PRACTICES AND CHALLENGES OF PHARMACEUTICAL LOGISTICS DATA QUALITY IN PUBLIC HEALTH FACILITIES AT OROMO NATION ZONE, AMHARA NATIONAL REGIONAL STATE, ETHIOPIA.

By

OMER ABDU (B.Pharm)

A THESIS SUBMITTED TO THE ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES, SCHOOL OF PHARMACY, DEPARTMENT OF PHARMACEUTICS AND SOCIAL PHARMACY; IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN HEALTH SUPPLY CHAIN MANAGEMENT.

Advisor: Dr. Shiferaw Mitiku

Co-advisors: Mr. Zelalem Tilahun (M.Sc.)

Julia Kleineidam (M.Sc.)

ADDIS ABABA, ETHIOPIA

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Chairman of Department

STATEMENT OF CERTIFICATION

This is to certify that **Omer Abdu** has carried out his research work on the topic entitled: **"Practices and challenges of pharmaceutical logistics data quality in Public Health Facilities at Oromo Nation Zone, Amhara National Regional State, Ethiopia**" is his original work and is suitable for submission for the award of Masters of Science in Health Supply Chain Management**.**

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Advisor: Shiferaw Mitiku (PhD)

Date & Signature

STATEMENT OF DECLARATION

I, **Omer Abdu**, declare that this Master's research "**Practices and challenges of pharmaceutical logistics data quality in Public Health Facilities at Oromo Nation Zone, Amhara National Regional State, Ethiopia**" is submitted in partial fulfillment of the requirements for the degree of Masters of Science in Health Supply Chain Management at the School of Pharmacy, Addis Ababa University. The thesis is my original work and has not been presented for a degree in any other university and all sources of materials used for the thesis have been duly acknowledged.

Declared by:

Omer Abdu

Date & Signature

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The researcher

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ABSTRACT

Data Quality assessment approach assesses the dimensions of data quality and the functional components of the data management system needed to ensure data quality. The study aimed to assess the practices of Pharmaceutical logistics data quality and their challenges in Public Health Facilities at Oromo Nation Zone, Amhara National Regional state, Ethiopia. A descriptive research design was used with the help of quantitative and qualitative research approaches. Data were collected using semi-structured key informant interviews and document observation at public health institutions, Woreda Health Office and Zonal Health Department. Routine data quality assessment tool multi-indicator version 2015 was customized and adopted to collect data. A total of 55 study participants from 28study sites were involved in the assessment. Finding of this study showed that those who work in Health Posts and those who work in logistically important service delivery units such as Laboratory and Family Planning never received formal logistics related training. Most of logistics related practices were implemented at lower health facility levels including Health Posts and Health Centers. But these two facilities were equipped with few, less trained and less supervised professionals. Availability of recording and reporting formats was good in both HPs and HCs. However, there is a shortage of blank formats, especially, health post report and resupply form. Updating of Bin cards at both Health Posts and Health Centers remain a major challenge. Considering logistics activities as silly task in Health Posts and Service Delivery Units; and work load in Health Center Pharmacy store were among the suggested reason for poor Bin Card update. Work load, training gaps, high employee turnover and budget constraint were among the main challenges reported to affect Pharmaceutical logistics data quality practices. Practices aimed to ensure Pharmaceutical logistics data quality at public health institutions vary in type and in degree. Capabilities needed for ensuring quality pharmaceutical logistics data were better at higher but poor at lower health institution level. The availability of essential pharmaceutical logistics tools are encouraging, but, proper use of Bin Cards which is an important data source for report, is still a problem at both Health Posts and Health Centers. Logistics related pre as well as post service trainings should be facilitated for pharmacy professionals, health extension workers and for those who are expected to work in logistically important Service Delivery Units such as Laboratory, Family Planning and ART departments along with increasing the number of graduates from colleges and universities.

***Key words**: data, quality, pharmaceutical, logistics, health and challenge.*

LISTS OF ACRONYMS

ART:	Anti-Retroviral Therapy
BC:	Bin Card
DQA:	Data Quality Assessment
HCMIS:	Health Commodity Management Information System
HMIS:	Health Management Information System
HCs:	Health Centers
HPMRR:	Health Post Monthly Request and Re-supply form
HPs:	Health Post
IFRR:	Inter-Facility Request and Re-supply form
IPLS:	Integrated Pharmaceutical Logistics System
LMIS:	Logistics Management Information System
OJT:	On Job Training
EPSA:	Ethiopian Pharmaceutical Supply Agency
PFSA:	Pharmaceutical Fund and Supply Agency
PMTCT:	Prevention of Mother to Child Treatment
RDQAT:	Routine Data Quality Assessment Tool
RRF:	Request and Re-supply Form
SDUs:	Service Delivery Units
WoHO:	Woreda Health Office
WHO:	World Health Organization
ZHD:	Zonal Health Department

CHAPTER ONE

INTRODUCTION

This chapter presents the background of the study, problem statement, objective of the study, research question, scope of the study, significance of the study, definition of terms and organization of the study.

1.1.Background of the study

The basic function of supply chain management is to match supply and demand, something impossible to achieve without quality real time data (USAID | DELIVER, 2016).

According to an Ethiopian pharmaceutical supply system, program pharmaceuticals are ordered every two months by hospitals and Health Centers (HCs) and delivered by Public supplying agent called Ethiopian Pharmaceutical Supply Agency (EPSA) to health facilities directly or indirectly. Public hospitals and most of urban health centers are directly supplied by the agent. However, health facilities at lower level including all health posts (HPs) and rural health centers receive their products either from their cluster health centers and health offices respectively. Regarding the flow of logistics information, lower health facility report logistics related data to its supplying units at which data is aggregated, summarized and then reported to the next highest level in the supply system (PFSA, 2015).

The quality of data are affected by certain variables including the diversity of data sources, data volume, whether the data change very fast or not, and the timeliness of data, the presence or absence of unified and approved data quality standards are considered as an important data quality challenges (Cai and Zhu, 2015).

The system assessment part of data quality focuses on measuring the capacity of the system to produce good-quality data. More specifically, level of training, availability of guidelines, availability logistics formats, supervision related practices and data use pattern are elements to be evaluated by system assessment (WHO, 2017).

The reason behind poor data quality may be attributed to procedures related to both data collection and data reporting practices. Incomplete and inaccurate data collection activities, lack of standard for collecting and reporting data are considered as a causes and sources of poor data quality. On the other hand, specific to data collection, poorly designed formats, lack of training and delay in recording were among major reasons for poor data collection practices (WHO, 2003).

1.2.Statement of the Problem

Report on health supply chain management practices done on 2018 in Dessie PFSA hub identified some major problems, among which high turnover of manpower, mismatch of health commodity management information system (HCMIS) bin card and data clerks' bin card balance, supportive supervisions to health facilities are rare as it is done with partners financial support only, very weak feedback mechanism to health facilities and central PFSA, zone logistic officers are less committed to support the hub and incomplete request and resupply form (RRF) commonly reported from facilities (Yikeber,*et al*, 2018).

To rely on hard copies but to fail to use electronic data system to capture logistics data were found as pharmaceutical supply chain challenge at health centers (Fiseha, 2017).

In Ethiopia pharmaceutical supply system, SDPs, so as to receive program items from their supplying public agent, they are expected to send logistics reports. However, practices in major regions of the country showed that still there is poor regular reporting practices. Additionally, there is also shortage of reporting formats especially at lower SDPs. Shortage of pharmacy professional, an increase in turnover of trained human power, minimal emphasis for logistics activities and minimal feedback are among major challenges to affect pharmaceutical logistics data quality practices (CHAI, 2017).

In Ethiopia, with some variations by level of health facility and phase, nationally designed standard recording and reporting system is being implemented in almost all health facilities. However, availability and utilization of the logistics recording and reporting formats were found to be reasonable; and in a considerable percentage of facilities, data quality is an issue (PFSA, 2015).

Training and supervisions that consider the actual needs of the health workers and the presence focal person are found to result significant improvement on the quality of HMIS (Simba and Mwangu, 2006).

In the process of ensuring data quality at service delivery points (SDUs), it is recommended to use cost effective interventions. For example, supportive supervisory practices are considered as cost effective interventions to improve data quality. On the other hand, maintaining adequate supply of logistics formats will help in improving data quality but it will be beyond a country's available budget (WHO, 2017).

However, despite all efforts made by government and its partner, poor data quality is a major challenge for pharmaceutical supply chain management practices. In this study, practices related with pharmaceutical logistics data quality will be assessed and actions to be taken to improve data quality in the system will be recommended.

1.3.Research Questions

- What is the availability status of recording and reporting formats; and guidelines in public health institution of Oromo nation zone?
- How pharmaceutical logistics data recording and reporting is being practiced in public health institution of Oromo nation zone?
- What are the capabilities used for practicing pharmaceutical logistics data quality in public health institution of Oromo nation zone?
- What are the pharmaceutical logistics data quality performances in public health institution of Oromo nation zone?
- What are the challenges of pharmaceutical logistics data quality in public health institution of Oromo nation zone?

1.4.Objectives

1.4.1. General objective

- The study was intended to assess practices and challenges of Pharmaceutical logistics data quality in public Health Facilities at Oromo nation Zone, Amhara National Regional State, Ethiopia.

1.4.2. Specific objectives:

This study was aimed to address the following specific objectives:

- To assess the availability of recording and reporting formats; and guidelines in public health - institution of Oromo nation zone.
- To assess pharmaceutical logistics data recording and reporting practices in public health institution of Oromo nation zone.
- To assess capabilities needed to practice pharmaceutical logistics data quality in public health institution of Oromo nation zone.
- To measure the pharmaceutical logistics data quality performances in public health institution of Oromo nation zone.
- To identify the challenges of pharmaceutical logistics data quality in public health institution of Oromo nation zone.

1.5.Scope of the study

This study focuses on assessing functional components or practices needed to ensure pharmaceutical logistics data quality in public health institutions of Oromo nation zone. The study also tries to identify challenges of data quality in pharmaceutical logistics at public health facility of Oromo nation zone.

1.6.Significance of the study

The findings of this study had the follow practical benefits:

- HPs, HCs, WoHOs and ZHD will see their levels with respect to pharmaceutical logistics data quality practices.
- FMOH, EPSA, RHB, zonal and woreda health offices; and also partners will easily identify some areas that need support in the process of ensuring quality in pharmaceutical logistics at service delivery points.

1.7.Organization of the study

The proposed study will include five chapters. Chapter one is the introductory chapter that covers the background of the study, statement of the problem, objectives of the study, scope of the study & significance of the study. Chapter two presents, the review of related literature. It covers concepts and theoretical framework and empirical studies on data quality for pharmaceutical logistics at Health Facilities. Chapter three presents discussion and explanation of the research methodology of the study. In this chapter the research design, population of the study, sampling techniques, sample size, data collection instruments, the data collection procedures, the ethical consideration and data analysis approach were discussed. Chapter four present the result and chapter five address discussion and interpretations of the findings. Finally, Chapter six pin point summary of findings, conclusion and recommendation of the research.

1.8.Operational Definitions

Service delivery units (SDUs): represent service delivery units within the HCs including Main store, ART department, family planning and laboratory services. These three units have standard requesting and reporting formats called inter facility report and resupply form (IFRR).

Urban and Rural Health Centers: Urban HCs are controlled by city administration health office while Rural HCs are controlled by Woreda health offices.

RRF Accuracy: RRF is accurate if the calculations on the RRF are correct for the tracer item selected.

RRF Completeness: RRF is said to be complete if all the required columns (Beginning balance, quantity received, ending balance, CC, Max Quantity, quantity to reach max) completed for the tracer item selected.

Report timeliness: Report is timely when it is available on schedule.(Report timeliness is specific to the type of report, i.e. IFRR, HPMRR, and RRF)

CHAPTER TWO

RELATED LITERATURE REVIEW

This chapter discusses the literature review of the study; it cover concepts and scientific research done on area of data quality in pharmaceutical logistics at health facility level, pharmaceutical logistics data quality with respect to data recording, reporting, management, use and determinants of data quality in pharmaceutical logistics in Ethiopia. Most of the information covered in the literature review was obtained using Google scholar and some concepts was collected from relevant books.

2.1. Theoretical Literature Review

2.1.1. Definition of Logistics

As defined by Council of Supply Chain Management Professionals, logistics is the part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirement (USAID | DELIVER, 2011).

2.1.2. Importance of Health Logistics

The goal of every public health logistics system is to ensure that every person is able to obtain and use quality essential health supplies whenever there is a need for it. So, more program managers have come to understand how important logistics is to a program's success (USAID | DELIVER, 2011).

2.1.3. Logistics management information systems (LMIS)

A logistics management information system (LMIS) is the system of records and reports that is used to collect, organize, and present logistics data gathered across all levels of the system. It enables logisticians to collect the data needed to make informed decisions that will ultimately improve customer service. The process of improving the quality of LMIS data needs step wise

emphasis on data collection, data reporting, Data monitoring, aggregation, and analysis and automated LMIS (USAID | DELIVER, 2011).

In most low- and middle-income countries (LMICs), significant amounts of data are collected at all levels of the health system, with the majority of data being created and compiled at the service delivery point (SDP).Because the supply chain is so heavily dependent on data at all levels, the temptation is often to place emphasis on collecting more data. This places an enormous burden on lower level health workers and supply chain personnel, and limits their ability to complete other aspects of their work. This burden also reduces employee motivation for the timely or accurate completion of the data collection requirements. Rarely are all the data collected used to make decisions for the improvement of the supply chain or commodity procurement (SIAPS, 2014).

Reliable record keeping is critical for any supply chain system to function well, and the information must then be reported to higher levels for effective logistics decision making. (USAID | DELIVER, 2015).

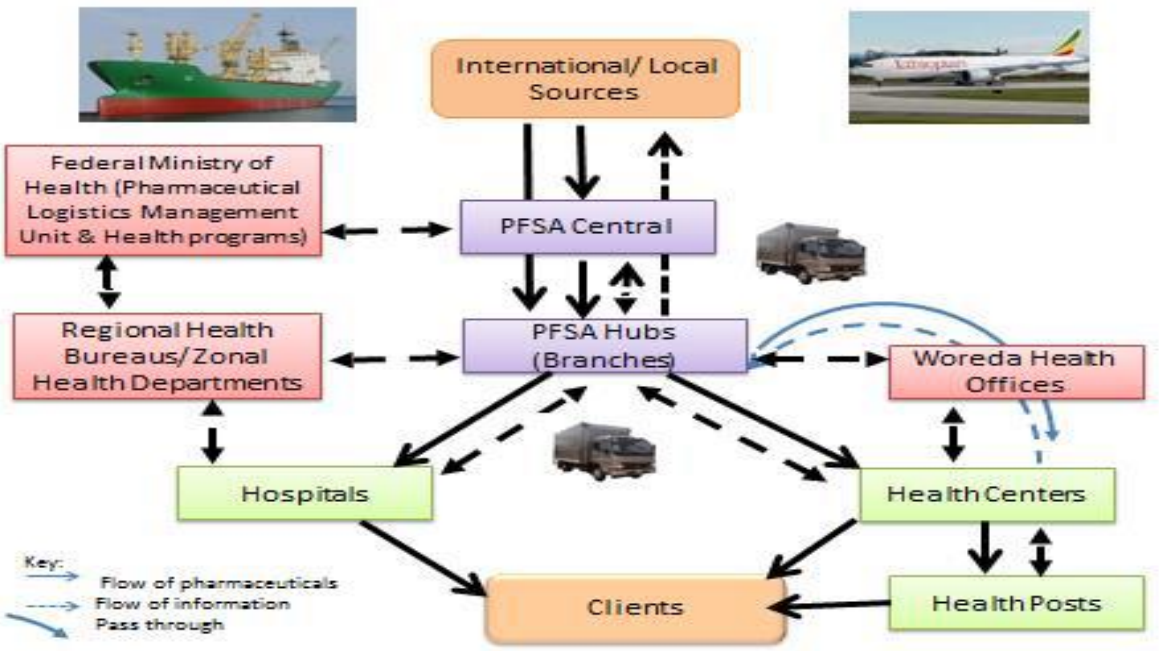


Figure 1: Flow of Pharmaceuticals and Information in the Integrated Pharmaceutical Logistics System (IPLS) (PFSA, 2015)

2.2.4. Concepts of data quality

The literature differs on a definition of data quality, but one thing is certain: data quality depends not only on its own features but also on the business environment using the data, including business processes and business users. Only the data that conform to the relevant uses and meet requirements can be considered good quality data. Usually, data quality standards are developed from the perspective of data producers. In the past, data consumers were either direct or indirect data producers, which ensured the data quality. However, in the age of big data, with the diversity of data sources, data users are not necessarily data producers (Cai L and ZhuY , 2015).

Data quality is paramount to successfully managing the supply chain; yet assessing quality is a complex undertaking. Quality encompasses the timeliness, completeness, and accuracy of the data. Data are useless if they cannot be relied upon. High quality data improve visibility into the operating conditions at each health center. They also provide a better determination of optimal replenishment amounts, better allocation of commodities and related resources across the health system, improved long-term forecasting, and identification of opportunities for improvements. Specific interventions to improve data quality may be categorized as technical, organizational, and behavioral (SIAPS, 2014).

2.2. Empirical Literature Review

2.2.1. Capabilities of Pharmaceutical Logistics at public health facilities

According to the national IPLS assessment done by Ethiopian Pharmaceutical Supply Agency (EPSA), there are still shortages of pharmacy professionals working in the health sector. Despite major efforts to train more pharmacy professionals (both pharmacists and pharmacy technicians), 15% of health facilities (all of the health centers) had no pharmacy professionals on their staff. While significant investments have been made in training on IPLS and commodity management (in service, pre-service and recently online training), for a variety of reasons (service expansion, staff turnover) gaps remain. Nearly 24% of hospitals and health centers had no IPLS trained staff on their pharmacy units with in-service training remaining the most common training modality (96%). At health posts, less than 10% of HEWs reported receiving informal OJT IPLS training,

8.1% with formal in-service IPLS training and while 1% reported receiving pre-service training. Regarding logistics related supervisory visit, at national level, 25.9% of hospitals and health centers reported receiving a supervisory visit in the one month period (EPSA, 2019). Another study done in Addis Ababa in 2014; found that Training of HCs laboratory professionals in LMIS was 0% (Desale, *et al*, 2013).

Most public health facilities including health posts and health centers commonly receive logistics related support from higher levels such as Woreda health offices and Zonal health department through regular supportive supervision program. According to the study done in Addis Ababa, it was found that 79.2% of the HCs reported to have had supervision on the pharmaceutical logistics quarterly (Mudzteba, 2014).

Public health facilities do not have equal chance for getting Supportive supervision services. For example, according to the study done in East Wollega Zone, the nearest health facility from PFSA had more frequent Supportive supervision access than the farthest. And similarly frequency of supervision was also varied among health facility type, such that ART site got more frequent supervision than PMTCT and non- PMTCT (Nigusie, 2017).

In most instances, following supportive supervision and regular report, Lower health facilities wait for feedbacks from higher level institutions. Feedback is a form of training and directly addresses the causes of poor quality data and enhances awareness of the importance of data. However, there was almost no feedback to clinic staff on the data they submitted. One factor in the absence of feedback was a lack of human resources. As the main providers of feedback, clinic supervisors should be trained in the interpretation and use of clinic data focusing on practical indicators of performance (Garrib, *et al*, 2008). Similar study also found that staff of the district and facility level reported receiving only limited feedback, with most feedback being negative and related to the timeliness of data or data errors (Ledikwe, *et al*, 2014).

2.2.2. LMIS availability, recording and reporting practices

Consistent and accurate use of bin cards is essential for inventory management. The average availability of bin cards is lower at the health post level 24% compared to hospitals 73% and health centers 64%. The percentage of updated bin cards was found to be similar across all health

facility levels. Reliable record keeping is critical for the IPLS to function well, and the information must then be reported to higher levels for effective logistics decision making (PFSA 2015). For almost every IPLS indicator, unsurprisingly, performance at health post level is poorer than at higher levels. For example, the use of bin cards is only 27% at health posts versus 55% at health centers (EPSA, 2019). Study done in Addis Ababa found that Bin card was available for 84.5% of non-program tracer drugs of which 69.5% were updated (Mudzteba M, 2014). Similar study done in east Wollega zone found that only 43.8% of public health facility Pharmacy stores had an updated Bin cards (Nigusie, 2017).

There are many reasons why a facility may not be supplied with the quantity ordered. A shortage is one, but it is also possible that facilities order more or less than the required or correct quantity. According to national IPLS survey done in 2014, only half the health posts surveyed used the HPMRR to request commodities from the resupplying health center and exact accuracy of RRF data was between 40 and 50% for most of the products; with the average of 46 percent (PFSA, 2015). Another Study done in northern Ethiopia shows that there is a discrepancy between stock record balance and physical count of medicines with the rate of discrepancy varies among surveyed health centers (from 0 to 60%) (Fentie, *et al, 2015*).

Logistics activities are not a sole role of Pharmacy units but it is also the responsibilities of all SDUs expected to receive and store health products in their units. Study done in Addis Ababa showed that, 37.5% of hospitals and health center laboratory mini-store used stock/bin cards for HIV/AIDS and TB laboratory commodities. Majority of stock/bin cards were not updated with accurate information matching with the physical count done at the time of visit. The total accuracy of stock/bin cards were 38.9% (Desale, *et al*, 2013).

2.2.3. Challenges of LMIS Data Quality

Among possible organizational and behavioral determinants, decisions based on supervisor directives and managers seeking feedback were found to be determinant factors for data quality. The level of data quality was below the national standard in all health facilities which is below 80%. However hospitals and health centers have better performance compared to health posts. The factors which affect data quality were lack of training, lack of decision based on supervision, and lack of feedback (Teklegiorgis, *et al*, 2016). Challenges of data quality is also attributed to

the characteristics of data such as diversity, complexity of structures, volume, timeliness, tendency to change very fast and the absence of unified and approved data quality standards (Cai L and ZhuY , 2015).

Another study in Addis Ababa identified some facilitators and barriers of LMIS in Public health facilities. Among which availability of necessary materials, store keeper's commitment, supervision, and training are among facilitators of the LMIS. Rotation among pharmacy staff where the trained and experienced store keepers were replaced by another staff who was new to storekeeping is regarded as a barrier for LMIS (Mudzteba, 2014). Similar study also notified that the transfer of health workers between districts and facilities often led to gaps in data recording and reporting as trained and experienced health workers transferred out of facilities. Having an adequate number of staff to cover all responsibilities, including M&E, was reported to improve data quality (Ledikwe, *et al*, 2014).

Study done in Botswana found that Health workers did not necessarily view the recording of patient and health facility information in registers as one of their job responsibilities. Reporting guidelines appeared to be widely known and nationally consistent. In some cases, the information had been conveyed in writing, but more often it was common knowledge. However, knowledge of reporting deadlines did not seem sufficient to encourage timely reporting, with late reporting appearing to be common at all levels and across all programs within the health system (Ledikwe, *et al*, 2014). Other study done in South Africa found that the high work burden reported for data collection and collation suggests that a large amount of scarce health care worker time was required for these tasks. Therefore information-related duties are often allocated to junior staff members who may not have the appropriate skills or insight to recognize and correct problems, and no authority to take the necessary actions. (Garrib, *et al*, 2008)

Poor data quality will lead to low data utilization efficiency and even bring serious decision-making mistakes. (Cai and Zhu, 2015). The quality of data, and consequently of the information system, must be seen in a broader perspective not focusing only on technicalities (data collection tools and the reporting system) but also on support mechanisms. Several studies have reported inconsistencies in data reporting as well as poor support mechanisms to ensure data quality at the district level (Mavimbe, Braa and Bjune, 2005).

A data quality improvement intervention that involved specific training for health-care workers on the importance of public health information, monthly data reviews and feedback, and regular data audits was effective in significantly increasing the completeness and accuracy of the data used to monitor PMTCT services in South Africa. It was found that data completeness increased from 26% before to 64% after the intervention. Similarly, the proportion of data in the information system considered accurate increased from 37% to 65%. The rationalization of data collection tools, clear definitions of data elements, continuous feedback on data quality and intermittent but regular data audits are considered as an effective ways of improving data quality (W Mphatswe, *et al*, 2012). Other study suggests that a dedicated information clerk in each clinic with responsibility for data collection and validation would improve data quality and free up time for clinical staff to discuss, interpret and take action on the basis of the improved data, properly presented as indicators (Garrib, *et al*, 2008).

2.2.4. Data quality assessment methods

Public health is a data-intensive field which needs high-quality data to support public health assessment, decision-making and to assure the health of communities. Literature review have examined the data quality assessment methods based on frame work which incorporate the three dimensions of data quality in the assessment methods for overall data quality: data, data use and data collection process**.** Quantitative data quality assessment primarily used descriptive surveys and data audits, while qualitative data quality assessment methods include primarily interview, documentation review and field observation. It was found that data-use and data-process have not been given adequate attention, although they were equally important factors which determine the quality of data. Literature review identified limitations of the previous studies with regard to data quality assessment. Among which, inconsistency in the definition of the attributes of data quality, failure to address data users' concerns and a lack of triangulation of mixed methods for data quality assessment (Hong Chen, *etal*, 2014).

According to routine data quality assessment tool user manual, precise estimates of data quality require a large number of clusters and sites. Often, it isn't necessary to have a statistically robust estimate of accuracy. That is, it is sufficient to have a reasonable estimate of the accuracy of reporting to direct system strengthening measures and build capacity. A reasonable estimate requires far fewer sites and is more practical in terms of resources. Generally, 12 sites sampled

from within four clusters (three sites each) is sufficient to gain an understanding of the quality of the data and the corrective measures required (MEval-SIFSA, 2017).WHO manual for evaluating Pharmaceutical sectors also suggested that 30 public health facilities are used to measure facility based core indicators (WHO, 2007).

2.3. Conceptual Frame work of the study

Data Quality Assessment (DQA) approach assesses the dimensions of data quality and the functional components of the data management system needed to ensure data quality. Quality data (measured through the dimensions of quality) are generated through a strong data management and reporting system made up of the various functional components that spans the different levels of the system (figure 2).For good quality data to be produced by and flow through a data management system, key functional components of data quality need to be in place at all levels of the system: the points of service delivery, the intermediate level(s) where the data are aggregated (e.g., districts, regions), and the M&E unit at the highest level to which data are reported. (MEval-SIFSA, 2017)

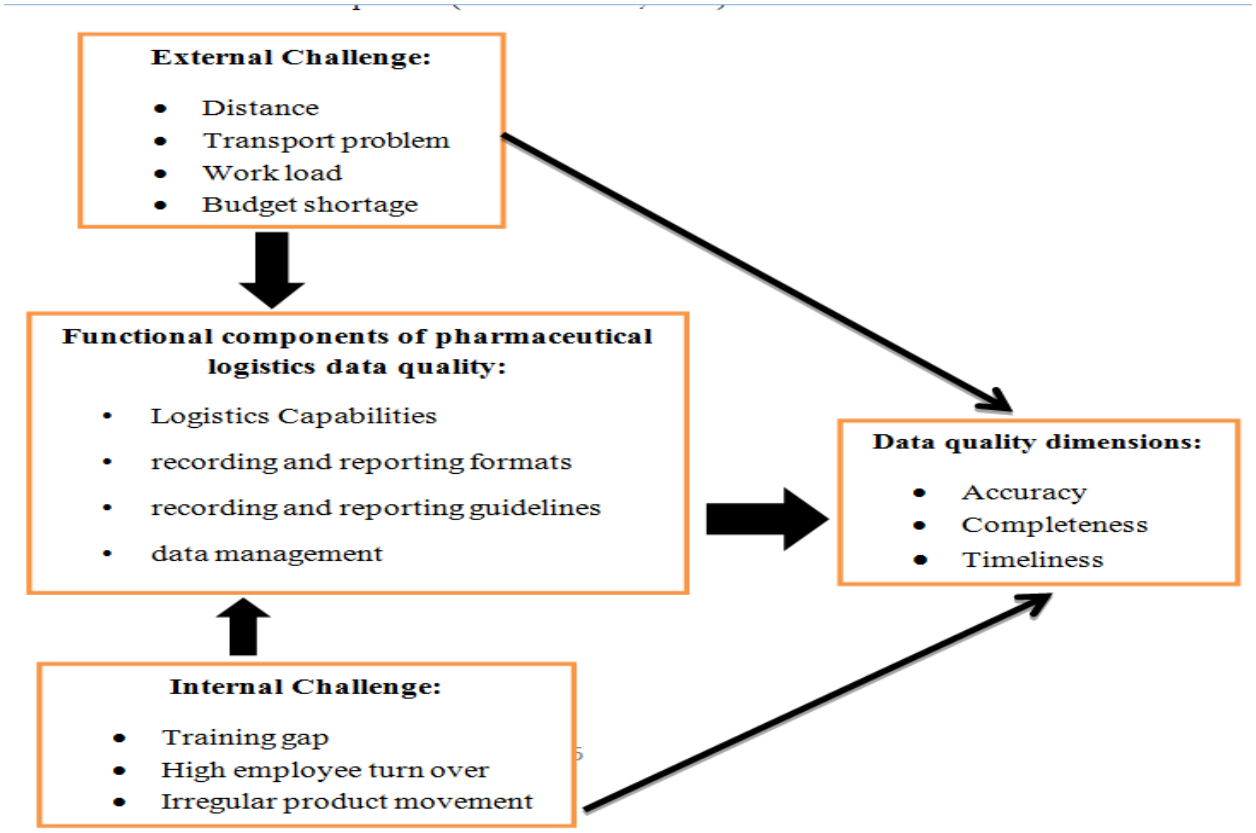


Figure 2: Conceptual framework of pharmaceutical logistics data quality assessment in public health institutions. (Adopted from MEval-SIFSA, 2017)

CHAPTER THREE

METHODS OF THE STUDY

In this chapter, area of the study were described, study design and research approach were explained, population of the study, sampling procedure, data collection instrument, data processing and analysis techniques were elaborated. Finally, ethical issues to be considered, instrument validity and reliability tests to be done were discussed in detail.

3.1. Description of study area

Oromo Nation Zone is located in North eastern part of Ethiopia in the Amhara Regional State. The Zone has a total of seven Woreda; two of them are under the administration of the town. Within the zone there are 123 health posts, 28 health centers, one primary hospital, one general hospital and 7 WoHOs. 47 and 9 pharmacy professionals are on job at facility and WoHO level respectively. Population size of the zone is estimated to 576,771 (Oromo ZHD, 2018). All HFs of the zone are served by EPSA Dessie Hub.

3.2. Study design

A descriptive research design was conducted from April 30 to May 30, 2019 in public health institutions administered under Oromo nation zone. By adopting descriptive study design, the current practices in relation with the fundamental components of pharmaceutical logistics data quality and also pharmaceutical logistics data quality challenges were better described. Additionally, via descriptive study design, pharmaceutical logistics data quality performances were measured.

3.3. Research Approach

Both quantitative and qualitative research approaches were used. So, data collected from each study site has both qualitative and quantitative aspects. The qualitative data were collected using in-depth key informant interview method with, Health center Pharmacy store managers, woreda

and zone logisticians. The quantitative data were collected using researcher administered semi-structured questionnaire, document review and observation methods at health posts, Health center Pharmacy stores, service delivery units (SDUs), woreda and zone health offices.

3.4. Population

The populations of the proposed study were Rural Health Posts (HPs), Pharmacy stores, Laboratory, ART Pharmacy and Family planning units within the HCs, Woreda Health Offices and Zonal Health Department (figure 3). So, health extension workers, pharmacy store managers, SDU heads from lab, ART and family planning units; Woreda and Zone logistics officers were participated in the study.

3.5. Sampling Procedure

Stratified sampling was employed. Based on the level of the service, study sites or population was divided into different groups including, health posts, health centers, health offices and zone health department. These groups are linked to each other through standard reporting system. Target study site from each group was determined proportionally and selected using lottery method. Then, considering their active involvement in the IPLS implementation, study participant from individual study sites were selected purposively. So, including Zone logistics officer, from seven WoHOs, seven Woreda logistics officers, two Urban HCs, twelve rural woreda HCs proportionally determined and randomly selected from each Woreda and finally from among fourteen HCs, fourteen rural HPs (one HP from under each HC)were selected randomly (figure 3). From within the Health centers; service delivery unit heads including store manager, Family planning head, Lab head and ART heads were participated in the study. These service units were selected as all of them use standard Intra- facility report and resupply form (IFRR) to report and request their items. Generally, a total of 36 study sites were selected for conducting the study. My data input or my data source for determining the total number of study sites was obtained from WHO manual for evaluating pharmaceutical sectors and RDQAT manuals. According to routine data quality assessment tool user manual, 12 sites sampled from within four clusters (three sites each) is sufficient to gain an understanding of the quality of the data and the corrective measures required (MEval-SIFSA, 2017).WHO manual for evaluating Pharmaceutical sectors also suggested that 30 public health facilities are used to measure facility

based core indicators (WHO, 2007). Urban health posts were not included in the study because these sites did not hold pharmaceuticals but only gave prevention services. On the same way newly built Health Facilities were excluded as they may not perform the IPLS yet.

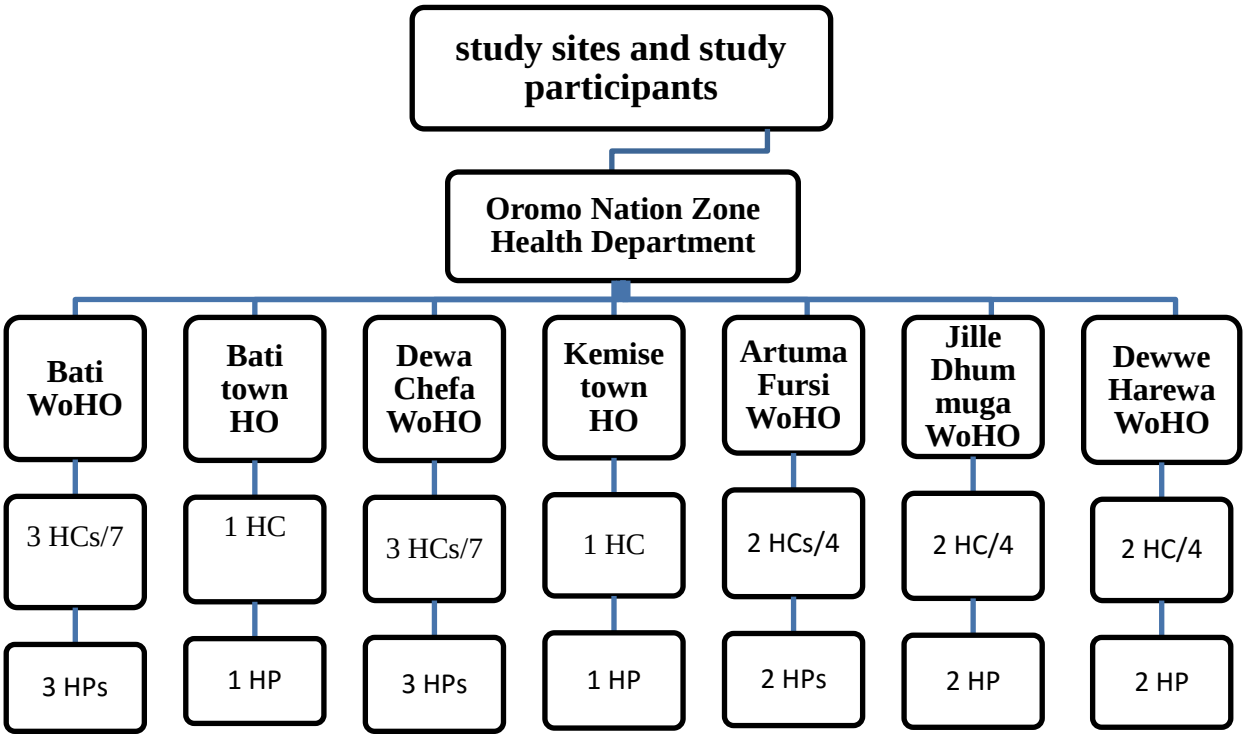


Figure 3: stratified sampling of study sites found in Oromo Nation Zone Health Department (source: Oromo Nation Health Department)

3.6. Data Collection Instruments

Standardized semi-structured questionnaire adopted from Measure Evaluation- Strategic Information for South Africa (MEval-SIFSA) and customized by the researcher were used together with self-prepared in-depth interview. It is routine data quality assessment tool (RDQAT) multi-indicator version 2015 commonly used for monitoring and evaluation purpose(MEval-SIFSA, 2017).The process of customizing the tool considered some unique activities related with logistics data recording, reporting and management at each levels of the system. In the process of customizing the tool, country unique pharmaceutical logistics management system such as IPLS and HCMIS was considered along with nationally used

reporting formats and guidelines. Health facilities were considered as service delivery points from which pharmaceutical logistics data originate and reported vertically woreda health offices, zone health department and EPSA hub. Recording and reporting documents were observed using self- prepared check list.

3.7. Methods of Data Processing and Analysis

To investigate the fundamental practices of pharmaceutical logistics data quality, four components were assessed. For each component of an assessment there were two possible results. If the respondent completely met the component, ‘’ yes’’ code with scale ‘’1’’was given. But, if the respondent never met the component, ‘’ no’’ code with scale ‘’0’’ was given. Further detail response was requested during in-depth interview data collection time. Thematic content analysis was used to analyze the qualitative data. Themes were identified based on the research questions and responses of key informants were recorded manually using field notes then grouped and summarized with respect to the themes identified. The quantitative data were entered and analyzed using SPSS version 20 and the result will be presented using descriptive statistics (average and percentage), frequency tables and figures.

3.8. Instrument Validity and Reliability

3.8.1. Validity Test

In an attempt to ensure content validity, the instrument which was commonly used for M and E purpose were customized in accordance to our setting. In the process of customizing the questionnaire, unique and general pharmaceutical logistics data quality practices were considered. Then the tools were critically reviewed by co-adviser with Pharmacy background and finally it was subjected to pre-test to further ensure its content validity. The pre-test was done in a hospital found in the same study area. Based on the pre-test, proper time for data collection were determined at each study units. The pre-test was also helpful to select best candidate for an in-depth interviews. The need for pre-notification of the participants was also obtained from the pre-test experience.

3.8.2. Reliability Test

Cronbach's alpha was calculated by application of SPSS for reliability analysis. Cronbach's Alpha was established for every study unit in order to determine whether or not the instrument would produce consistent results if the same research be done again. The overall Cronbach's alpha score was 0.804 which confirms that the instrument were reliable (Table 1).

Table 1: Reliability of instrument based on Cronbach's alpha level (SPSS Analysis)

Study Unit	***Number of item***	***Cronbach's Alpha Value***
Questions for **Health Center Pharmacy Store**	92	0.758
Questions for **Woreda Health Office**	58	0.858
Questions for **Service Delivery Units**	42	0.752
Questions for **Health Posts**	65	0.849
Over all reliability	**257**	**0.804**

Source: Own Survey, 2019.

3.9. Ethical Consideration

Ethical clearance was obtained from the Institutional Review Board (IRB) of the School of Pharmacy, College of Health Sciences, and Addis Ababa University. Permission was obtained from the selected HFs, WoHO and ZHD. The investigator clearly explained the aims of the study for the study participants. Information was collected after obtaining verbal consent from each participant. For the sake of anonymity the names of the health facilities and respondents will not be mentioned.

CHAPTER FOUR

RESULT

The findings of the study is presented objective wise. So, pharmaceutical logistics data quality practices that are specific to each category of study units (i.e. HPs, Health center Pharmacy stores, SDUs and WoHOs) are presented in narration followed by either tables or figures. Similarly, results associated with pharmaceutical logistics data quality challenges in HPs, Health center Pharmacy stores and WoHOs are also presented. Additionally, for three tracer items, five pharmaceutical logistics performance indicators are measured at HPs and Health center Pharmacy stores.

4.1. Demographic Profile of the Respondent

From the total of 55 respondents participated in this study, 6 were from woreda health offices, 11 from Health Center pharmacy store, 11 from Health center laboratory, 6 from Health center ART, 10 from Health center Family Planning, 10 from Health Posts and one from Zonal Health Department (see table 1). The number of pharmacy professional in assessed Health Centers varies from 2 to 5 with an average of 3 pharmacy professionals per Health center. Among 11 pharmacy professionals interviewed while working in the Health center pharmacy store, 7 were pharmacy technicians. The rest 4 pharmacy professionals were 2 Druggists and 2 pharmacists. From among the assessed Health centers 4 (36%) and from the total Health centers found in the Zone 4 (14%) are HCMIS pilot sites. In-depth interviews were held with a head of pharmacy, HC Pharmacy store keepers, Woreda logistics officers and zone logistics officers. From 14 key informants interviewed, 7 of them were druggists and 2 of them were Pharmacist. The rest were Pharmacy technicians.

Table 1: Study units and Participants, Oromo Nation Zone, July 2019

S.no	Study unit	Participant	No. of participant
1	Woreda Health Office	Woreda logistician	6
2	Health Center	Pharmacy store manager	11
		Lab. Head	11
		ART pharmacy Head	6
		Family Planning Head	10
3	Health Post	Health Extension Worker	10
4	Zonal Health Department	Zone logistician	1

Source: Own survey, 2019.

4.2. Pharmaceutical Logistics Data Quality Practices at Public Health Facilities

Pharmaceutical logistics data quality practices vary in type as well as in degree among the five study units. At Health Centers and Health Post, almost all logistics data quality practices were expected to be implemented. However, higher level of the facility such as woreda health offices and Zonal health department commonly rely on report verification practice and quarterly done supportive supervisions.

4.2.1. Pharmaceutical Logistics Capabilities of Public Health Facilities

Health Posts

From the total 10 Health Posts assessed under this study, none of them reported taking of formal IPLS training. In the same way their monthly HPMRR report was not reviewed prior to submission to the Health Center pharmacy store. 3 (30%) of the Health Posts reported taking supportive supervision from their cluster Health Center and also Woreda Health Office. 5 (50%) of Health Posts receive oral feedback regarding the quality of their HPMRR report. (Table 2)

Table 2: Pharmaceutical logistics Capabilities of Health Posts in Oromo Nation Zone, July 2019 [n=10]

Capability for LMIS (n=10)	Frequency			
	Yes		No	
	Frequency	%	frequency	%
Interviewee trained IPLS	0	0	10	100
HPMRR report is reviewed prior to submission to the HC store	0	0	10	100
Health post receive oral regular feedback on its report	5	50	5	50
Health post receive Supportive supervision in the past three month from HC	3	30	7	70
Health post receive regular Supportive supervision from woreda health office	3	30	7	70

Source: Own survey, 2019.

Service Delivery Units (SDUs)

From the total 27 Service Delivery Units assessed under this study, none of professionals interviewed in both Laboratory and Family Planning took formal IPLS training. But 50% (n=6) of interview participant from ART unit took formal IPLS training. ART units received less supportive supervision from Pharmacy department, 33%, while Laboratory units received more, 54.5%. 57% of SDUs receive oral feedback regarding the quality of their IFRR report. (Table 3)

Table 3: Pharmaceutical Logistics Capabilities of SDUs for in Oromo Nation Zone, July 2019

Capability for Logistics Service	Frequency				Frequency				Frequency			
	Lab (n=11)				ART (n=6)				FP (n=10)			
	Yes		No		Yes		No		Yes		no	
	frequency	percent	Frequency	percent	frequency	percent	Frequency	percent	frequency	percent	frequency	percent
Interviewee trained IPLS	0	0	11	100	3	50	3	50	0	0	10	100
IFRR report is reviewed prior to Submission to the store	0	0	11	100	0	0	6	100	0	0	10	100
Oral Feedback is received on quality of IFRR report	6	54.5	5	45.5	4	67	2	33	5	50	5	50
Supportive supervision received within three month from pharmacy department	6	54.5	5	45.5	2	33	4	67	5	50	5	50

Source: Own Survey, 2019.

Health Center Pharmacy Stores

From the total of 11 Health center pharmacy stores assessed under this study, 5 (45.5%) reported taking of formal IPLS training. 9 (82%) of RRF report prepared by pharmacy store man is reviewed prior to submission to the Woreda Health Office. In all facilities RRF report is reviewed by the Head of the Health center. 5 (45.5%) of Health center pharmacy stores receive oral feedback regarding the quality of their RRF report from their Woreda Health Offices. Regarding the role of DTC, 91% of Health center Pharmacy stores reported there was no logistics related support from DTC of the HCs. (Table 4)

Table 4: Pharmaceutical Logistics Capabilities of Health Center Pharmacy Stores in Oromo Nation Zone, July 2019 [n=11]

Capability for Logistics Services	Frequency			
	Yes		No	
	frequency	%	frequency	%
Interviewee trained IPLS	5	45.5	6	54.5
RRF report is reviewed prior to submission to the health office or hub	0	0	11	100
The health center receive Oral feedback from woreda health office	5	45.5	6	54.5
The store receive supportive supervision from woreda health office within three month	7	64	4	36
The store receive supportive supervision from zone health department within three month	5	45.5	6	54.5
There is support from drug and therapeutics committee/DTC/	1	9	10	91
Feedback is given to health posts for their HPMRR	6	54.5	5	45.5

Source: own survey, 2019.

Woreda Health Office

From the total of 6 Woreda Health Office logisticians interviewed under this study, 5 (83%) reported taking of formal IPLS training. 5 (83%) Woreda Health Office logisticians conducted logistics related regular supportive supervision to Health centers. However, those conducted supportive supervision at Health centers neither of them give written feedback to Health facilities. (Table 5)

Table 5: Pharmaceutical Logistics Capabilities of Woreda Health Offices in Oromo Nation Zone, July 2019 [n=6]

Capability for Logistics Service	Frequency			
	Yes		No	
	frequency	%	frequency	%
Interviewee trained IPLS	5	83	1	17
Oral feedback provided on the quality of health facility's logistics record	4	67	2	33
Oral feedback provided on the quality of health facility's report	5	83	1	17
Supportive Supervision is conducted within three month	5	83	1	17
Following supportive supervision feedback written to health facility	0	0	10	100

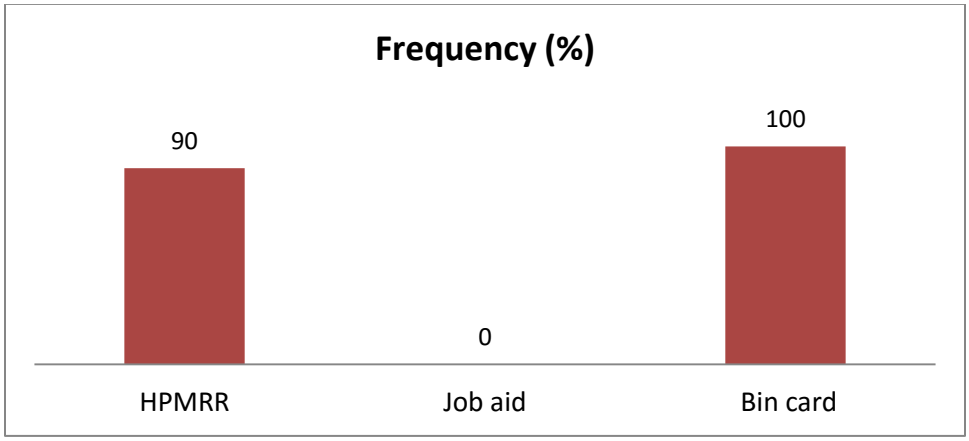
Source: Own Survey, 2019.

4.2.2. Availability of Logistics Formats and guidelines in Health Facilities

Health Posts

Among 10 Health Posts assessed under this study, 9 (90%) has HPMRR reporting formats (Figure 4). 7 (78%) Health Posts have pre-printed HPMRR format pads, while 2 (22%) have no pre-printed format pad but copy of it.

Figure 4: Availability of Logistics Formats and Guidelines in Health Posts of Oromo Nation Zone, July 2019 [n=10]



Source: Own survey, 2019.

Service Delivery Units (SDUs)

All Service Delivery Units assessed have IFRR reporting formats while 97% of SDUs have Bin cards. Job aid used for recording as well as for reporting was not available in both Laboratory and Family planning units but available in 50% (n=6) of ART units (see table 6). 76% of SDUs have pre-printed IFRR format pad while 24% have no pre-printed format pad but copy of it.

Table 6: Availability of Logistics Formats and Guidelines in SDUs of Oromo Nation Zone, July 2019

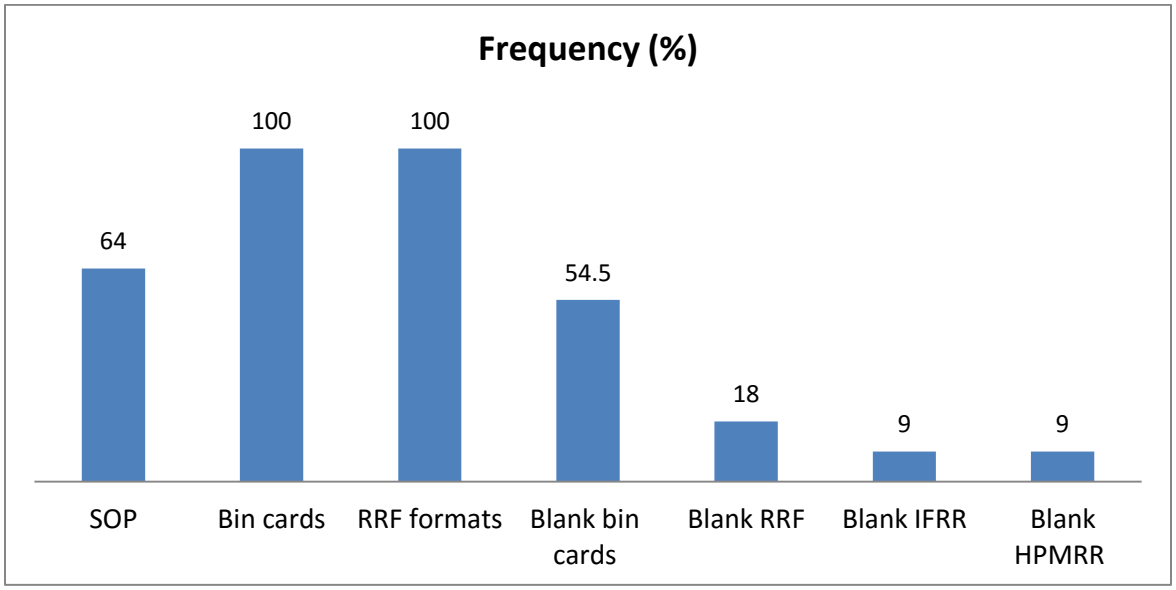
Availability of Recording, Reporting Formats and Guidelines	Frequency				Frequency				Frequency			
	Lab (n=11)				ART (n=6)				FP (n=10)			
	Yes		No		Yes		No		Yes		No	
	frequency	percent	frequency	percent	frequency	percent	frequency	Percent	frequency	percent	frequency	percent
There is job aid for recording and reporting	0	0	11	100	3	50	3	100	0	0	10	100
There is guideline for recording data on bin card	10	91	1	9	5	83	1	17	10	100	0	0
There is guideline for IFRR reporting	10	91	1	9	5	83	1	17	10	100	0	0
Service delivery unit have Bin card	11	100	0	0	6	100	0	0	9	90	1	10
There is IFRR reporting formats is in the unit	11	100	0	0	6	100	0	0	10	100	0	0

Source: Own Survey, 2019.

Health Center Pharmacy Store

Standard Operating Procedure (SOPs) used for recording as well as for reporting was available in 7 (64%) of Health center pharmacy stores assessed. From among 11 Health center pharmacy stores assessed under this study, 54.5%, 18% and 9% have blank Bin card, RRF and HPMRR reporting formats in their units respectively. (Figure 5)

Figure 5: Availability of Logistics Formats and Guidelines in Health Center Pharmacy Stores of Oromo Nation Zone, July 2019 [n=11]

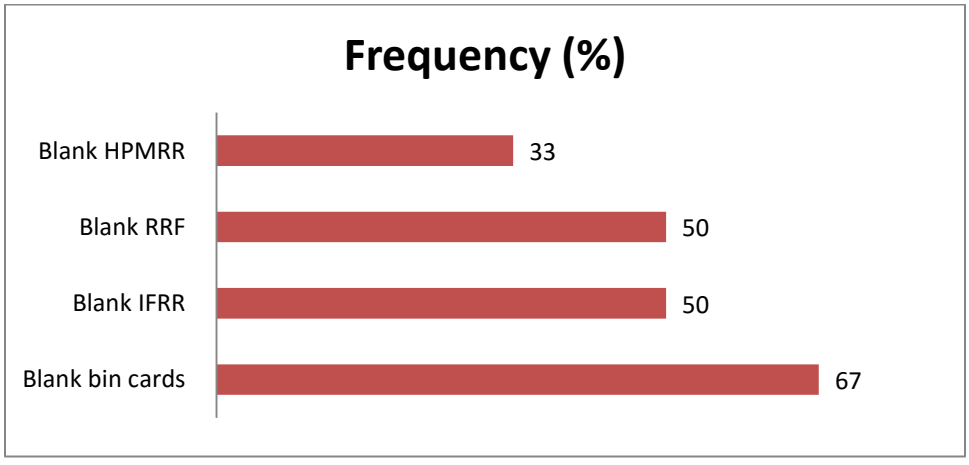


Source: Own Survey, 2019.

Woreda Health Offices

Availability of blank recording and reporting formats in 6 Woreda Health Offices were assessed. Blank Bin card was available in 4 Woreda Health Offices. While blank RRF and HPMRR were available in 3 Woreda Health Offices. (Figure 6)

Figure 6: Availability of Logistics Formats and Guidelines in Woreda Health Offices of Oromo Nation Zone, July 2019 [n=6]



Source: Own Survey, 2019.

4.2.3. Pharmaceutical Logistics Data Management Practices in Public Health Facilities

Health Posts

From the total 10 Health Posts assessed under this study, 3 (30%) of the Health Posts consistently update Bin cards. Regarding the use of HPMRR, only 6 (60%) of the Health Posts assessed use the format for requesting items from their cluster Health Center Pharmacy store. 4 (40%) and 7 (70%) of the Health Posts compile their monthly HPMRR report using their Bin card and physical count respectively. Among 10 Health Posts no one of them have expire item tracking list and none of them record their daily transaction of products. (Table 7)

Table 7: Pharmaceutical Logistics Data Management practices in Health Posts of Oromo Nation Zone, July 2019[n=10]

Pharmaceutical Logistics Data Management practices	Frequency			
	Yes		No	
	Frequency	%	Frequency	%
Bin card is consistently updated in the health post	3	30	7	70
HPMRR is consistently used for requesting	6	60	4	40
using bin card as data source for HPMRR report compilation	4	40	6	60
HPMRR is compiled from physical count	7	70	3	30
Bin card is placed near the product it tracks	4	40	6	60
The health post has expire item tracking list	0	0	10	100
Daily transaction of product is recorded in the health post	0	0	10	100
Logistics data is presented using charts, graphs and maps	0	0	10	100
Schedule for HPMRR report is posted in the health post	0	0	10	100

Source: Own Survey, 2019.

Service Delivery Units (SDUs)

From all SDUs assessed under this study, 40% (n=27) of the Service Delivery Units consistently update Bin cards. Regarding consistent use of IFRR, only 97% of SDUs assessed use the format for requesting items from the Health Center Pharmacy store. 28% of SDUs compile their regular IFRR report using their Bin card while 69% of them compile their regular IFRR report using physical count. (Table 8)

Table 8: Logistics Data Management in SDUs of Oromo Nation Zone, July 2019

Logistics Data Management	Frequency				Frequency				Frequency			
	Lab (n=11)				ART (n=6)				FP (n=10)			
	Yes		No		Yes		No		Yes		No	
	frequency	percent	frequency	percent	frequency	percent	Frequency	percent	Frequency	percent	Frequency	percent
Bin card is consistently updated by the unit	4	36	7	64	2	33	4	67	5	50	5	50
IFRR is consistently used by the unit	10	91	1	9	6	100	0	0	10	100	0	0
Bin Card is placed near the product it is aimed to track	2	18	9	82	2	33	4	67	4	40	6	60
Expire item tracking list	1	9	10	91	0	0	6	100	0	0	10	100
Daily transaction of item is recorded in the unit	4	36	7	64	0	0	6	100	6	60	4	40
Logistics document are archived	7	64	4	36	1	17	5	83	5	50	5	50
Logistics documents are presented using graphs, charts and maps	0	0	11	100	0	0	6	100	0	0	10	100
IFRR schedule is posted in the SDU	4	36	7	64	2	33	4	67	3	30	7	70

Source: Own Survey, 2019.

Table 9: Data source for compiling IFRR report in Laboratory, ART and Family Planning, Oromo Nation Zone, July 2019

Source of data for IFRR report in three SDUs	Frequency		Frequency		Frequency	
	Lab (n=11)		ART (n=6)		FP (n=10)	
	frequency	%	frequency	%	frequency	%
Bin card	4	36.4	1	16.7	3	30.0
physical counting	6	54.5	5	83.3	7	70.0
model 22	1	9.1	0	0	0	0

Source: Own Survey, 2019.

Health Center Pharmacy Store

From 11 Health Center Pharmacy Stores assessed under this study, 3 (27%) of Health center pharmacy stores consistently update Bin cards. But all assessed pharmacy stores consistently report their RRF and 7 (64%) of the Health centers report their RRF on timely manner. From 11 Health Center Pharmacy Stores assessed , 7(64%) , 3 (27%) and 6 (54.5%) of Health center pharmacy stores compile their bi-monthly RRF report using their Bin card, previous RRF report and Model 19 respectively.(Table 10)

Table 10: Pharmaceutical Logistics Data Management practices in Health Center Pharmacy Stores of Oromo Nation Zone, July 2019 [n=11]

Pharmaceutical Logistics Data Management practices	Frequency			
	Yes		No	
	frequency	%	frequency	%
Bin card consistently updated in the store	3	27	8	73
The store consistently report RRF	11	100	0	0
Bin card is used as source of data for RRF report	7	64	4	36
Previous RRF is used as source of data for RRF report	3	27	8	73
Model 19 is used as source of data for RRF report	6	54.5	5	45.5
In the store bin card is placed near the product it tracks	4	36	7	64
The store has near expire item tracking list	3	27	8	73
Rotated stocks are received using model 19	9	82	2	18
Logistics documents are archived in the store	8	73	3	27
Logistics data are presented using charts, graphs and maps in the store	1	9	10	91
IFRR is kept in folder in the store	7	64	4	36
RRF is timely reported to woreda health office	7	64	4	36
KPI is regularly reported to woreda health office	6	54.5	5	45.5

HPMRR is kept in folder in the store	8	73	3	27
HPMRR is timely reported from health posts	1	9	10	91
Invoices are kept in folder in the store	5	45.5	6	54.5
Schedule for report is posted in the store	4	36	7	64

Source: Own Survey, 2019.

Woreda Health Offices

Among 6 Woreda Health Offices assessed none of them reported having of expire item tracking list in their office. Similarly, none of the Woreda Health Office had a system to track the stock status of the Health facilities administered under them. (Table 11)

Table 11: Pharmaceutical Logistics Data Management practices in Woreda Health Offices of Oromo Nation Zone, July 2019 [n=6]

Pharmaceutical Logistics Data Management practices	Frequency			
	Yes		No	
	frequency	%	frequency	%
Near expire item tracking list for its catchment	0	0	6	100
There is a system to track stock status of the health facilities	0	0	6	100
There is procedure to address quality record in the health facility	1	17	5	83
There is procedure to address quality report in the health facility	4	67	2	33
Logistics documents are archived	5	83	1	17
Logistics data are displayed by charts, graphs and maps	0	0	6	100
RRF is kept using folder	5	83	1	17
RRF from health facility is timely reported	5	83	1	17
Invoices are kept using folder	4	67	2	33

Source: Own Survey, 2019.

4.3. Pharmaceutical Logistics Data Quality Performance Measurement in Health Posts and Health Center Pharmacy Stores

Health Posts

For three tracer items namely Amoxicillin dispersible tablet, Medroxyprogestrone injection and coartem tablet, Bin card availability, Bin card updating status, HPMRR completeness and HPMRR accuracy for three tracer items was measured. Among 10 Health Posts assessed 2 (20%), 3 (30%) and 2 (20%) of them update Bin cards for Amoxicillin dispersible tablet, Medroxyprogestrone injection and coartem tablet respectively. Using recent HPMRR report of the Health Posts, in 93% of the Health Posts data items on the report are complete for three tracer items. However, calculated order is accurate in 53% of the Health Posts. (Table 12)

Table 12: Logistics Data Quality Performance Measurements in Health Posts of Oromo Nation Zone, July 2019 [n=10]

Tracer drugs	Logistics Data Quality Performance Indicators				
	BC available N (%)	BC near item N (%)	BC update N (%)	HPMRR completeness N (%)	HPMRR accuracy N (%)
Amox. Dispersible tab.	10 (100)	4 (40)	2 (20)	9 (90)	4 (40)
Depo injection	10 (100)	5 (50)	3 (30)	10 (100)	6 (60)
Coartem tab.	10 (100)	4 (40)	2 (20)	9 (90)	6 (60)

Source: Own Survey, 2019.

Health Center Pharmacy Stores

For three tracer items namely Amoxicillin dispersible tablet, Medroxyprogestrone injection and coartem tablet; Bin card availability, Bin card updating status, HPMRR completeness and HPMRR accuracy for three tracer items was measured. Among 11 Health center pharmacy stores assessed 2 (18%), 2 (18%) and 3 (27%) of them update Bin cards for Amoxicillin dispersible tablet, Medroxyprogestrone injection and coartem tablet respectively. Using recent RRF report of the Health Centers, in 94% of the Health centers, data items on the report are complete for three tracer items. However, calculated order is accurate in 70% of the Health center. (Table 13)

Table 13: Logistics Data Quality Performance Measurements in Health Center Pharmacy Stores of Oromo Nation Zone, July 2019 [n=11]

Tracer drugs	Logistics Data Quality Performance Indicators				
	BC available N (%)	BC near item N (%)	BC update N (%)	HPMRR completeness N (%)	HPMRR accuracy N (%)
Amox. Dispersible tab.	9 (82)	3 (27)	2 (18)	11 (100)	6 (54.5)
Depo injection	11 (100)	5 (45.5)	2 (18)	11 (100)	10 (91)
Coartem tab.	11 (100)	7 (64)	3 (27)	9 (82)	7 (64)

Source: Own Survey, 2019.

4.4. Challenges of Pharmaceutical Logistics Data Quality in Public Health Facilities

Health Posts

HPMRR report is delayed due to distance in 2 (20%) of the Health Posts. But in 7 (70%) of the Health Posts report is delayed due to work load. Work load also attributes to stock inaccuracy in 40% and to report inaccuracy in 50% of the Health Posts. (Table 14)

Table 14: Challenges of Pharmaceutical Logistics Data Quality in Health Posts of Oromo Nation Zone, July 2019 [n=10]

Pharmaceutical Logistics Data Quality Challenges	Frequency			
	Yes		No	
	Frequency	%	frequency	%
Distance attributes to delay of report	2	20	8	80
Transport attributes to timeliness of the report	1	10	9	90
Work load attribute to delay of report	7	70	3	30
Work load attributes to stock inaccuracy	4	40	6	60
Work load attributes to report inaccuracy	5	50	5	50
Work load attributes to report incompleteness	5	50	5	50

Source: Own Survey, 2019.

Health Center Pharmacy Stores

RRF report is delayed due to distance in 3 (27%) of the Health centers. But in 6 (54.5%) of the Health center RRF report is delayed due to work load. Work load also attributes to stock and report in accuracy in 8 (73%) of the Health centers. Work load also attribute to weak supportive supervision in 64% of the Health center pharmacy stores assessed. Poor logistics knowledge is

attributed to high employee turnover in 54.5% and training gaps in 82% of Health center pharmacy stores. On the other hand irregular product movement from the Health center pharmacy store to different SDUs also attribute to stock in accuracy in 91% and report inaccuracy in 91% of Health center pharmacy stores. (Table 15)

Table 15: Challenges of Pharmaceutical Logistics Data Quality in Health Center Pharmacy Stores of Oromo Nation Zone, July 2019 [n=11]

Pharmaceutical Logistics Data Quality Challenges	Frequency			
	Yes		No	
	frequency	%	frequency	%
Distance attributes to delay of report	3	27	8	73
Transport attributes to timeliness of the report	3	27	8	73
Work load attribute to delay of report	6	54.5	5	45.5
Work load attributes to stock inaccuracy	8	73	3	27
Work load attributes to report inaccuracy	8	73	3	27
Work load attributes to report incompleteness	8	73	3	27
Weak supportive supervision is attributed to budget constraint	3	27	8	73
Weak supportive supervision is attributed to work load	7	64	4	36
Poor logistics knowledge is attributed to high employee turnover	6	54.5	5	45.5
Poor logistics knowledge is attributed to training gaps	9	82	2	18
High employee turnover is attributed to report delay	4	36	7	64
Irregular product movement to SDUs attributes to stock inaccuracy in the store	10	91	1	9
Irregular product movement to SDUs attributes to RRF inaccuracy	10	91	1	9

Source: Own Survey, 2019.

Woreda Health Offices

From among 6 Woreda Health Offices assessed under this study, 5 (83%) Woreda Health Offices believed that Work load attribute to weak supportive supervision. Weak supportive supervision also attributed to budget constraints in 2 (33%) of Woreda Health Offices. High employee turnover and training gaps also attribute to poor logistics knowledge in 4 (67%) of Woreda Health Offices assessed. (Table 16)

Table 16: Challenges of Pharmaceutical Logistics Data Quality in Woreda Health Offices of Oromo Nation Zone, July 2019 [n=6]

Pharmaceutical Logistics Data Quality Challenges	Frequency			
	Yes		No	
	frequency	%	frequency	%
Report timeliness is attributed to distance	3	50	3	50
Report timeliness is attributed to transport	4	67	2	33
Supportive supervision is attributed to budget	2	33	4	67
Poor supportive supervision is attributed to work load	5	83	1	17
Poor logistics knowledge is attributed to high employee turnover	4	67	2	33
Poor logistics knowledge is attributed to training gaps	4	67	2	33

Source: Own Survey, 2019

4.5. Qualitative Findings

In-depth interviews were held with a head of pharmacy, HC Pharmacy store keepers, Woreda logistics officers, zone logistics officers and distribution officer from EPSA Dessie Hub. From 14 key informants interviewed, 7 of them were druggists and 2 of them were Pharmacist. The qualitative exploration was on five thematic areas:

4.5.1. Availability of LMIS Formats in public HFs

Recording and reporting formats and their guidelines are among essential tools needed for logistics activities in Public health facilities. These tools were made available through partner support. But recently, health facilities were encountering shortage of these formats. As a result HCs and WoHOs were forced to use and distribute copy of original format. One of the logistics officer said that:

‘’ *partners stop supplying logistics formats, so we are forced to printed formats in the HF*’’. Printing reporting format at Health facility was challenging due to budget limitation as described by Pharmacy technician from one Health center:

‘’ *we print formats in our facility but there is shortage of budget.*’’

Shortage for HPMRR was more significant in many Health facilities assessed. Logistics officer from WoHO said that:

‘’ *There is relatively enough recording and reporting tools except shortage of HPMRR. ‘’*

The other Pharmacy technician from health center also said that:

‘’ *Currently we have enough tools except OPD IFRR which we copy it using our computer. There is also shortage of HPMRR.*’’

Shortage of logistics tools was associated with the decline in Partner support of the program. However, one logistics officer argues that health facilities should not rely on partner support for availing their logistics formats. He said that:

‘’ *Partner support is diminishing from time to time. As a result we were facing shortage of formats in the HFs and HFs were forced to print formats through their expenses. To be frank, we should not relay on partners with respect to ensuring the availability of formats as well as in other tasks like preparing trainings.’’*

4.5.2. Pharmaceutical Logistics Data recording and reporting practices

Level of Logistics data quality was not the same at all level of the health institutions. One logistics officer said that:

‘’ *Logistic data quality practice differ from facility to facility as well as from professional to professional.’*

Pattern of data quality were assessed with respect to quality of recording, quality of reporting and associated support mechanisms. Most of Key informants agreed that there is poor Bin card update in HPs, SDUs and HC Pharmacy stores. However, there was an improvement in preparing their regular reports. One logistics officer said that:

‘’ HP and SDUs are good in report but poor in updating their BC’’

On time updating of Bin card in HC Pharmacy store was found a challenge in Health centers with few Pharmacy professionals. One Pharmacy technician said that:

‘’ Due to shortage of pharmacists, I work in both the store and dispensary. So I cannot update even my BC due to work load’’

Even if there was some improvement in compiling regular report at SDUs, still there are gaps in timely reporting. One Clinical Pharmacist said that:

‘’ I argue with the SDUs to timely report their IFRR.’’

4.5.3. Capability for data recording and reporting at public HFs

Professional and institutional capabilities are an important input for ensuring logistics data quality at any level of the Facility. Professional capability could be viewed with respect to

professional level of knowledge and initiation to do the job. Professionals may lack initiation if there is no incentive, if they were forced to work beyond their capacity and if they consider the task as an additional role. In some WoHO and HCs assessed, there was Pharmacy professional having formal Post service IPLS training. One logistics officer said that:

'' No pharmacy professional currently working in the woreda has taken IPLS training.''

Especially in health facilities with high Pharmacy professional turnover, logistics performance will not consistent. One Pharmacy technician said that:

''Due to human turnover, there is gap in knowledge and initiation.''

In some Health centers, a shortage of Pharmacy professional is more serious. One logistics officer said that:

'' Shortage of pharmacy professional is a major challenge. The HC is forced to delegate health professional other than pharmacist in the pharmacy working units. We lack moral to force other health team to work effectively in the pharmacy units.''

Institutional capability is also needed to realize logistics data quality. Availing essential logistics tools, maintain continuous logistics support, specially improving the logistics knowledge of relevant professionals are mandatory tasks of the institution. Health facilities should serve as per their human power capacity. It not fair and rational for a HC with single Pharmacy professional to serve more than hundreds of patient per day. One Pharmacy technician said that:

'' After health insurance is implemented there is high Work load on pharmacy professionals, this affect our initiative for work.''

Professionals having IPLS training are few even in HCMIS pilot sites. One logistics officer said that:

'' From among four HCMIS pilot sites, only two are currently functioning. In the rest two pilot sites, professionals have no knowledge of the software, even they have no IPLS training, as both of them are newly assigned.''

4.5.4. Supportive Supervision and Feedback practices

Public health facilities are logistically supported by public institutions such as WoHO, ZHD and PFSA or by partners working in the program. Pharmacy units from HCs also logistically supervise their cluster HPs. Supportive supervision commonly conducted on quarterly basis. Pilot health facilities and those near one are more benefited from supervision services than distant non pilot health facilities. This study showed that those institutions liable to supervise lower facilities were not conducting their supervision program consistently on regular basis. One logistics officer said that:

'' Those HFs that have special partner supported have good performance. There is gap in HFs located far or distant from the woreda health office as they are poorly supervised.There is weak supportive supervision which is due to shortage of labor force in the office. ''

Some WoHO logistics officer think of supervision by the time people from either partner or PFSA come to their office. One Pharmacy technician from health center said that:

'' They (WoHO logistics officer) only come accompanying people from ZHD or PFSA or partner.''

Some supervisees from health centers are frustrated due to some behavior from supervisor. One druggist from health center said that:

'' We are not 100% perfect. There are fault finders from among supportive supervisory team, but we need teaching and supporting supervision. ''

An important aspect of regular supportive supervision is feedback. However, as the study revealed almost all logistics related supervisions were not followed with written feedback but only oral feedback was given either through face to face or telephone conversations. Supervisory feedback has a fast response especially from the lower level of health institutions. One logistics officer said that:

'' HFs, especially HP respond fast to the feedback or orientation given to them in correcting or improving what they are told from their cluster.''

4.5.5. Attention Given for pharmaceutical Logistics in public HFs

Health programs without Pharmaceutical products are difficult to implement. So, all Health program owners should see logistics activities as their major role. However, in most of public health facilities logistics is considered as sole role of Pharmacy professionals. Health facility administration and health team other than Pharmacy professionals give less attention for the logistics activities but more for their programs. A Pharmacy technician from a HC said that: ‘’

The HC administration gave Weak attention to the pharmacy department. They only visit us by the time there is complain in relation with shortage of products. People from the office come to us by the time they hear that there is supervision from higher organization such as ZHD or PFSA or partners.’’

This poor attention given for logistics was not restricted to Health facility administration but it is wider. One logistics officer said that:

‘’ Starting from the region, less attention is given to the logistics activities.’’

Health Posts and SDUs from within the HCs did not consider logistics activities as their major tasks. Most of participant from both study units did not participate on formal IPLS training. As a result, most of the professionals were not encouraged for duties they were not trained for it. One Pharmacy technician said that:

‘’ logistics given less focus by other health team in the HCs and by the HPs. They consider it as an additional task. ‘’

However, due to some pressures from the Pharmacy unit, attention of SDUs for IFRR report was improved. A Pharmacy technician said that:

‘’ All SDUs give good attention for the logistic activities as they will not be supplied if they do not report timely. ‘’

CHAPTER FIVE

DISCUSSION AND INTERPRETATION

Discussion and interpretation of the result is presented objective wise. However, unlike the result, discussion and interpretation is not specific to each study units (i.e. HPs, Health center Pharmacy stores, SDUs and WoHOs). But, pharmaceutical logistics data quality practices at all four categories of the study units is discussed and interpreted together in a paragraph. Similarly, results of pharmaceutical logistics data quality challenges in HPs, Health center Pharmacy stores and WoHOs; and results of pharmaceutical logistics performance indicators at HPs and Health center Pharmacy stores are discussed and interpreted together. Objective wise discussion and interpretations are triangulated with the qualitative findings of the research.

5.1. Pharmaceutical Logistics Capabilities of Public Health Facilities

The process of ensuring pharmaceutical logistics data quality in public health facilities need the involvement of different entities working at different level of the health system. Pharmaceutical logistics activities performed at health facilities including health posts and health centers are not similar with logistics activities done at woreda health offices and zone. The process of recording and report compilation is more common at health facilities while woreda health and zone logistician are focused in report aggregation task and support programs.

Institutional capability is also needed to realize logistics data quality. Availing essential logistics tools, maintain continuous logistics support, specially improving the logistics knowledge of relevant professionals are mandatory tasks of the institution.

Professional and institutional capability for logistics activities were assessed using Professional level of logistics related training and institutional status to give or receive quarterly supportive supervision and related feedback. Finding of this study showed that those who work in HPs never received formal IPLS training. However, study participant reported they were given short time orientation on IPLS as part of other non-logistics training. Similarly those who work in

logistically important SDUs such as Laboratory and Family Planning never take formal IPLS training. Study done in Addis Ababa found that training of HCs laboratory professionals in LMIS was 0% (Desale, *et al*, 2013). Recent national IPLS assessment revealed that only 8.0% of the health posts had staff trained in IPLS (EPSA, 2019). Level of training was good in units commonly headed or occupied by Pharmacy professionals. For example, level of IPLS training in ART, Health center Pharmacy store and WoHOs were 50% (n=6), 45.5% (n=11) and 83% (n=6) respectively. Nationally, 38% of health centers had 80% or more of their pharmacy unit staff trained in IPLS. (EPSA, 2019)

Professional and institutional capabilities are an important input for ensuring logistics data quality at any level of the Facility. Professional capability could be viewed with respect to professional level of knowledge and initiation to do the job. Professionals may lack initiation if there is no incentive, if they were forced to work beyond their capacity and if they consider the task as an additional role. In some WoHO and HCs assessed, there was Pharmacy professional having formal Post service IPLS training. However, in some Health Facilities experiencing high Pharmacy professional turnover, it was difficult to get IPLS trained professional.

This study also assessed whether regular reports were reviewed prior to submission to the higher levels. Health Post HPMRR report and Service Delivery Units IFRR report were not reviewed prior to submission to the Health center Pharmacy store. Similarly, Health center RRF report was not reviewed prior to submission to Woreda Health Office or the Hub. The institutional set up at all level could allow reviewing of reports through Heads of the units. However, report were simply sent to the next level merely with the signature of the Health center's Head.

Health Posts and SDUs could be logistically supervised either by Pharmacy professional from their cluster HC or by Logistics Officer from their WoHO. On the other hand Health center Pharmacy stores were commonly supervised by Logistics officers from WoHO and ZHD. Supervision was done on quarterly basis and this study assessed level of supervision within three month prior to the study. HPs and HCs received oral feedback from WoHO and ZHD either through face to face or telephone conversations. Feedback is a form of training and directly addresses the causes of poor quality data and enhances awareness of the importance of data. In most instances, following supportive supervision and regular report, Lower health facilities wait for feedbacks from higher level institutions(Garrib, *et al*, 2008). According to this study, none of

the participant reported receiving written feedback from their supervisor institutions. Study done in South Africa found that lack of human resources was a factor for the absence of feedback(Garrib, *et al*, 2008). Another similar study done in Botswana also found that staff of the district and facility level reported receiving only limited feedback, with most feedback being negative and related to the timeliness of data or data errors (Ledikwe, *et al*, 2014).

An important aspect of regular supportive supervision is feedback. However, as the study revealed almost all logistics related supervisions were not followed with written feedback but only oral feedback was given either through face to face or telephone conversations. Supervisory feedback has a fast response especially from the lower level of health institutions.

According to this study, 30% of HPs received supportive supervision from the HC Pharmacy unit and Woreda logistics officer. 64% and 45.5% of Health center Pharmacy stores received supportive supervision from Woreda and Zone logistics officer respectively. Study done in Addis Ababa found that 79% of Health centers received supportive supervision on the pharmaceutical logistics quarterly (Mudzteba, 2014). However recent National IPLS survey found 37% of Health centers received supervisory visit in the three month period (EPSA, 2019). Unlike Woreda Supervision, Zonal supervision was not conducted on regular basis. According to the response from key informant interviews, facilities that are near and pilot sites for partners are more likely to be supervised and supported frequently. According to the study done in East Wollega Zone, the nearest health facility from PFSA had more frequent Supportive supervision access than the farthest. Similarly, frequency of supervision was also varied among health facility type, such that ART site got more frequent supervision than PMTCT and non- PMTCT (Nigusie, 2017).

Public health facilities are logistically supported by public institutions such as WoHO, ZHD and PFSA or by partners working in the program. Pharmacy units from HCs also logistically supervise their cluster HPs. Supportive supervision commonly conducted on quarterly basis. Pilot health facilities and those near one are more benefited from supervision services than distant non pilot health facilities. This study showed that those institutions liable to supervise lower facilities were not conducting their supervision program consistently on regular basis. Some WoHO logistics officer think of supervision by the time people from either partner or

PFSA come to their office. On the other hand, some supervisees from health centers are frustrated due to some behavior from supervisor.

Regarding the role of DTC in supporting logistics activity in HCs, in most of HCs DTC were not functional, so less attention was given to the logistics activities. The only situation logistics get an attention of the DTC member was by the time there was shortage for some products.

Health programs without Pharmaceutical products are difficult to implement. So, all Health program owners should see logistics activities as their major role. However, in most of public health facilities logistics is considered as sole role of Pharmacy professionals. Health facility administration and health team other than Pharmacy professionals give less attention for the logistics activities but more for their programs. The poor attention given for logistics was not restricted to Health facility administration but it was wider. Even at regional level less attention is given to the logistics activities.

5.2. Availability of Logistics Formats and guidelines in Health Facilities

In this study, availability of recording and reporting formats at four study units was assessed. At HPs and HCs availability of ready to use BCs and reporting formats were assessed. The availability of an extra blank BCs and reporting formats were also assessed in HC Pharmacy stores, WoHO and ZHD. BC availability was as good as availability of report formats at both HPs and HCs. Report formats were available as pre-printed format pad or copy of it. However, the study revealed that there were shortage of blank BCs and blank reporting format pads. For example, 91% of HC Pharmacy stores had no blank HPMRR format pads, so they were obliged to distribute copy of the original pad for their cluster HPs. However, recent national IPLS assessment found that only 15% of HCs had no blank HPMRR format pads (EPSA, 2019). This shortage of blank recording and reporting format pad at Public health facilities were due to recent decrement in partner support for the program.

Recording and reporting formats and their guidelines are among essential tools needed for logistics activities in Public health facilities. These tools were made available through partner support. But recently, health facilities were encountering shortage of these formats. As a result HCs and WoHOs were forced to use and distribute copy of original format that made printing of

reporting format at health facility challenging due to budget limitation. Specially, shortage of HPMRR was more significant in many Health facilities assessed. Shortage of logistics tools was associated with the decline in Partner support of the program. However, health facilities should not rely on partner support for availing their logistics formats.

The study also assessed availability of job aids and SOPs at HPs and HCs respectively. The study found that none of the HPs possessed job aids used as a guide for recording and reporting logistics data. However, recent national IPLS assessment found that 31.1% of HPs possess job aids in their units (EPSA, 2019). Job aids might be stocked at HC pharmacy stores or at WoHOs but not distributed to HPs.

5.3. Pharmaceutical Logistics Data recording and reporting Practices in Public Health Facilities

Regarding logistics data management, this study assessed practices related with recording logistics data, regular report compilation, preparing summary of important logistics data and logistics data keeping process at HP, HC, WoHO and ZHD levels.

Findings of this study showed that Updating of Bin card at HPs and HCs became a challenging task. Specifically, in relation with shortage of Pharmacy professionals; 3 Pharmacy professional per HC or 9 Pharmacy professional per WoHO, ensuring consistent update of Bin card remain a major challenge. It is evident that BC serves as a major data source for most of logistics reports and decisions. According to the finding of the study, only 30% of HPs and 27% of HC Pharmacy stores update their BCs. Study done in Addis Ababa for the Non Program Tracer Drugs found that Bin card was available for majority of Non Program Tracer Drugs. On average, 84.5% of the non-program tracer drugs had bin cards of which 69.5% were updated (Mudzteba, 2014).Similar study done in east Wollega zone found that only 43.8% of public health facility Pharmacy stores had an updated Bin cards (Nigusie, 2017).

Pattern of data quality were assessed with respect to quality of recording, quality of reporting and associated support mechanisms. On time updating of Bin card in HC Pharmacy store was found a challenge in Health centers with few Pharmacy professionals. Most of Key informants agreed that there is poor Bin card update in HPs, SDUs and HC Pharmacy stores.

On the other hand, recent national IPLS assessment found that Bin card availability and use in HCs were 64% and 55% respectively (EPSA, 2019). For this low performance different reasons were raised. Among the major reasons reported HPs and SDUs consider logistics activities as an additional silly task. Work load in the Pharmacy store man, most of Store mans were not restricted to store activities but also have additional dispensing role.

Use of HPMRR and IFRR report for requesting product by HPs and SDUs was 60% (n=10) and 97% (n=27) respectively. Recent national IPLS assessment found that HPMRR and IFRR use in Health Post and in 80% of SDUs were 34.4% and 43.8% respectively (EPSA, 2019). In order to be supplied by the HC Pharmacy store, HPs and SDUs were forced to consistently prepare their regular reports. However, in these units BC update was poor, so they rely on physical count to compile their reports. 70% of HPs compile their HPMRR after Physical count. This may be simple in units like HPs with few products in their shelves. All HC Pharmacy stores assessed reported their RRF consistently. However, despite their poor BC update, 64% of Pharmacy stores reported that they compile their RRF report using their BCs. Previous RRF report and Model 19 also served as an additional data source to prepare HC RRF reports. It is evident that the quality of a report depends on the quality of the data source from which the report is going to be compiled. Even if there was some improvement in compiling regular report at SDUs, still there are gaps in timely reporting.

Health Posts and SDUs from within the HCs did not consider logistics activities as their major tasks. Most of participant from both study units did not participate on formal IPLS training. As a result, most of the professionals were not encouraged for duties they were not trained for it. However, due to some pressures from the Pharmacy unit, attention of SDUs for IFRR report was improved.

In this study, none of the HPs and WoHOs reported having expire item tracking list. Even in HC Pharmacy stores, only 27% with the majority of them HCMIS pilot HCs had expire item tracking list. Paper based expire item tracking list is more alarming and repeatedly visualized by professionals than the computer software HCMIS data base. Logistics related data in public health facilities should be summarized and then should be used for decisions. In this regard, none of the study units at all level of the system present logistics data using charts and graphs. The study also assessed whether HPs and SDUs had schedule for preparing their regular reports.

None of the HPs and only 33% of SDUs were posted their report schedule in their units. Recent IPLS assessment found that within 74% of Health centers IFRR schedule was posted in at least one SDU (EPSA, 2019). However, for effective logistics data management, to comply with the report schedule is more important than to have the schedule. Record and report inaccuracy may arise as a result of irregular product movement in the store. On the other hand, if HPs and SDUs do not comply with report schedule, their report may come either early or late. But most of the times as the study revealed only 60% of HPs send their report to the HC Pharmacy store on timely manner. Similarly only 64% of HCs send their RRF to WoHOs timely. Similarly 69% of Health centers report their RRF timely as the recent survey done by EPSA found (EPSA, 2019).

The study also identified that old IFRR, HPMRR and Invoices were foldered in 64%, 73% and 45.5% of HC Pharmacy stores respectively. Similarly RRF and Invoices kept foldered in 83% and 67% of WoHOs respectively. In both facilities Reports were given more attention than Invoices.

The study also assessed whether WoHOs do have formal procedure to address quality of record and report in Health Facilities. WoHOs poorly address quality of record but as part of supportive supervision and following Health Facility's report, they tried to address quality of reports. WoHOs were also expected to track stock status of some important items stocked in Health facilities residing within their administration. This task will enable effective use of resources and can minimize stock wastage due to expiry. Near expire and over stocked items could be rotated from one Facility to the other if and only if the stock status data of the Health Facilities are properly documented and tracked.

5.4. Pharmaceutical Logistics Data Quality Performance Measurement in Health Posts and Health Center Pharmacy Stores

This study also measured certain logistics performance indicators or logistics data quality dimensions. Performances were measured for three essential program items namely Amoxicillin dispersible tablet, Medroxy progesterone (Depo) injection and Coartem tablet. These three tracer items are considered among essential items commonly used for three major health programs namely child health, maternal health and communicable disease treatment. Selected performance indicators were five and include availability and proper use of BCs for each tracer item selected

at HPs and HC Pharmacy stores assessed. Proper use of BCs considers placing BC near the tracer item it aimed to track and BC update for that tracer item. The rest two performance indicators measure accuracy and completeness of report for the each tracer item in each HPs and HC Pharmacy stores assessed. Logistics data quality practices are strongly related with the performance indicators, such that, an institution with better logistics data quality practice is expected to have better performances.

In this study, BC use for three tracer items at 10 HPs and 11 HC Pharmacy stores were assessed. And using recently sent report of the Health facilities, report accuracy and completeness were checked. HPMRR report of target HPs was easily accessible in their cluster HCs, while RRF report of the HCs were checked at WoHOs. For each tracer item, report said to be complete if all column or data items were filled. On the other hand, report said to be accurate if there was no miss calculation.

In HPs availability of BCs was 100%. For three tracer items selected, 23% (n=10) of the HPs updated their BCs. HPMRR report for three tracer items were complete in 93% and accurate in 53% of the HPs. For three tracer items BC was available in 94% of HC Pharmacy stores. 21% (n=11) of the HC Pharmacy stores updated their BCs. RRF report for three tracer items were complete in 94% and accurate in 70% of the HC Pharmacy stores. Recent survey done by EPSA showed HPMRR completeness and accuracy for tracer items assessed were 57.6% and 61% respectively (EPSA, 2019).Study done in Addis Ababa found that the total accuracy of bin cards in hospitals and health center laboratory mini-store for HIV/AIDS and TB laboratory commodities were 38.9% (Desale, *etal*, 2013).Performance measurement in both health facilities can show the over view of the logistics practices, but it does not show perfectly the level of logistics data quality. For example, an updated BC serves as an indirect check for stock accuracy. But accurate and complete report does not justify that the data is correct. So, in order to have full and genuine picture of logistics data quality, performance indicators or logistics data quality dimensions better to be combined with their functional components or data quality practices. Study done in South Africa suggested that an intervention that involved specific training for health-care workers on the importance of public health information, monthly data reviews and feedback, and regular data audits was effective in significantly increasing the completeness and accuracy of the data used to monitor PMTCT services(W Mphatswe, *et al*, 2012).

5.5. Challenges of Pharmaceutical Logistics Data Quality in Public Health Facilities

This study also assessed some challenges of pharmaceutical logistics data quality. Challenges can be either internal associated with the health facility's practice or external which are beyond the control of the health facility. As data quality practices vary at different level of the health institutions, challenges were also specific to their practice.

Some challenges may be attributed to report delay. These challenges had significant effect on HPs and HCs data quality practices but less on WoHOs. On the other hand, challenges that were attributed to supportive supervisions practices were more relevant to affect practices aimed to ensure logistics data quality at WoHO levels. Considering these facts, this study tried to assess some specific challenges that have significant effect on logistics data quality practices as well as directly effect on dimensions of data quality namely timeliness, accuracy and completeness.

In both HPs and HCs, distance and transport were not a major challenge for report delay. This might be due to some improvements in road infrastructures and also due to presence of an ambulance service near all public health facilities. So reports were easily sent to the higher level of the system. A major challenge for report timeliness at both HPs and HCs was work load. Study done in South Africa found that the high work burden reported for data collection and collation suggests that a large amount of scarce health care worker time was required for these tasks. Therefore information-related duties are often allocated to junior staff members who may not have the appropriate skills or insight to recognize and correct problems, and no authority to take the necessary actions (Garrib, *et al*, 2008).

Due to work load which might be as a result of an increase in service level and shortage of labor force, professionals at work were unable to compile their reports timely. Work load could affect report timeliness directly or indirectly by retarding on time recording activities. Most of the time reports were compiled from the recorded documents. Work load also indirectly affect stock accuracy, report accuracy and completeness. Professionals should have enough time to record product transactions on their BCs and so compile reports properly. Health facilities should serve as per their human power capacity. It was not fair and rational for a HC with single Pharmacy professional to serve more than hundreds of patient per day.

Pharmacy units from HCs are expected to supervise HPs working under their HC cluster. However, 27% and 64% of participant from pharmacy units within the HCs believed that their supervision practice was affected due to budget constraint and work load respectively. Budget constraint and work load also affect supportive supervision practices done at WoHO levels. High employee turnover and training gaps were also among major internal challenges that could affect logistics knowledge of Pharmacy professionals working in the HCs Pharmacy units as well as in WoHOs. The transfer of health workers between districts and facilities often led to gaps in data recording and reporting as trained and experienced health workers transferred out of facilities. On the other hand, in health facilities with high Pharmacy professional turnover, logistics performance will not be consistent. Having an adequate number of staff to cover all responsibilities, including M&E, was reported to improve data quality (Ledikwe, *et al*, 2014).Study done in eastern Ethiopia found that lack of training, lack of decision based on supervision, and lack of feedback were among major factors that affect quality of data (Teklegiorgis . *et al*, 2016). Irregular product movement which might be due to failure to stick to report schedules also attributed to stock and report inaccuracy in the HC Pharmacy stores.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1. Conclusion

From the findings of this study, it could be concluded that practices aimed to ensure Pharmaceutical logistics data quality at public health institutions vary in type and in degree. Capabilities needed for ensuring quality pharmaceutical logistics data were better at higher units including WoHOs and ZHD. However, most of logistics related practices were implemented at lower health facility levels including HPs and HCs. But these two facilities were equipped with few, less trained and less supervised professionals.

Availability of essential logistics tools at public health facilities was good. But shortage of an extra blank logistics formats at all levels were still a problem. This problem may be aggravated if there is internal budget constraint along with the partner withdrawal from supporting the program. In relation with logistics data management, both HPs and HCs were good in report compilation. But the quality of the data source was not dependable as the use of BCs in both facilities was poor. With regard to preparing essential logistics documents and using them for decision, all units including Health facilities and their offices showed poor performances.

As a result of Pharmacy professional shortage and concurrent increment in service levels at all level of the public health institutions, work load is challenging Pharmaceutical logistics data quality practices.

6.2. Recommendations

- Health extension workers and those who are expected to work in logistically important SDUs such as Laboratory, Family Planning and ART should be provided logistics related pre service as well as post service trainings.
- WoHOs and ZHD should conduct logistics related supervisory services regularly in less than quarterly period and their supervision should be followed with written feedbacks.

- Health facilities as well as their offices should have an estimated budget allocated for maintaining adequate availability of reporting formats and also for supporting the logistics activities.
- So as to improve logistics data management practices, there should be managerial decisions to make important logistics related recording and reporting activities as measurement of professional competency and also better performing professionals should be incentivized.
- Based on the responses of key informants, the service level of public health facilities are increasing from time to time. The number of Pharmacy professionals joining colleges and universities should be increased, so that workload on few pharmacy professionals will be minimized as well as the logistics data quality will be improved.

LIMITATIONS OF THE STUDY

- Shortage of similar literatures done on Pharmaceutical logistics data quality was a challenge so that the findings of this study were not compared enough with the works of others.
- To decide whether the data quality practices at each study units was good or bad in a more scientific way, it was difficult to find specific acceptable standard to compare with current practices.
- EPSA and partners that have an active role in the Pharmaceutical supply chain management practices of the country were not included in your study.

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ANNEX I

Consent form to study Participants

ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES,

SCHOOL OF PHARMACY,

DEPARTMENT OF PHARMACEUTICS AND SOCIAL PHARMACY

Dear Participants;

My name is **Omer Abdu** conducting a thesis entitled **Practices and challenges of pharmaceutical logistics data quality components**for partial fulfillment of my M.Sc. in **Health Supply Chain Management** at school of pharmacy, Addis Ababa University. With sincerity I would like to extend my deep appreciation to you and your institution for the willingness and cooperation in undertaking this valuable research. I request your kind cooperation in answering the questions as truthfully as possible and your response will be highly confidential.

This interview has six parts.

Part I – general information

Part II- Pharmaceutical logistics data quality practices

Part III- Pharmaceutical logistics data quality challenges

Part IV- in-depth interview

Part V- document observation

Part VI- Pharmaceutical logistics data quality performance measurement for tracer items

Concerning any problem related with this work, you can contact,

Omer Abdu, principal investigator, 0912157180, e-mail; abuabdelmennan@gmail.com

Or you can also contact advisors for this study

- Shiferaw Mitiku (PhD, Ass. Prof): Email; shiferawsm@gmail.com
- Zelalem Tilahun (Ass.Prof); Email: zelatilahun@gmail.com
- Julia Kleineidam (MSc); Email: Kleineidam@logistik.tu-berlin.de

If you agree to this interview, you can let me know I will proceed.But if you do not agree, you can let me know at this point and I will not proceed with the interview.

ANNEX –II
INTERVIEW GUIDE

Part- 1: General Information

Study site Information				
Health Facility code		Facility Level		
		□ Health Center □ Health Post □ Woreda Health Office □ Zone Health Office		
		Facility Type		
		□ HCMIS site □ nonHCMIS site		
		SDUs (HCs and Hospitals)		
		□ Main Store □Lab □Family planning □ART		
		Number of key staff in the unit		
Participant information				
Date of interview	Interviewee Qualification	Work experience	Start time	End time

Part- 2- Pharmaceutical logistics data quality practices

2.1. Service Delivery Units

(Store, ART unit, Family Planning and Lab in HC or Hospital and HPs)

Pharmaceutical logistics data quality practices			
Component of the assessment		Answer Codes: Yes - 1 No -0	**FURTHER COMMENTS**
Functions and Capabilities			
1.1	All relevant staff has received training on IPLS		
1.2	The responsibility for recording the service delivery on the source document is clearly assigned to the relevant staff.		
1.3	There are designated staff responsible for reviewing periodic reports prior to submission to the next level (e.g. WoHO or ZHD or Hub).		
1.4	There is a process in place to ensure that data compilation and reporting is completed in the event that the responsible staff is not available to do the job (e.g. shared duties, a team approach etc.)		
1.5	The health facility or their SDUs receives regular feedback on the quality of their submitted reports according to the guidelines.		
1.6	The health facility or their SDUs receives regular supportive supervisory visits from WoHO or ZHD or Hub staff according to the guidelines.		
1.7	…If yes, the last visit was within the past ----- months.		
1.8	The staff assigned in the SDUs stay in their duty for -------- year.		
II- recording and Reporting Guidelines			

2.1	The Health Facility and their SDUs has **SOP** for IPLS		
2.2	The Health Facility and their SDUs has **job aid** for recording and reporting		
2.3	The Health Facility and their SDUs has written guideline showing when to update recording formats		
2.4	The Health Facility and their SDUs has written guideline showing when and how to report their IFRR or HPMRR or RRF		
III - Data-collection and Reporting Forms and Tools			
3.1	Service delivery site do have pre-printed Bin Cards (BC)		
3.2	…If yes, the standard forms/tools are consistently updated by the service site.		
3.3	Service delivery site do have standard reporting formats (HPMRR, IFRR, RRF)		
3.4	…If yes, the standard reporting formats are consistently used by the service site.		
3.5	The store has enough invoices including model 19 and 22		
3.6	Bin Cards (BC) are used as a data source for preparing a regular report		
3.7	There are sufficient stocks of blank data collection and reporting forms at the service site.		
3.8	The store unit has un interrupted internet service		

3.9	The store manager regularly provide HCMIS reports to the Pharmacy head or other management of the facility?		
3.10	In relation with HCMIS system ,problems are encountered in the past -------- months		
IV- Data Management Processes			
4.1	Specific bin card (BC) is placed as near as possible to the product it is aimed to track.		
4.2	Service delivery site do have " near expire item tracking list"		
4.3	The service delivery site routinely records daily transactions on the bin card (store) or registration books (other SDUs)		
4.4	The recording and reporting system is suitable to count half used products such as liquid lab reagents and cottons.		
4.5	Service delivery site have a system to safely retain fully used bin cards and reporting formats.		
4.6	Rotated stocks are received or issued using either receiving or issuing vouchers and their bin card is updated.		
4.7	Service delivery site maintains an adequate archive of documents (i.e. clean, dry, with sufficient space, etc).		
4.8	There is common and uniform understanding of the recording and reporting system by all staffs working in the unit.		
V - Use of data for decision making			
5.1	The service delivery site develops charts, graphs, maps, etc. (If yes, ask to see		

	them.)		
5.2	...If yes, there are assigned staff to develop them regularly.		
5.3	There are assigned staff to interpret and analyze the data / results.		
5.4	Staff at the health facility is provided guidance or technical assistance from supervisory visits on data use.		
5.5	The analyzed data / e.g. near expire item, over stocked essential item/ is disseminated to different department within the HF or to other information system stakeholders (e.g. higher administrative office) so that the information can be used to inform decisions. (Ask to see an examples.)		
5.6	Disseminated information has an immediate feedback or response.		
5.7	There is managerial support for decisions taken by the service delivery site based on analyzed data / results. (If yes, ask for examples.)		

2.2. OFFICES (WoHO and ZHD)

Pharmaceutical logistics data quality practices			
Component of the assessment		Answer Codes: Yes - 1 No -0	**FURTHER COMMENTS**
I - Functions and Capabilities			
1.1	All relevant staff has received training on IPLS		
1.2	There is designated staff responsible for reviewing regular report (HPMRR, RRF, KPI)		
1.3	There are designated staff responsible for reviewing the quality of recorded data (i.e., accuracy, completeness and timeliness) at health facilities.		
1.4	There are designated staff responsible for reviewing the quality of reported data (i.e., RRF accuracy, completeness and timeliness) received from HCs and Hospitals.		
1.5	There is a procedure in place to ensure regular facility reports are compiled, completed and submitted in the event the responsible staff is unavailable (e.g. shared duties, a team approach etc.)		
1.6	Feedback is systematically provided to all health facilities on the quality of their recording (i.e., accuracy, completeness and timeliness).		
1.7	Feedback is systematically provided to all health facilities on the quality of their reporting (i.e., accuracy, completeness and timeliness).		
1.8	The WoHO or ZHD has guidelines for supportive supervision to HFs		
1.9	The WoHO or ZHD conducts regular supervisory visits to the health facilities		

	according to the guidelines.		
1.10	…If yes, the last visit was within the past -------months.		
II- recording and Reporting Guidelines			
2.1	WoHO or ZHD has written guideline showing when to update recording formats		
2.2	WoHO or ZHD has written guideline showing when and how to report their IFRR or HPMRR or RRF		
2.3	WoHO or ZHD has SOPs for monitoring quality of recorded and reported data at HFs		
2.4	…If yes, monitoring was done within the past -------months.		
III - Data-collection and Reporting Forms and Tools			
3.1	WoHO or ZHD ensures availability of recording and reporting formats at HFs		
3.2	WoHO or ZHD has a system to ensure consistent use of recording and reporting formats at HFs		
3.3	There are sufficient stocks of blank data collection and reporting forms at the WoHO or ZHD.		
3.4	WoHO or ZHD has un interrupted internet service in their units		

IV- Data Management Processes			
4.1	WoHO or ZHD has " near expire item tracking list" for HFs administered under them		
4.2	WoHO or ZHD has a system to track stock status of highly essential program items within HFs administered under them		
4.3	There is written procedure to keep data for rotated stock among HFs administered under them		
4.4	There is a written procedure to address incomplete, inaccurate and missing logistics records on bin cards.		
4.5	There is a written procedure to address late, incomplete, inaccurate and missing RRF reports.		
4.6	If data discrepancies have been found in records or reports from service points, the office has a system to resolve these inconsistencies.		
4.7	logistics documents are archived properly (e.g. filing cabinets)		
4.8	There is a formal communication b/n Woreda logistics and Zone logistics (e.g. regular report and feedback)		
V - Use of data for decision making			
5.1	The office develops charts, graphs, maps, etc. (If yes, ask to see them.)		
5.2	...If yes, there is assigned staff to develop them regularly,		

5.3	There is assigned staff to interpret and analyze the data / results.		
5.4	The analyzed data / results are presented / disseminated to HFs on a timely manner so that the information can be used to inform decisions. (Ask to see an example.)		
5.5	WoHO or ZHD give guidance or technical assistance on data use for HFs using supervisory visits.		
5.6	Disseminated information has an immediate feedback or response.		
5.7	There are any logistics decisions taken by the office based on analyzed data. (e.g. near to expire item, over stock item)		

Part 3. Pharmaceutical logistics data quality challenges						
Component of the assessment		**Response**				
External Determinants		**SD**	**D**	**N**	**A**	**SA**
3.1	Distance highly attributes to report timeliness (delay)					
3.2	Transport problem highly attributes to report timeliness (delay)					
3.3	Work load highly attributes to report timeliness (delay)					
3.4	Work load highly attributes to stock accuracy					
3.5	Work load highly attributes to report inaccuracy					
3.6	Work load highly attributes to report incompleteness					
3.7	Weak supportive supervision is highly attributed to budget constraint					
3.8	Weak supportive supervision is highly attributed to work load					
Internal Determinants						
3.9	Poor logistics knowledge is highly attributed to high employee turnover					
3.10	Poor logistics knowledge is highly attributed to training gap					
3.11	High employee turnover attributes to report timeliness (delay)					
3.12	Lack of internet service attributes to report timeliness (delay)					
3.13	Irregular product movement highly attributes to stock inaccuracy					
3.14	Irregular product movement highly attributes to RRF inaccuracy					

Part – 4: In-depth Interview

Participants: store managers, pharmacy head, Woreda and zone logistician.

1. How do you assess the current pharmaceutical logistics data quality in your HFs/ offices/Hub?

   Probing with respect to:

   a. Quality of data recording
   b. Data keeping
   c. organizing
   d. Data reporting
   e. Data using for decision

2. How do you assess your role and the role of other health team in your facility/organization in ensuring pharmaceutical logistics data quality?

   Probing with respect to having:

   a. Logistics Knowledge
   b. Enough time to do the job
   c. Initiation to do the job

3. How do you assess the capacity of your HF/organization in ensuring pharmaceutical logistics data quality?

   Probing with respect to having:

   a. Enough LMIS tools and guidelines
   b. Regular M and E practices
   c. Regular Supportive supervision
   d. On time feed back

4. How do you assess the attention given for logistics activities by SDUs as well as by admin part?
5. In relation with HCMIS, what kind of problems encountered and solution under taken?
6. Is anything more would you like to add?

   I will analyze the information you and others gave me and submit a draft report to my advisor at department of pharmaceutics and social pharmacy, school of pharmacy, Addis Ababa University in two months. I will be happy to send you a copy to review at that time, if you are interested. Thank you for your time and cooperation.

Part -5: Document Observation

	Components of the assessment	**Answer Codes: Yes - 1 No –0**	Additional comments
Document Review and observation			
1	Each tracer item is tracked with BC		
2	BC is placed near each tracer items		
3	Blank BC are available at HFs/ office/hub		
4	Near expire items tracking list is posted in the SDUs		
5	Blank IFRRare available at HFs/office/hub		
6	IFRR are kept properly in folder		
7	Blank RRFare available at HFs/office/hub		
8	RRF are kept properly in folder		
9	RRF is timely reported		
10	Blank KPI reporting format is available at HFs/ office		
11	KPI is regularly reported (bi-monthly)		
12	KPI report is kept properly in folder		
13	Product Availability is reported regularly		
14	Blank HPMRRare available at HFs/office		
15	HPMRRare kept properly in folder		
16	HPMRR is timely reported		
17	Invoices are kept properly in folder		
18	Feedback report received or given for the previous reporting period is available.		
19	Written schedules for IFRR and HPMRR is posted in the SDUs		
20	Written schedules for RRF is posted in the store / office		

Part -6: Pharmaceutical logistics data quality performance measurement for tracer items

Tracer items	Item is tracked with BC	BC is placed near the item	BC is updated (last update)	Stock accuracy (100 %)	RRF completeness	RRF accuracy
Health post/ answer= yes or no						
Amoxicillin dispersible tablet						
Oral Rehydration Salts						
Zinc dispersible tablet						
Gentamycin Sulphate injection						
Medroxyprogesterone Injection						
Arthmeter + Lumfanthrine (Coartem) tablet (any packing)						
Ferrous sulphate + folic acid						
Implanon NXT						
health centers, answer= yes or no						
Amoxicillin dispersable tablet						
Oral Rehydration Salts						
Zinc dispersible tablet						
Gentamycin Sulphate injection						
Co-trimoxazole						
Magnesium Sulphate injection						
Oxytocin injection						
Enalapril tablets						
Medroxyprogesterone Injection						

Glibenclamide 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 (TAT)						
Tetracycline eye ointment						
Arthmeter + Lumfanthrine (Coartem) tablet (any packing)						
Artesuante injection						
Implanon NXT						

ANNEX- III

Lists of tracer items for Public Health Facilities (FMoH, 2017)

Health Post	
s.no.	***Tracer item***
1	Amoxicillin dispersible tablet
2	Oral Rehydration Salts
3	Zinc dispersible tablet
4	Gentamycin Sulphate injection
5	Medroxyprogesterone Injection
6	Arthmeter + Lumfanthrine (Coartem) tablet (any packing)
7	Ferrous sulphate + folic acid
8	Implanon NXT
Health centers	
1	Amoxicillin dispersible tablet
2	Oral Rehydration Salts
3	Zinc dispersible tablet
4	Gentamycin Sulphate injection
5	Co-trimoxazole
6	Magnesium Sulphate injection
7	Oxytocin injection
8	Enalapril tablets
9	Medroxyprogesterone Injection
10	Glibenclamide tablet
11	Adrenaline injection
12	Pentavalent vaccine
13	Glucose 40%
14	Dextrose in normal saline
15	Ferrous sulphate + folic acid
16	Ciprofloxacin tablet
17	Ceftriaxone injection
18	Hydralazine injection
19	TDF/3TC/EFV adult
20	RHZE/RH
21	Tetanus Anti toxin (TAT)
22	Tetracycline eye ointment
23	Arthmeter + Lumfanthrine (Coartem) tablet (any packing)
24	Artesuante injection
25	Implanon NXT

ANNEX IV

Lists of Study Sites

s.no.	Study site	HF level	Number of pharmacy professional per HF level
1	Artumma Fursi	WoHO	8
2	Bati Town administration	WoHO	5
3	Bati rural	WoHO	10
4	Dewa Chefa	WoHO	19
5	Dewe Herewa	WoHO	7
6	Kemise Town administration	WoHO	5
7	Bora	health center	3
8	Bati	health center	5
9	Chefa	health center	2
10	Chirretti	health center	4
11	Dullecha	health center	2
12	Ela	health center	2
13	Gariro	health center	2
14	Gula	health center	2
15	Kemise	health center	5
16	Senbete	health center	3
17	Weleddi	health center	3
18	Gariro	health post	1 HEW
19	Indikiye gobensa	health post	2 HEW
20	Jeldeyti	health post	1 HEW
21	Kachur	health post	2 HEW
22	Melka lugo	health post	2 HEW
23	Qamme	health post	2 HEW
24	Salmene	health post	2 HEW
25	Sellatte	health post	1 HEW
26	Shekla	health post	2 HEW
27	Tuche	health post	2 HEW
28	Zone Health Department		