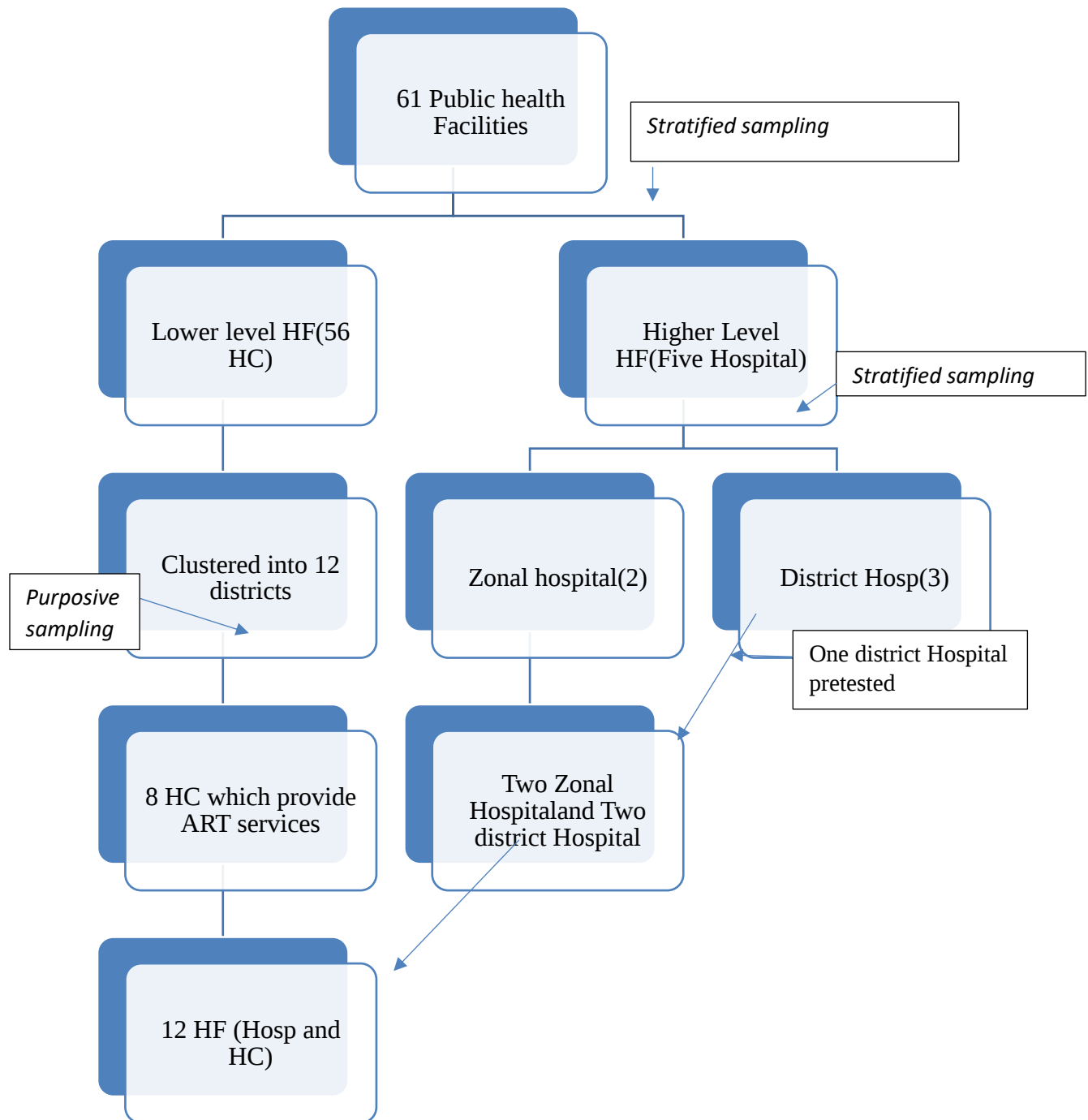


Figure 2: Flow diagram showing the health facility selection procedure

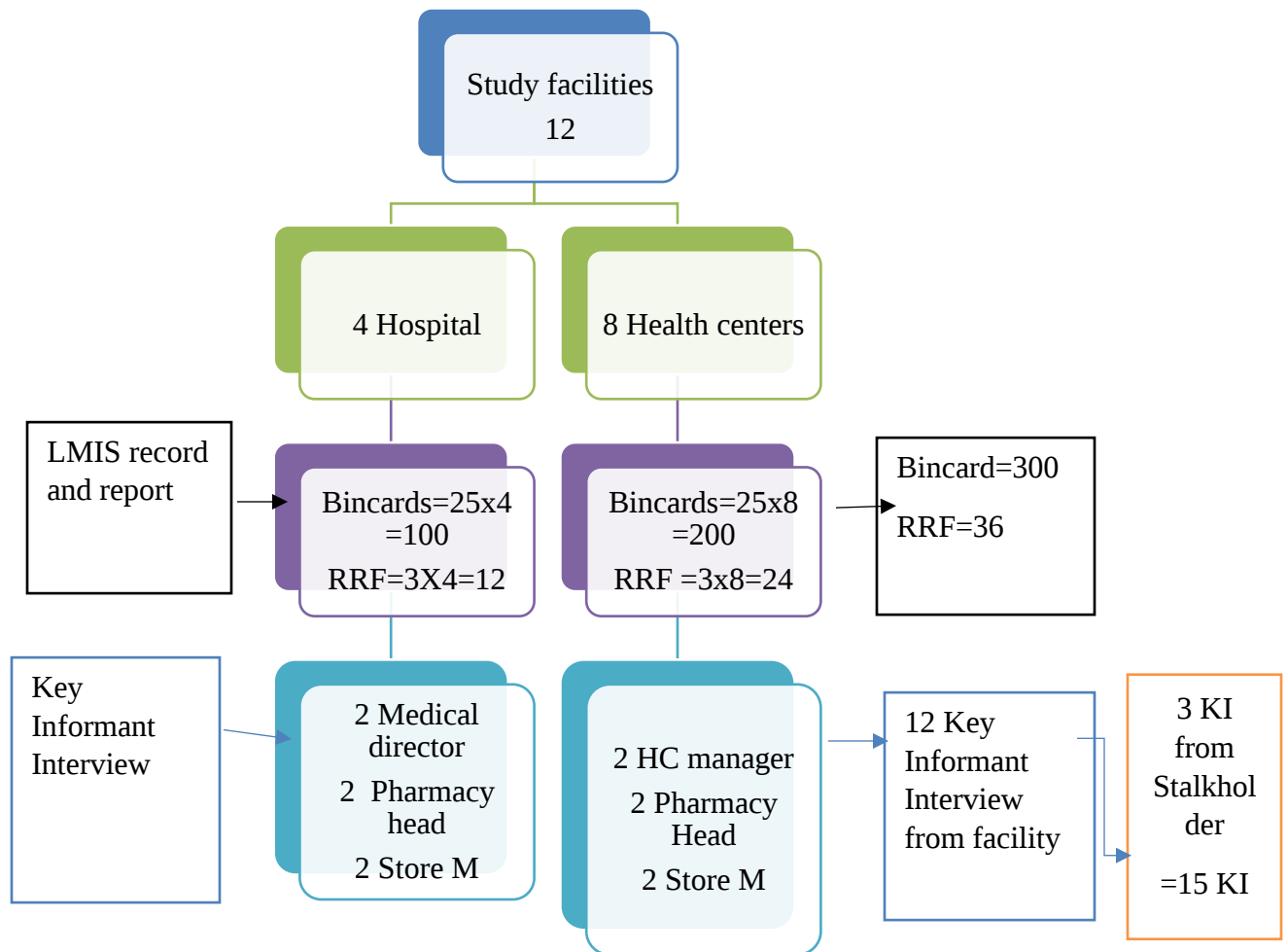


figure 3. Flow diagram showing documents and personal selection for study.

3.7. Variables of study

Inventory management performances of key essential pharmaceutical in these health facilities is the variable of the study.

Logistics management information system: the collecting, processing, and reporting of pharmaceuticals supply chain data to the concerned body, and also known as a manual system or an automated system.

Storage Conditions: - ensuring the safety and integrity of the products and its package until drugs are dispensed to the clients.

All the list of indicators and data sources are summarized on Table 1 below.

Table 1 Lists of Indicators and data sources.

	Indicators	Data Source	Formula	Interpretation
1	Percentage of facilities stock out at the time of visit	Physical count, bin card records, respondent	Number of tracer drugs available over number tracer under review.	If a product is not available for one day in the month, then it's considered as not available for the whole month
2	Percentage of accurate stock balance with bin cards.	Comparison of bin card balance and physical count	Numbers of stock equals physical stock count over total number of tracer counted .	The accuracy of logistics data as the percentage of discrepancy between physical count and stock record.
3	Average lead time	RRF, Model 19 and Respondent	Perception of the respondents.	lead time exceeding 20 days is considered as delay
4	Average number of of key essential medicines stock out in six months	Records and respondents	Number of days in which tracer drugs not available	Availability of tracer items
5	Percentage of facilities meet storage conditions	Visual observation	Number of HF that meet acceptable storage over total HF	Condition of storage against the standard
6	Percentage of Facility bin card utilization and update	Presence of bin cards and evidence of utilization in store	Visual observation	Evidence of Utilization in store
7	Percentage of facilities that completed and submitted RRF for the most recent reporting period	Presence of RRF and evidence of utilization	Completeness of all Column and Row	Quality of Report
8	Percentage of facilities with accurate RRF report	Bin card and RRF report	Comparison of stock balance on	Quality of report

			bin card and most recent RRF report	
9	Percived fill rate	RRF,model 19 and respondent	Percentage of facilities that receive the quantity of products ordered	To determine whether an order is filled in the correct quantities
10	Percentage of facilities that send report and requisition on time to the supplier	RRF report	Total number of RRF submitted over Expected.	Measure of whether timely reports and requests are sent to EPSA.

Source : (FDRE MOH,2019,Shawerega ,et.al., 2015).

Description of Core logistics Indicators

i) Inventory Accuracy Rate=
$$\frac{\text{No of health facilities that has accurate logistic data} \times 100}{\text{Total no of health facilities}}$$

$$\frac{\text{Number of items where stock record count equals physical stock count} \times 100}{\text{Total number of items counted}}$$

ii) Percentage of facilities that send

RRF=

$$\frac{\text{Percentage of health facilities that send report on time} \times 100}{\text{Total number of health facilities}}$$

iii) Percentage of HF that receive exact quantity of

product ordered=

$$\frac{\text{No of Health facilities that receive the exact quantity of products ordered} \times 100}{\text{Total number of health facilities}}$$

iv) Percentage of HF that meet adequate storage conditions=

$$\frac{\text{No of health facilities that maintain acceptable storage conditions} \times 100}{\text{Total number of health facilities}}$$

v) Percentage of facilities that experienced a stock out at any point during the study period or at the time of the visit=

$$\frac{\text{Number of health facilities that experience stock out} \times 100}{\text{Total Number of HF}}$$

vi) Order Lead time= day order is received by facility – day order is placed by facility to the supplier

3.8. Data source and type

Primary data sources were bin cards for inventory accuracy rate, and RRF for percent of health facility that report on time, percent of facility experience stock out and facility head, medical director, pharmacy head, zonal logistic officer, ORHB and EPSA hub one staff for interview guide. The secondary data source includes manual, SOP, books, logistic document from different organizations.

3.9. Data collection methods, instruments and procedure

The Semi structured questionnaire has two parts; socio demographic parts of the respondents and the second part deals with main parts, which were customized from logistics indicator assessment tool (LIAT) of USAID/DELIVER, and administered to store manager (store keeper). Observation/physical count and checklists for tracer drugs on bin cards, and RRF of was also reviewed to determine, inventory accuracy rate, percentage of facilities experience stock, bin card updating practices and percentage of facilities report on time and the data for observational check list were six months preceding the survey, six months logistic data enables to represent service performance.

Storage condition observation checklist was also used to collect data on the general pharmaceutical storage condition in the health facilities, and twenty aspects of storage condition is verified (USAID, 2011).

Flexible and probing questions were designed for head of pharmacy, store manager, medical director, health center manager, logistics officer and EPSS staff ; because they are expected to be in charge of the overall activities of pharmaceutical logistics and hence able to provide the needed information from respective health facility to cover areas that may not be mentioned on questionnaires. The interview guide was translated into the region's working language, Afaan Oromo, to facilitate conversation and not to be limited by language barrier. On average, the interview took 20 min and was held in a private setting. Then, the interview was audio tape

recorded and the result was translated into english by investigators. The raw data was categorized and quoted some KIs direct speech to strengthen the description and to illustrate the seriousness of the issues.

3.10. Data Quality assurance

The tools were piloted to determine its validity to determine the approximate amount of time needed to complete the tools. Validity refers to the extent to which an instrument measures what is supposed to measure. By taking 5% of the total sample size of the study and two hours training was given for the data collectors regarding the objectives and significance of the study and how to collect the data. During data collection process there was a close supervision by the principal investigator to ensure consistency and completeness of the data.

3.11. Data analysis method

The quantitative data from the questionnaire were analyzed using the Excel spreadsheet version 16 to calculate, Inventory accuracy rate, percentage of acceptable storage condition, percentage of facility sent report on time and percentage of facility that receive exact quantity drug ordered. The collected data were entered and analyzed by using Statistical package for Social Science version 25 for windows and chi-square test was done to determine a significant variables. The results were then presented using, graphs, and texts ,whereas the qualitative part of the study was transcribed and summarized manually. The data collected was analyzed using thematic analysis. Variables with a similar code were arranged together to formulate appropriate themes and the results were presented in the form of narration.

3.12. Ethical considerations

The Study protocol was reviewed and approved by Research and Ethical Review Committee of School of pharmacy, Addis Ababa University. The school issued support letter to Oromia regional health bureau/ PHEM department. The issued letter and one soft copy of the proposal were submitted . Then authorization letter was received from Oromia regional health bureau, South west Shewa zone health department and from each Woreda health office sequentially at the health facilities . Permission was obtained before data collection from the health facility medical director and pharmacy head by submitting the letter of cooperation obtained from the respective Woreda

health office and participants of the study were asked for consent before participating in the study. They were informed about the purpose of the study, why and how they selected and what is expected from them through out the consent process. During data collection there was high degree of confidentiality and no name of any health facility and participating subjects to be put in the result instead the aggregate result of the facilities.

4.RESULT

4.1. Characteristics of health facilities and respondents

Around 20 (43%) were degree holders, and 30 (68.2%) of staff had service year between one and five years. Four (33.3) % of the study facilities had received supportive supervision before three months ago, based on the types of facility, around 16.6% of health center had never received supervision within the last six months.

From the total of 46 staffs in study facilities, 37 (80.4) never received formal IPLS training, 11(23.9) received pre service training , there was no Public health facilities received on job training within the study period. from study health facilities, 5(41.66%) had never got feedback from higher level, based on the types of health facility, 4(33.3%) were health centers (Table 2).

Table 2. Characteristics of health facilities and respondents of the selected health facility of SW Shewa zone, Oromia, Ethiopia, 2021

	Variables		Hospital Frequency(%)	HC frequency	Total frequency
1	Professional background under pharmacy	Pharmacy	33(68.75)	13(27)	46(95.8)
		Nurse	0	2(4.1)	2(4.1)
2	Working experience	<1years	2(4.5)	2(4.5)	4(9)
		1-5years	25(56.8)	5(11.3)	30(68.2)
		>5 years	4(4.5)	6(13.6)	10(22.7)
3	Educational level(Qualification)	Degree	17(36.5)	3(6.5)	20(43)
		Diploma	16(34.7)	10(21.7)	26(56.4)
4	Recent Supervision	a. Never received	0	2(16.6)	2(16.6)
		b. Within the last Months	0	1(8.3)	1(8.3)
		c. One – three Months ago	1(8.3)	2(16.6)	4(33.3)
		d. Three to Six Months ago	1(8.3)	1(8.3)	1(8.3)
		E. Six Months ago	2(16.6)	2(16.6)	4(33.3)
5	Trainings staffs of pharmacy unit taken	IPLS	Received	7(15.2)	9(19.5)
			Not Received	26(56.5)	37(80.4)
		Pre-service training	Received	9(19.5)	11(23.9)
			Not Received	24(52.1)	35(76)
		On job trainings	Received	0	0
			Not Received	33(71.7)	46(100)
6	Feedback report from higher managers	No never	1(8.3)	4(33.3)	5(41.66)
		Quarterly	2(16.6)	1(8.3)	3(25)
		Six monthly	0	0	0
		Annually	1(8.3)	3(25)	4(33.3)

4.2. Availability and stock out duration of key essential medicines

Availability of key essential medicines were assessed using different approaches such as availability on the day of visits, frequency, duration of stock out within six months. Mean availability on the day of visit were 86% out of 25 key essential medicines and 93.5% bin card were updated in selected public health facilities (Table 3).

Table 3. Availability, stock status and bin card utilization for key essential medicines, selected health facility of SW Shewa zone, Oromia, Ethiopia, 2021

s.No	Description of key Essential medicines	Managed at this Facility F(%)	Availability on the day of visit. (%)	Bin card Availability (%)	Bin card Up dated (%)
1	Amoxicillin 500mg/250mg Dispersable tablet	12(100)	83.33	100	100
2	ORS salts	12(100)	75	100	100
3	Zinc dispersable tablet	12(100)	25	100	100
4	Gentamycin 80mg injection	12(100)	83.33	100	100
5	Cotrimoxazole 240mg/5ml suspension	12(100)	100	100	100
6	Magnesium sulfate injection	12(100)	100	100	84
7	Oxytocin 10iu injection	12(100)	100	100	100
8	Enalapril 10mg/5ml tablet	12(100)	66.66	100	100
9	Medroxyprogesterone acetate	12(100)	100	100	84
10	Glibenclamide 5mg tablet	12(100)	66.66	100	100
11	Adrenaline injection	12(100)	100	100	92
12	Pentavalent vaccine	12(100)	91.66	100	84
13	40% Dextrose	12(100)	41.66	100	100
14	Dextrose in Normal saline of 100ml	12(100)	100	100	92

15	Ferrous sulfate +folic Acid	12(100)	91.66	100	100
16	Ciprofloxacin 500mg tablet	12(100)	100	100	100
17	Ceftriaxone 1gm/0.5g injection	12(100)	100	100	100
18	Hydralazine injection	12(100)	100	100	100
19	TDF+3TC+EFV tab	12(100)	91.66	100	100
20	RHZE/RH tab	12(100)	100	100	88
21	TAT injection	12(100)	83.33	100	88
22	Tetracycline eye ointment	12(100)	75	100	100
23	Artemeter+ Lumefantrine tablet(20mg +120mg)	12(100)	100	100	100
24	Artesunate injection	12(100)	83.33	100	100
25	Iplanon	12(100)	91.66	100	88
Average			86	100	93.5

The finding of this study also disclosed that among the selected 25 key essential medicines, mean availability on the day of visit were 86% at all HF and 14(56%) of the key essential medicines were available throughout the Review period.

Eleven (44%) of key essential medicines were stock out at least once within review period. Within the review period about 75% of the health facility had stock out of Zinc dispersible tablet with stock out duration of 113.3 days, 50% were stocked out of 40% Dextrose with stock out duration of 110 days. Enalapril tablet were stock out in 41.66%) of the health facilities with a stock out duration of 165. In addition 33.3% of HF were stock out of ORS salts with stock out duration of 142.5 days and 25%) of the facility were stocked out of TTC eye Ointment with stock out duration of 120 days. While 16.66% of the facility had stock out of Artesunate Injection, Gentamycin injection and Glibenclamide with stock out duration of 165 days, 135 and 105 days respectively. Dextrose in normal saline, Fefol, and TAT injection were stock out in only 1 (8.33%) with a stock out duration of 180, 120, and 90 days respectively (Table 4).

Table 4. key essential medicines stock out in the last six months in selected health facility of SW Shewa zone, Oromia, Ethiopia, 2021.

Tracer Drugs	N	Stock Out Encountered, n (%)	Mean Frequency of Stock Out	Mean Stock Out Day within six months
ORS	12	4 (33.33)	3	142.5
Zinc tablet	12	9 (75)	1	113.3
Gentamycin 80mg injection	12	2 (16.66)	1	135
Enalapril 10mg tablet	12	5 (41.66)	2	165
Glibenclamide 5mg	12	2 (16.66)	1	105
Dextrose 40%	12	6 (50)	1	110
DNS	12	1 (8.33)	1	180
Fefol	12	1 (8.33)	1	120
TAT	12	1 (8.33)	1	90
TTC	12	3 (25)	1	120
Artesunate injection	12	2 (16.66)	1	165
Average	12	24.99	1.27	131.4

The stock out of key essential medicines is significantly associated with product expired ($p=0.018$), the resupply point was stock out, ($p=0.02$) the resupply point doesn't have adequate supply ($p=0.02$) and order amount changed at resupply point ($p=0.01$) according to evidence from Fishers exact test (Table 5).

Table 5. The association of stock out greater than two items and contributing factors in the selected health facility of SW shewa zone, Oromia, Ethiopia, 2021 (N=12).

Variable	(> 2 Stock out)			
	Fisher's Exact Test			
	Yes (%)	No (%)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Product expired	9(75)	3(25)	0.018	0.018
The resupply point was sock out	8(66.6)	4(33.3)	0.02	0.02
The resupply point doesn't have adequate supply	8(66.6)	4(33.3)	0.02	0.02
order amount changed at resupply point	7(58.33)	5(41.6)	0.01	0.01

Percentage of facilities that receive the exact quantity of drugs ordered.

As can be referred from the study results, none of the health facilities always received the exact quantity of products ordered from the supplier, EPSA. Therefore, this indicator is calculated only for facilities reported to receive exact ordered quantity most of the time, sometimes and never.

Percentage of public facilities that receive the exact quantity of products ordered most of the time Was two (16.6)%. There were no health facilities that received the exact ordered quantity the product always.

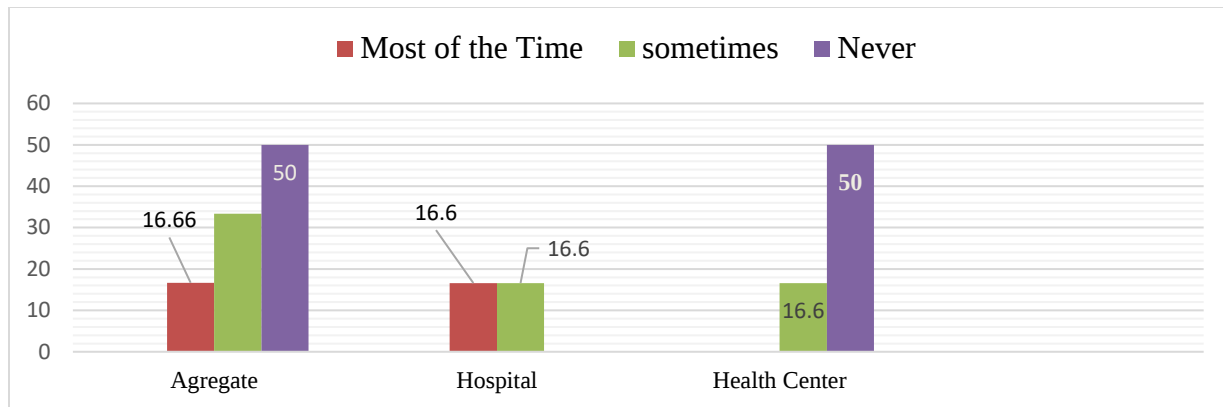


Figure 5. Rate of receiving the Exact quantity of key Essential medicines in selected Health facility of SW Shewa zone, Oromia, Ethiopia

Percieved Timeliness

Regarding the lead time, the approximate time between an order initiated and received from EPSA according to the respondents was two weeks to one month for Nine (75%) of health facilities. There were no public health facilities received less than two weeks for programs drugs (figure 4).

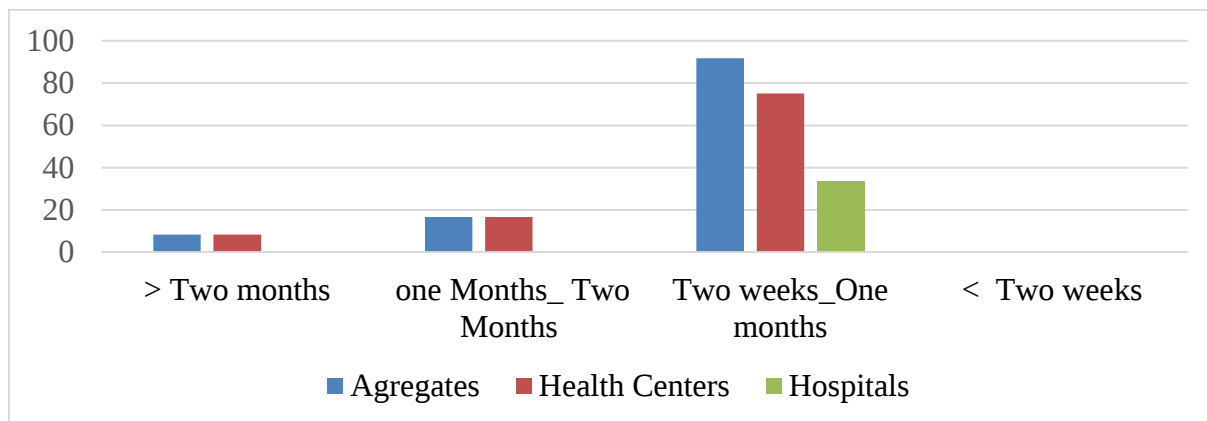


Figure 4. Approximate Lead time for receiving Key Essential Medicines in selected Health facility of SW Shewa zone, Oromia, Ethiopia, 2021

4.3. Indicators on logistics management information System

All the study health facilities had logistic recording tools and reporting forms like bin-cards 12 (100%), report and requisition forms 12 (100%), internal facility report and requisition forms 12(100%). Around five(41.6%) of health facilities had automated store, almost all hospitals had automated recording and reporting system. Only fifty percent of the facilities had SOP at store (figure 6).

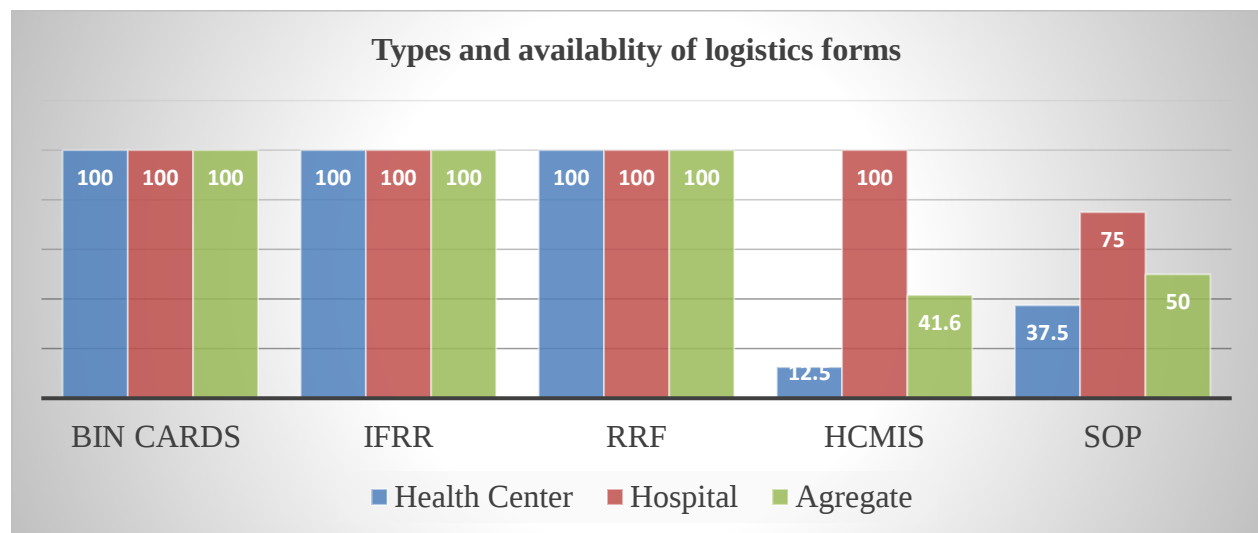


Figure 6. Types and availability of logistics form and automation selected health facility of SW Shewa zone, Oromia, Ethiopia, 2021

Inventory Accuracy Rate

The use of bin cards for stock control is a basic requirement to use this indicator. From this, it can be noted that the number of health facilities which has no discrepancy between physical count and balance on the bin card on the day of visit. The average IAR was found to be 74.5% in public health facilities. The hospital were greater inventory accuracy rate than Health centers (figure 3).

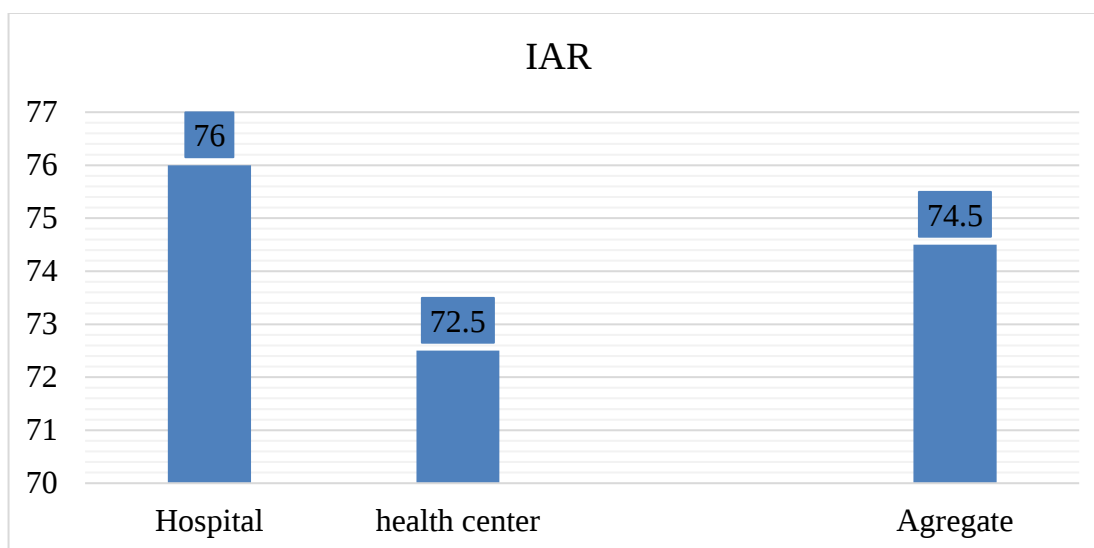


Figure 7. IAR of selected health facility of SW Shewa zone, Oromia, Ethiopia, 2021

Facility reporting quality

Data quality of LMIS report was assessed , around 32 (88.8)% of the RRF were timely, 26(72.2)% of RRF were complete and 25 (69.4)% were accurate for study facilities (figure 7).

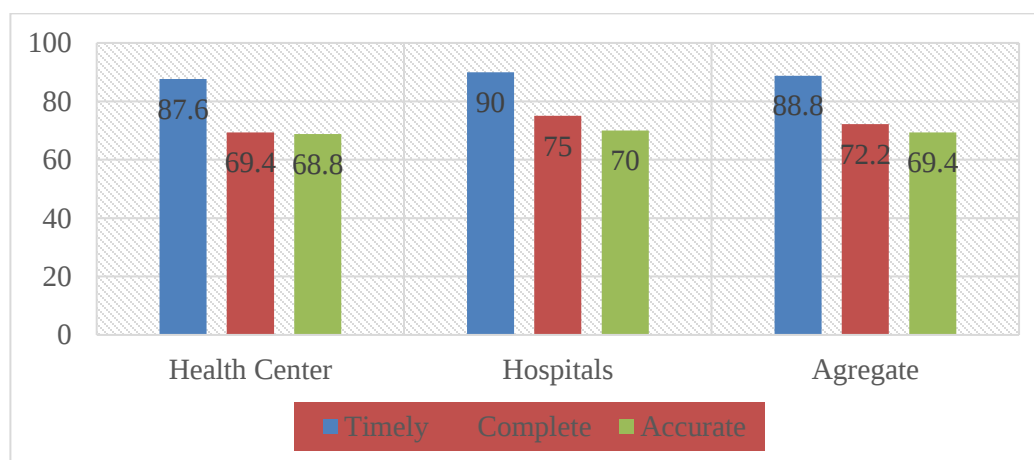


Figure 8. Percentage of RRF Timeliness ,completeness,accuracy in selected health facility of SW Shewa zone, Oromia, Ethiopia, 2021

A chi-square test was done to determine if an association exists between RRF data accuracy and possible factors. Consequently, a significant association was observed between RRF data accuracy and supervision($p < 0.05$), automation($p < 0.05$) and training($p < 0.05$).

Table.6. The association of RRF data accuracy, and possible contributing factors in selected Health facility of SW Shewa zone, Oromia, Ethiopia, 2021(N=36)

Variable	RRF data accuracy	
	Pearson chi square	
	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Training	0.011	0.007
Automation	0.013	0.011
Supervision	0.005	0.004

4.4. Indicators on storage conditions

This study shows that 3 (25%) public health facilities met at least 80% of acceptable storage condition according to the check lists. Half, seven (58.8%), of the public health facilities met 50-75% of the criterion of the storage condition whereas the rest 2 (16.6%) score 35% of the Criteria according to the checklist (figure 5).

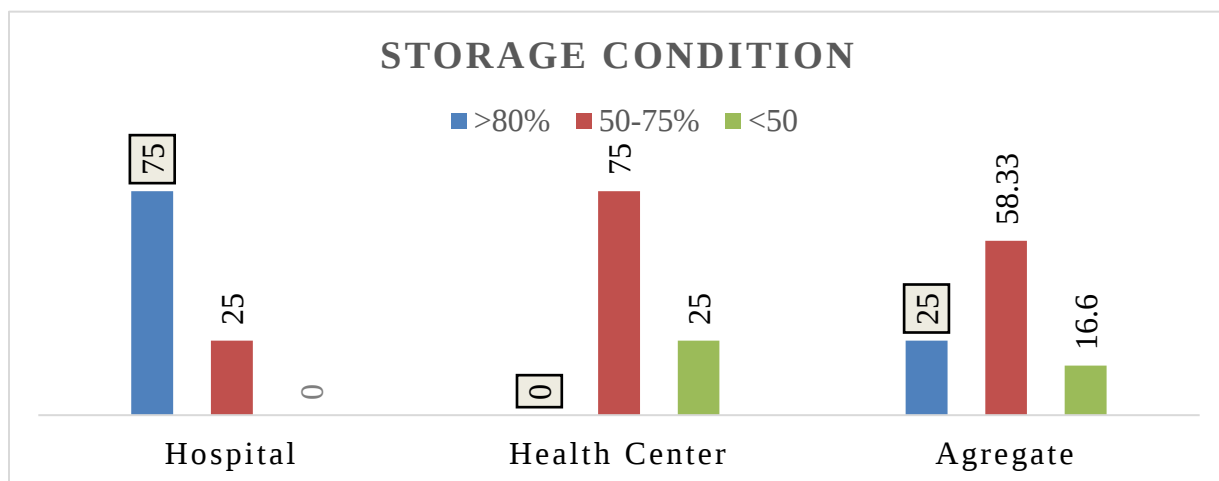


Figure 9. Extent of storage Condition Creterion Met by the selected Health facility of SW Shewa zone,Oromia,Ethiopia,2021.

According to FMOH and EPSS context any facility is said to have an acceptable storage condition when it fulfills at least 80% of the storage conditions defined in the check list used for evaluation of warehouses (MOH, 2019). Store room, were not sufficient for 75% of HF and fire safety equipment is not available and accessible for 83.33% of health facilities.

Table 7.Health facilities adherence to storage conditions standards for essential medicines in selected Health facility of SW Shewa zone, Oromia, Ethiopia, 2021.

Number	Description	Adherence N(%)
1	Pharmaceutical that are ready for distribution are arranged so that identification label and expiry/manuf date are visible.	10(83.3)
2	Product are stored and organized in manner of FEFO	9(75)
3	Cartoons and products are in good condition,not crushed due to mishandling.	9(75)
4	The facility makes ,it a practices to separate damaged and expired from usable products ,removes them from the inventory..	8(66.6)
5	Products are protected from direct sunlight at all times of the day and during all reason.	12(100)
6	Cartoons and products are protected from water and humidity during all seasons	12(100)
7	Storage area is free from harmful insects and rodents .	9(75)
8	Storage area is secured with lock and key ,but accessible during normal working hrs(access to authorized personnel)	12(100)
9	Products are stored at appropriate T during all season according to specification.	12(100)

10	Roof is maintained in good condition to avoid sunlight and water penetration.	10(83.3)
11	Store room is maintained in good condition (Clean and organized boxes).	8(66.6)
12	The current space and organization is sufficient for existing products and for reasonable expansion	3(25)
13	Products are stacked at least 10cm off the floor.	10(83.3)
14	Products are stacked at least 30cm away from the wall.	4(33.3)
15	Products are stacked no more than 2.5m high.	10(83.3)
16	Fire safety equipment is available and accessible .	2(16.6)
17	Products are stored separately from insecticides and chemicals	7(58.3)
18	There is no evidences of food and drinks in the stores.	12(100)
19	Bin cards are used and updated regularly	12(100)
20	The floor is maintained in good condition so it is easy to move products from place to place .	6(50)
	Total score	8.75(72.9)

The fisher's exact test revealed that the storage conditions of medicines had significant association with the Volume of store ($p=0.05$) and availability of manual in the store ($p=0.018$) (Table 4)

Table 8.Association of HF adherence to Good Pharmacy Practices standards for the storage of key essential medicines and contributing factors in selected Health facility of SW Shewa zone,Oromia, Ethiopia, 2021 (N=120).

Variable	Storage condition (80%)	
	Fisher Exact test	
	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Availability of ,manual and sop	0.018	0.018
Capacity of the store	0.05	0.05

4.5. Challenges of Key Essential Medicines Inventory Management performances

Key informant Interview were held with four head of facility/medical director, four heads of pharmacy, four store managers working in those selected health facilities ,one logistics officer of the zone,one ORHB supply case team and one EPSA hub one staff. All KI were males, aged between 30 and 33 years old. In addition their work experience ranged between four and ten years.

All challenges were categorized under four broad themes;budget and ownership related, human resources and capacity building related, availability and bureaucracy related, and infrastructure and automation related.The majority of KI agreed that the availability of the medicines at their facility should be improved to give quality service to clients.

Budget and Ownership related

When asked about challenges about key essential medicines inventory managements, and the majority of the respondents mentioned budget deficit as the major challenge, specially during budget closing due to most clients costs is covered by public health insurance.

One KI mentioned that (Manager, Male, 6 Years experience).

‘usualy our facility has no problem of using health care financing, how ever,there was

price inflation of medicines within the last six months”

Key informants also added that there is limited support and follow-up from the higher level in a regular manner. Most of them have smooth communication system at health center level except with higher level concerning consumption of medicines was mentioned as reasons for stock out of key essential medicines. One KI mentioned that (Pharmacist, Male, 4 Years experience)

“We couldn’t procure beyond 60000 per term for Health care financing and sometimes the woreda level committee for health care financing may not able to decide supposed 70% of internal revenue.”

KI from the EPSA addis ababa hub one were asked about their commitment and challenges and stated that, (EPSA, male, 7 years experience).

“The regionals health bureau take program like ART and DTC training. The direction and owner of some programs is not clear so that there is no budget for regular supervision, no system for accountability and gap identification. for instances since we are not engaging with health facility directly the data for quantification is usually poor.”

Availability and Bureaucracy related

All KI agreed that significant barriers affecting the availability of the commodities were stockout of the products at EPSA, and unavailability of the products in the market.

(Manager, Male, 7 Years experience) KI added that

“For RDF drugs we purchase as we can, but market un availability is main issue. For program drugs once they notify us product availability, we arrive to collect from woreda but they say the product was out of stock.”

Most of the KI agreed that the availability of the products at the private suppliers (wholesalers) was relatively good ;however, they complain procurement process procedure. The other KI

articulated that (Pharmacist, Male, 4 Years experience)

“procurement process is too long from private ,difficult to get instantly”

Human resource and Capacity building related

Regarding the human resources , shortage of trained pharmacy professionals specially at health centers is another challenge mentioned by the participants .A single KI added (manager, Male, 8 Years experience)

“our facility pharmacy workforce is currently around 42% as per the standard .Thus there is lack of workforce, despite the fact that trained workforce must sign to increase the retention ”.

Zonal logistics officer asked about commitment and challenges about key essential medicines availability and inventory management performances,and reported that (ZHB ,Male , 10 years experience)

“We have lack of human resources ,specially in health centers;however, currently some what improving. ”

The Majority of the KI reported that, no supportive training has been given for some store managers.One KI said (Pharmacist, Male, 5 Years experience)

“ usually the supervisor from higher level have been taken a check lists for identified challenges ;however, no training and regular feedback”

Another KI added (Pharmacist, Male,7 Years experience)

“Most of the time I use manual data for the report perfection ,since the data entry man may come up with data entry error because she is non pharmacy professional”

Zonal logistics officer asked about commitment and challenges about key essential medicines availability and inventory management performances,and reported that (ZHB, Male, 10 years experience)

“Concerning the training this year only few store managers got chance of IPLS training.”

KI from the EPSA addis ababa hub one were asked about their commitment and challenges and stated that(EPSA, Male, 7 years experience).

“There is huge gap regarding the capacity building of our health professionals ,due to programmatic area shifts of EPSA to only supply chain related issues , RHB some times invite us for training ;however ,there is also conflict of interest.”

Infrastructure and LMIS related

In some health facilities medical supplies and equipment are in the same store.Some of the participants stated presence of scattered nonstandard warehouses as major limitation

“Having a big warehouse helps us for safety,better categorization and arrangement” (Pharmacist, Male, 6 Years experience)

Most of the KIs agreed with the idea that automated LMIS have an impact on improving the availability of the key essential medicines.One KI stated that (Pharmacist, Male, 10 Years experience)

“Since the inventory management affect the availability of key essential medicine we are focusing on it and gives special attention. The software is advantageous incase of to trace the dead stock,over stock and highly consumed items.The soft ware support the manual and good for timely decision making despite our store the existing pharmaceutical logistics system is not automated and lacks more robust information management system at our facility”

Zonal logistics officer asked about commitment and challenges about key essential medicines availability and inventory management performances,and reported that (ZHB ,Male , 10 years experience)

“The main challenges is about quality of report from health facilities.”

ORHB supply case team asked about their commitment and challenges ,and reported as (RHB, Male, 9 years experience)

“We have been trained around hundred pharmacy proffessionls in 2013 in Oromia region.

The main challenges hindering availability in our facilities is problem with foreign currency for imported drugs , report quality from health facilities and lack of infrastructure specially in remote area”

Finally, to solve the stated problems, KIs provided the following possible solutions, namely; regular supervision, online communication system with EPSA , continue ‘quick win initiative’, having pharmacy specific policy, procedure , and plan to procure from private supplier and skill based capacity building were identified by KIs as recommendation to improve the logistics management performances of key essential medicine.

The key informant also added his recommendation as; (RHB, Male, 9 years experience)

“To improve the capacity of the our professionals ,including the IPLS and HCMIS dagu in under graduate pharmacy curriculum as a solution.”

5.DISCUSSION

Inventory management (IM) is a core component of logistics management that prevents healthcare against disruption of service provision as part of monitoring and evaluation. Moreover, undertaking performance evaluation helps to identify the weaknesses and challenges of managing inventory. There are several logistics indicator to assess the efficiency of inventory management.

The findings of this study emphasized on the Inventory management performance of key essential medicines using indicators including availability, stock record accuracy, percentage of quantity received according to request, percentage of report on time and storage condition of medicines.

This finding of this study disclosed that among the selected 25 key essential medicines. Mean availability on the day of visit were 86% at the day of visit in each facilities which is higher than study by (EPSA, 2019) and (Kefale and Shebo, 2019) in which the overall average availability of TDs on the day of the survey was 79% and 76.3% respectively. The figure were also slightly higher than study done on Influence of inventory management practices on availability of medicines in public health facilities in Kenya, in which the average number of medicines available in the whole county was (63.35%) out of 114 medicines (Barasa, 2018). This might be due to number of medicines and facility included.

The availability of TDs in the present study was better than Sub-saharan countries, like Uganda (45.7%), Uganda (MOH, 2016), Kenya (20%), (Harrington, 2014), but similar to Ghana (85%), (Nyanwura, 2010) and Uganda Kaliro district (79.53%) (Bruno et al, 2015).

The present study also reveal that, the mean stock out rate was (24.99)% with average stock out duration of 131.4 days, and which is comparable to study by (Gurmu and Ibrahim, 2017) and (Barasa, 2018) in which mean stock out rate of key essential medicines was around 27.25% with average stock out duration of 35.31 days and 51.30 days respectively. The possible reason could be the difference in duration of time under consideration to review logistics performances (eight versus six months) for the assessment of stockout status.

In Majority of HF zinc dispersable (75%) tablets and 40% Dextrose (58.33%) were stock-out on the day of visits due to unavailability at EPSA and other supplier. This challenge were also

addressed by KIs . Many of the KIs complained, stockout of the products at EPSA, unavailability of the products on the market, and inadequacy of budget. The same problem were reported in study conducted in Indonesia (JSI inc, 2016), in Sierra Leone (UNFPA, 2011).

Regarding the Percentage of public facilities that receive the exact quantity of products ordered most of the time, The result of this study showed that two (16.6)% of the public health facilities store kepeers receive the exact requested quantity most of the time, four(33.3)% of the public health facilities reported to sometimes receive the exact quantity they requested and six (50)% of the facilities reported that they never received the exact requested quantity .

The finding of this study was lower as compared to a result found in a study conducted in eastern Ethiopia on supply management of ARV drugs where 30% of the health facilities received the ordered quantity always, 60% of facilities receive ordered quantity most of the times and 10 % of health facilities never received the ordered quantity (Tesfaye et. al, 2016). The difference could be because of the number and types of facilities selected for the studies, types of drugs and the size of the study area.

In calculating the approximate lead time from ordering to receiving this study showed that the number of public HF that received ordered quantity in two weeks to One months was 75% ,and (16.6%) of health facilities receive ordered quantity from one months to two month after reporting from supplier. This finding was better than the study carried out in Ethiopia (EPSA ,2018) in which On time delivery to hospitals and HC (72.2% and 44.4%) respectively and Uganda by the country's ministry of health where an average lead time of 41 days was discovered (Ugandan MoH, 2016).

There are many reasons why a health facilities may not be supplied with the quantity ordered. Shortage is one, but it is also possible that facilities were ordering more or less than the required or correct quantity (PFSA, 2015).Therefore, there is a need to replenish what has been requested and reported.

Regarding the the inventory accuracy rate, the inventory record accuracy is one of the components of data quality that has a impact on a report data accuracy. Poor LMIS data quality leads to discrepancy of logistics information and ultimately results in wrong supply decisions by the

supplier. Having accurate stock on hand is very important during quantification, procurement, picking and distribution.

The present study identified the average bin card accuracy rate of public HFs 74.5% , the figure is similar to study conducted by (Kefale and Shebo, 2019) in which the discrepancy of tracer drugs between physical count and on bincard for which physical inventory less than the balance on bincard records ranges from 0 to 33.3%.

The inventory accuracy rate of this study also higher than study done by (Alice Mahoro, 2013) in South africa showed that the percentage of total inventory variation between stock records and physical counts for the drugs assessed was 51.7%. This shows relatively good record keeping practice but not high. In this study, the percentage of discrepancy varies among all HF, highest in Health centers . According to the KIs , the potential reason for this could be the absence of proactive supervision by higher level lack of training on IPLS” and lack of commitments on the side of store managers and the absence of computer software system at health centers.

Regarding the availability of logistics formats, the study showed that all of the study health facilities had logistic recording tools and reporting forms like bin-cards 12 (100%), RRF forms 12 (100%), IFRR 12(100%) and 93.5% bincard were updated, which is higher than the study conducted by (EPSA, 2018), in which the average use of bin cards for tracer items was 90% at hospitals, 55% at health centers, between 68% and 81% of bin cards at health centers were up-to-date , higher than study by (Alemu et. al, 2020) in which the average availability of bin cards for the selected products was 83.9% for hospitals, 75.4% for health centers, on average, hospitals had an updated bin card for 43.8% of the product while health centers had an updated bin card for 32.9%.

The reason might be degree of commitments of health facilities and since they are ART center have better support from higher level. Those documents are crucial for the availability of key essential medicines and should always be available when and where needed.

The percentage of automated LMIS at store was 41.6% in public HFs, which were higher than study done by (Gurmu and Ibrahim, 2017) in which nearly 20% of health facilities LMIS were

automated. The difference could be due to hospital was included in this study, the result is higher than the study conducted by (Obwocha, 2016), in which the facilities mainly depend on a paper-based reporting system and poorly supported by an automated system.

Concerning the quality of logistics report, the findings of the current study showed RRF completeness of 26 (72.2%), RRFs timeliness of 32 (88.8%) and accuracy of 25 (69.4%) . The RRF sent to respective level, for resupply purpose is prepared by store managers(store keeper) and verified by pharmacy head in all the visited health facilities.The figure is higher than study by (Alemu et al, 2020) in which the average accuracy of (RRF) data for hospital and health center was 45.6% and 37.1%, respectively.

According to some KIs ,the difference might be due to a lack supervision, and main challenge with the Health facilities is data quality of RRF, so there is still room for improvements when we compare to the expected report quality. Consequently, poor LMIS data quality leads to distortion of logistics data and resulted in poor supply decision. This in turn, shortage of key essential medicines. Thus, timely supervision is important to support the logistics professional do their activities strictly by equipping the professionals knowledge and skills (USAID DP, 2010).

With regard to storage conditions, this study revealed, about 25% of public health facilities meets the accepted storage condition. This similar with study by (Gurmu and Ibrahim, 2017) nearly five (25%) of the health centers have full filled good storage condition criteria and slightly higher than study by (EPSA, 2018) in which the percent of hospitals and health centers with acceptable storage conditions (meet 80% of criteria) nationally, were 21.8%).

The study finding reveal that store room, were not sufficient for nine (75%) of HF and fire safety equipment is not available and accessible for 10 (83.33%) of HF in which comparable to the finding from (Schöpferle, 2013), in which inadequate cold storage capacity and shortage of reception areas, delivery, and quarantined products . The figure is similar to study by (Tola. et. al., 2020) in which half of the public health facilities (50%) practiced unacceptable storage condition. Report from KI made clear the some of the reason behind the issues for instances; poor infrastructures and in adequate skilled human resources.

Storage conditions can affect the safety and quality of pharmaceutical products in store. A well-organized warehouse will streamline its different activities; the storage area has to be dry, wellventilated, out of direct sunlight, well-lit, complete with safety equipment ,clean, of adequate space, and with standard pallets and shelves (PFSA, 2015).

6.CONCLUSIONS AND RECOMENDATION

6.1. Conclusion.

The following Conclusion were drawn based on the the study results.

Availability of most tracer medicines on the day vist was relatively good, majority of the health facilities were stock out of key essential drugs for at least one key essential drugs during the study period and most probably because of inadequate supply of medicines and budget constraints as reported by KIs .

Logistic record updating practices and inventory accuracy rate was found to be good and encouraged. The facility report quality and inventory record accuracy require improvements, similarly their reporting rate, completeness, and the RRF accuracy was encouraging and needs to be improved.

Even though health facilities storage locations for key essential medicines is critical and necessary to maintain the acceptable storage condition criteria, only three health facilities under study met the acceptable storage criteria and no aoutomation of LMIS in majority of health facilities.

The major challenges were identified to be shortage of supply, budget constraints, insufficient infrastructure, lack of commitment from top-level management and inability to implement automated recording and reporting system, weak capacity building practice, lack of comminication between health facilities and respectives level, supportive supervision and feedback report were main challenges.

6.2.Recomendation

The following recommendation are suggested for conclusion based on the study results.

- EPSA and other suppliers should work strongly to avail the necessary key essential drugs to the health facilities to avoid stock outs, and should monitor and provide feedbacks to improve on time request.
- Study public health facilities, specially, health centers should continue updating inventory recordings like bin card for all key essential drugs in every transaction to improve the inventory accuracy rate performance in public health facilities in South West Shewa zone.
- Study public health facilities should send RRF according to the schedule to EPSA to minimize stock outs occurred due to late reporting of key essential drugs.
- The facilities, especially the health centers together with the concerned stakeholders, should strength LMIS by implementing automated recording systems to improve data quality and minimize the time taken on using paper passed method.
- Study health facilities should improve storage conditions with respect to following standard storage guidelines and criteria's of key essential drugs in order to maintain safety, efficacy of key essential medicines and minimize damage and expiry of products.
- Continous trainings should be given to store managers by the regional health bureau and non- governmental organizations working in the area to fill the gap analyzed during the study regarding the recording and reporting of LMIS data.
- Thus, EPSA and partners should increase the frequency of supportive supervision and also provide constructive feedback to the public health facilities.

6.3.Limitation

- The lower stream of SC (health posts; manage only a few program drugs) was not included.
- Wastage rate for both programs, RRF data quality and lead time for RDF were not done due to deficiency of recording and reporting data at the health facility level.

6.4.Future research direction

The current study may show the direction for other researchers to make further research on this topic, similar studies should be conducted from the suppliers perspective.i.e capacity building, supportive supervision and implementation follow up, cooperation with key stakeholders and to investigate and explore the challenge that supplier are experiencing.

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APPENDICES

Annex I: copy of questionnaire, consent Forms

College of Health Science School of Pharmacy, Department of Pharmaceutics and Social Pharmacy

Consent Forms

Dear Respondents, My name is Alemayehu Gutasa Guchu.

I am postgraduate student In Health Supply Chain Management at Addis Ababa University and I am Conducting a research on key essential medicines inventory management performances in Public Health facilities'' I would like to ask a few question on key essential medicines inventory management performances.

The main aim of this survey is to collect data for the study ,and thus you are requested to help the successful of the research by giving the necessary data.your participation is entirely voluntary and questionnarrie is totally anonymous and doesn't take more than thirty minutes.i would like to confirm you that information is confedential and only mentioned for academic purpos,hence help your facilities pharmaceutical supply performances.if you feel any discomfort ,you can withdraw from the queries at any time.

I agree to participate _____

I do not agree to participate_____

Part-II: Question for the Store Managers (Most knowledgeable at store)

Types of facility_____and Code of the Facility_____

Table. 1

S.no	Background information	Response (Please mark X in response choice)
01	Age in years	21-24 years § 25-29 years § 30-33 years § Above 34 years §
02	Sex	1. Male 2. Female
03	Educational level	Diploma Degree Mastes PHD
04	Working experience	Less than 1year 1-5 years Greater than 5 years
05	Professional background	Pharmacy background other Health professionals
06	Current working position	

	Questions	Code classifications	Comments
07	How many staff in your pharmacy department?	_____	
08	Did you received IPLS training? What type of trainings staffs of pharmacy unit have taken?	Yes No Pre-service trainings_____ On job trainings _____ Never been trained_____ Others(specify)_____	
09	Is there any feedback from higher level?	Yes=1 No=0	
10	If YES how often?	A. monthly B. quarterly C. six monthly D. annually	
11	Is there automation in your store?	Yes=1 No=0	

12	If no why?	1. Not available 2. Not functional 3. Not trained 4. other	
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Availability of logistics forms in Health Facilities			
S.No	Questions	Code classifications	Comments
13	Bin Cards	Yes=1 No=0	
	IFRR	Yes=1 No=0	
	RRF	Yes=1 No=0	
	SOP for IPLS	Yes=1 No=0	
	In your facility, Do you use the following stock keeping logistics forms to manage health products .		
	A. Bin Cards	Yes=1 No=0	
	B. Other (specify)	Yes=1 No=0	
14	What LMIS forms do you use for reporting/ordering? Multiple responses are possible.		
	A. IFRR	Yes=1 No=0	
	B. RRF	Yes=1 No=0	
	D. Other	Yes=1 specify _____ No=0	

15	The health facility compiles and sends RRF or reports to higher level?	Yes=1 No=0	
16	If yes, does all the columns in RRF completed for all medicines?	Yes=1 No=0	
17. Do major dispensing units (DUs) use IFRR for regular reporting?			
OPD		Yes=1 No=0	
ART		Yes=1 No=0	
MCH		Yes=1 No=0	
TB		Yes=1 No=0	
18	Does the facility usually stock out key essential medicines? If No why? If no, why not?	Yes =1 No=0 1. Resupply point does not have adequate supply 2. Resupply point was stock out 3. Order amount changed at the resupply point 4. Other (specify) _____	
19	When did you receive your most recent supervision visit?	1. Never received 2. Within the last month 3. 1 - 3 months ago 4. 3 - 6 months ago 5. More than 6 months ago 6. Other (specify) _____	
20	Do you always receive the exact quantity of products ordered from the supplier, (see RRF, model 19)	Always Most Some times Never	

21	If never ,why?	1.The resupply point does not have adequate supply 2.The resupply point was stocked out 3.Order amount changed at the resupply point 4.Other (specify)_____	
22	how long does it take from the time the facility places an order until the drugs are received?	1.Less than two weeks 2.2 weeks to 1 month 3.1months-2months 4.More than two months	
23	When was the last time you submitted the RRF	1.Within the last month 2.months ago 3.More than 2 months ago 4. never	

Reporting Rate of Health facilities

S.no	RRF Reporting period	Date of RRF sent to district or Town health office	Reporting status (Reported=1,Not Reported=0)	Reporting on time (Yes=1,No=0)
1	Reporting period 1			
2	Reporting period 2			
3	Reporting period 3			

RRFs	Are all the report components found?		If yes, are all the columns of the products filled complete?		If no, how many of the products left incomplete?	Comments/ clarification
1	2		3		4	5
	yes	no	Yes	No		
RRF1						
RRF2						
RRF3						

Annex II: Observational check lists

Storage condition

Number	Description	adherance	comments
1	Pharmaceutical that are ready for distribution are arranged so that identification label and expiry/manuf date are visible.		
2	Product are stored and organized in manner of FEFO		
3	Cartoons and products are in good condition,not crushed due to mishandling.		
4	The facility makes ,it a practices to separate damaged and expired from usable products ,removes them from the inventory..		
5	Products are protected from direct sunlight at all times of the day and during all reason.		
6	Cartoons and products are protected from water and humidity during all seasons		
7	Storage area is free from harmful insects and rodents .		
8	Storage area is secured with lock and key ,but accessible during normal working hrs(access to authorized personnel)		

9	Products are stored at appropriate T during all season according to specification.		
10	Roof is maintained in good condition to avoid sunlight and water penetration.		
11	Store room is maintained in good condition (Clean and organized boxes).		
12	The current space and organization is sufficient for existing products and for reasonable expansion		
13	Products are stacked at least 10cm off the floor.		
14	Products are stacked at least 30cm away from the wall.		
15	Products are stacked no more than 2.5m high.		
16	Fire safety equipment is available and accessible .		
17	Products are stored separately from insecticides and chemicals		
18	There is no evidences of food and drinks in the stores.		
19	Bin cards are used and updated regularly		
20	The floor is maintained in good condition so it is easy to move products from place to place .		
	Total score		

Product	Managed at this Facility? (Y/N)	Stock out on day of visit? (Y/N)	Bin card Available? (Y/N)	Bin card Up dated? (Y/N)	Stock out most recent 6 months? (Y/N)	Number of Stock outs (most recent 6 months)	Total number of days of stock out(s)	Number of days of data available on stock card
Amoxicillin Disp. tablet								
Oral Rehydration Salt								
Zinc Dispersible tablet								
Gentamycin 80mg								
Cotrimoxazole 240mg/5ml								
Magnesium Sulphate injection								
Oxytocin 10iu injection								
Enalapril 10mg/5mg tablet								
Medrox Progesteron Acetate injection								
Glienclamide tablet								
Adrenaline injection								
Pentavalent Vaccine								
Glucose 40%								
Dextrose in normal Saline								
Ferrous Sulphate + Folic Acid								
Ciprofloxacin 500mg tablet								
Ceftriaxone 1gm injection								
Hydralazine injection								
TDF/3TC/EFV adult								
RHZE/RH								
Tetanus Anti Toxin								

Tetracycline eye ointment								
Arthemeter + Lumefantrin (Coartem) tablet								
Artesunate injection								
Implanol								

Inventory Accuracy at Public Health facilities (at the time of visit)			
Products	Physical count	Bin card balance	Reasons for discrepancy
Amoxicillin Dispersible tablet			
Oral Rehydration Salt			
Zinc Dispersible tablet			
Gentamycin Sulphate injection			
Cotrimoxazole tablets			
Magnesium Sulphate injection			
Oxytocin injection			
Enalapril tablet			
Medroxy Progesteron Acetate			
Glienclamide tablet			
Adrenaline injection			
Pentavalent Vaccine			
Glucose 40%			
Dextrose in normal Saline			
Ferrous Sulphate + Folic Acid			
Ciprofloxacin tablet			
Ceftriaxone injection			
Hydralazine injection			
TDF/3TC/EFV adult			
RHZE/RH			
Tetanus Anti Toxin			
Tetracycline eye ointment			
Tetracycline eye ointment			
Arthemeter + Lumefantrin (Coartem) tablet			

Artesunate injection			
Implanol			

Tabl.3. Stock Data(Availablity) for tracer Drugs (for the last 6 months till the day of the visit)

Table.4: LMIS Data Quality: Inventory Accuracy at Public Health facilities (at the time of visit)

LMIS accuracy rate (the last two consecutive reporting periods) at health facilities from RRF

S.no	Item description	Unit	Previous ending balance	Present beginning balance	Is there discrepancy (Yes=1,No=0)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
Total discrepancy					

Annex III Interview guide

- 1) How can you evaluate the **LMIS quality, specifically for key essential medicines** at your facilities? If there are discrepancies, what are the possible reasons?

Probing (1)

- a. using logistics forms recording and reporting ? b. using computer software?
c.training d.supervision

- 2) Do you think that **Warehousing and store management** can improve inventory performances within your facilities? If yes how? If not why?

Probing (1): With respect to: a. The size and design of the store space b. Equipment's and furniture c. Handling of drugs and sanitation .

- 3) What are the **some of the Reason/barriers** that affect overall key Essential medicines Availablity and inventory management performance in your facilities?
 - a) Do you encounter stock-out? If yes what are the main possible reasons & which type of products are prone to these problems?
- 4) What is your **recommendation** for improvement of Key essential medicines inventory management performances of your facilities? Is there anything more you would like to add?

Annex IV Interview Guide afaan oromoo Version.

Ittigala

Yeroo keessan fudhattani waan nu waliin hasawuuf heyyamamoo taataniif galatooma. Maqaan koo Alamayyoo Guutasaan nan jedhan. kanan dhufe Yuniversitii Addis ababaa yoo ta'u, achumattin sagantaa degree lammaffoo barachaan jira. "*Qorannoo fi qo'annoo Sirna Bulchiinsa Qorichootaa bu'uura dhabbilee fayyaa irratti*" kan jedhuudha. Wayee bulchinsa qorichoota bu'ura isin waliin hasawuun barbaada. gaffiin kun Daqiiqaa digdama qofa fudhata, af gaffiin kun ni waraabama, afgaffii kana yeroo barbaaddan addaan kutu dandeessu., Firiin qorannoo kana doksaadhaan qabama.

Afgaffii Kana irratti hirmachuuf fedhii qabdu? Eeyyee-----lakkii-----

Af Gaffii

1. Akkaatan dhiyeessi fi bulchinsa qorichoota bu'uraa(Tracer drugs) maal fakkaata? Rakkoon qulqullina galmee fi gabaasa isaani irratti rakkoon ni jira? Yoo jiraate maalifi?
2. Haala qabiinsa fi kuusaa qorichoota bu'ura irratti rakkoon maaltu jira?
 - a. Baldhinni kutaa kuusaa qorichaa keessanii gahaadhaa? argamu isaani irratti dhiibba qaba?
 - b) Eyyee yoo ta'e sababni rakkoo kanaa maal isinitti fakkaata,
- 3) Huudhaleen ykn danqaan dhabamu qorichoota bu'ura ta'an maal fa'aadha jette yaadda?
5. Falli ykn malli hudhaalee armaan olii maal jette yaadda?

yeroo keessaniif Galatooma!

Interview guide for ZHB/EPSS/RHB

- 1) What is your opinion regarding your commitment in supplying key essential medicines public health facilities with type and quantity needed timely? How do you evaluate the availability of key essential medicines?

- 2) What are the **some of the Reason/barriers** that affect overall key Essential medicines Availability and inventory management performance in facilities under your catchment?

- 3) What is your **recommendation** for improvement of Key essential medicines inventory management performances of public health facilities? Is there anything more you would like to add?

Annex V Lists of Health Facilities

S. No	Facility Code	Name of Facility	Name of woreda
1	Facility 01	Leman primary hospital	Karsa Malima
2	facility 02	Dilalla, Health center	Woliso
3	03	Gindo Health center	Ameya
4	04	St Lukas Higher General Hospital	Waliso town
5	05	Tare Health center	Sodo Dache
6	06	Teji Health center	Ilu
7	07	Busa health center	Dawo
8	08	Bantu primary hospital	Tole
9	09	Harbu Chululle	Saden sodo
10	10	Tulubolo General Hosp	Bacho
11	11	Chitu health center	Wonchi
12	12	Gurura, health center	Goro

Annex V Letters

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የኢትዮጵያ ሪፑብሊክ ኮምቴ

አዲስ አበባ ዩኒቨርሲቲ
Addis Ababa University



School of Pharmacy
Ethical Review Committee

ቀን
Date April 05, 2021

ቁጥር
Ref. No. ERB/SOP/262/13/2021

To: Alemaychu Gutasa
School of Pharmacy

Re: Ethical Clearance

It is to be recalled that you submitted a research proposal entitled "Assessment on Key Essential Medicines Logistics Management performances of public health facilities at south west Shewa zone, Oromia region, Ethiopia". The committee thoroughly reviewed the proposal based on its operational guidelines and found that it fulfills all ethical requirements stipulated in the guidelines. This is, therefore, to inform you that the proposal is ethically approved for implementation.

With best regards,

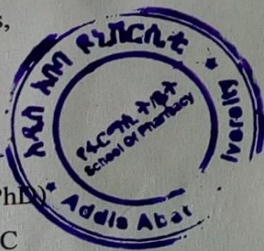
Shemsu Umer (PhD)

Chairperson, ERC

School of Pharmacy

College of Health Sciences

Addis Ababa University



☎ 00251156 02 12

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ቴሌክስ
Tele: 21205

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Fax: 00251(11)1558566

ኬብላ
Cable: AAUNIV



Lakk/Ref.NO BEFO/11/16/1005
Guyyaa/Date 3/9/2013

Waaaj/E/Fay/Godina Shawa Kibba Lixaa tiif

B/J

Dhimmi: Xalayaa Deggersa Ilaala

Akkuma beekamu Biiroon Keenya , qorannoo geggeessuuf propoozaala dhiyeffatan propoozaala isaanii madaaluun akkasumas iddo biratti ilaalchisani fudhatama argatan (Approved) dhiyeffatan, propoozaala isaanii ilaaluudhaan waraqa deggersa ni kenna. Haaluma kanaan mata dure "Assessment on Key Essential Medicines Logistics Management performances of public health facilities at South West Shewa zone, Oromia region, Ethiopia" Godina keessan keessatti qorannoo geggeessuuf propoozaala isaanii koree "Health Research Ethical Review Commite" Biiroo keenyatti dhiyeffatani jiru. Haaluma kanaan koreen "Health Research Ethical Review Committee" Biiroo keenyaa piropoozaal kana ilaaluun mirkaneessee qorannoon kun akka hojii irra oolu murteesse jira.

Kanaafuu, hojii qorannoo kana dhaabilee fayyaa irratti wan hojetamu deggersa barbaachisa ta'e gootaniifii hordoftan jechaa, " Mr. Alamayoo Gutasaa qorannoon kun qaaceffamee eerga xumuramee booda firii isaa koppii tokko BEFO tiif akka galii godhan galagalcha xalayaa kanaan isaan beeksifna.

Haaluma kanaan anis " Mr. Alamayoo Gutasaa "qorannoon kun qaaceffame xumuramu firii isaa koppii tokko BEFO tiif galii gochuuf mallattoo kootiin nimirkanessa.

Mallattoo _____

Maqaa Mr. Alamayoo Gutasaa (PI)

Bilbila 0913722529

G/G

Mr. Alamayoo Gutasaa (PI) tiif

B/J



Nagaa wajjin!

Birhaanuu Qanbatee
Indeessaa Garee Qorannoo Fi
Qo'annoo Fayyaa Hawwasaa

Addis Ababa University
አዲስ አበባ ዩኒቨርሲቲ



School of Pharmacy
Department of Pharmaceutics
and Social Pharmacy

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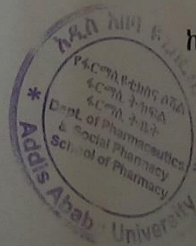
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ሊኒ.ት.ዮጵያ መድኃኒት አቅራቢ ኤጀንሲ (EPSA)
አዲስ አበባ ቁጥር አንድ
ለኦሮሚያ ጤና ቢሮ
አዲስ አበባ

ጉዳዩ: ትብብርን ይመለከታል

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አለማየሁ ጉታሳ የመመረቁ ድህረ-ፊት የሚሰራው “Assessment on Key Essential Medicines
Logistics Management Performances of Public Health Facilities at South West Shewa
Zone, Ormia Region, Ethiopia”. በሚል ርዕስ ሲሆን በአካሉ በኩል አስፈላጊውን ትብብር
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አስተዋጽኦ ከልብ እናመሰግናለን፡፡



ከሰላምታ ጋር

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+251118697102

☒ 1176 ቴሌክስ
Telex: 21205

ፋክስ
Fax: 00251 (11)1558566

ቴሌግራም
Cable: AAUNIV

