ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

Assessment of Integrated Pharmaceutical Logistics System for Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS) and Tuberculosis (TB) Laboratory Diagnostic Commodities management in Public Health Facilities, Addis Ababa, Ethiopia

By

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Research Thesis Submitted to the Department of Medical Laboratory Sciences, School of Allied Health Sciences, College of Health Sciences; Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Science in Clinical Laboratory Science (Laboratory Management)

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DECLARATION

I the undersigned, declare that this is my original work and has never been presented for the degree in this or any other university and all the source materials used for this thesis have duly acknowledged.

Name of the student: **Alemwork Tilahun /BSc/**

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This thesis has been submitted with my approval as University advisor.

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Date of submission:_____

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Abbreviations

AARHB	Addis Ababa Regional Health Bureau
AAU	Addis Ababa University
AAU-MF	Addis Ababa University Medical Faculty
AFB	Acid Fast Bacilli
AIDS	Acquired Immunodeficiency Syndrome
ALP	Alkaline Phosphate
ART	Antiretroviral Therapy
ARV	Antiretroviral Drug
BUN	Blood Urea Nitrogen
CD	Cluster of Differentiation
EHNRI	Ethiopian Health and Nutrition Research Institute
EOP	Emergency Order Point
FMOH	Federal Ministry of Health
GOT	Glutamate Oxaloacetate Transaminase
GPT	Glutamate pyruvate transaminase
HIV	Human Immunodeficiency Virus
IFRR	Internal Facility Report & Resupply
IPLS	Integrated pharmaceutical logistics system
IRB	Institutional Review Board
JSI/DELIVER	John Snow Inc. / Deliver project

LCM	Laboratory Commodity Management
LIAT	Logistics Indicator Assessment Tool
LMIS	Logistics Management Information System
LSAT	Logistics System Assessment Tool
MDR	Multi Drug-Resistant
MOH	Ministry of Health
NGO	Non-Governmental Organization
PA	Principle Advisor
PFSA	Pharmaceuticals Fund and Supply Agency
PI	Principle Investigator
PMTCT	Program for Mothers to Child Transmission
RHB	Regional Health Bureau
RL	Regional Laboratory
RRF	Report and Requisition form
SCMS	Supply Chain Management System
SPSS	Statistical package for social sciences
TB	Tuberculosis
USAID	United States Agency for International Development
XDR	Extensively Drug-Resistant

Abstract

Background: - Managing HIV/ADIS & TB laboratory commodities through IPLS is crucial, to enhance smooth commodities flow and prevent frequent stock out of critical items which might hindering continuous and quality testing.

Objective*:* - To assess implementation status of Integrated Pharmaceutical Logistics System (IPLS) for managing HIV/ AIDS & TB laboratory diagnostics commodities

Methods*:* - A cross-sectional descriptive study was conducted on 33 public health facilities in Addis Ababa. Information on characteristics of the selected facilities and indicators of IPLS implementation (measured using availabilities and utilization of IPLS tools) were collected using structured questionnaires customized form Logistics Indicator Assessment Tool (LIAT). In addition, in-depth interviews with key informant were done to extract information which was difficult to obtain using quantitative method. Data obtained through structured questionnaires were entered to Excel spread sheet and transported and analyzed using the Statistical Package for the Social Sciences version 20 (SPSS). Results from the in-depth interview were summarized in narrative format.

Result*:*-A total of 33 public health facilities were involved in this survey. Of these 6(18.1%) were hospitals and 17(51.5%) health center. Availabilities of IPLS recording and reporting formats (bincards, and IFRR and RRF) were reported in 92.6% of facilities. Of these 16(61.5%) of the facilities updated bincard, 22(84.6%) completed IFRR and 24(92.6%) reported RRF for HIV/AIDS and TB laboratory commodities. Majority of the facilities (88.5%) facilities reported RRF report was submitted to PFSA every two month. 24(96%) of facilities were reported one or more reagents stocked out during the last six months. Of these (33.3%) of Clinical chemistry reagents were the most frequent stocked out reagents. 10(41.6%), 12(54.5%) and 11(46.7%) of facilities were stock out on day of visits for SGPT, BD vacationer EDTA test tube and 1% Carbol Fuchsin respectively while 7(43.8%), 9(64.7%) and 9(69.8%) of facilities were stock out for SGOT, SGPT and 3% Acid alcohol during the last six months respectively. Furthermore, management supports on IPLS implementation were significantly associated with acceptable data quality ($X2= 22.2$, $p< 0.00$) and utilization of IFRR ($X2 = 5.71$, $p<0.042$).

Conclusion:- Majority of the facilities reported the availability and utilization of IPLS implementation tools for managing HIV/AIDS and TB laboratory commodities, though 24(96%) of facilities experienced stocked out for HIV/AIDs and TB laboratory commodities in the last six months, which provide in part an indication of failure to implement IPLS in full scales.

Key words: - IPLS implementation, stock out, management support

1. Introduction

1.1. Background

Logistic is the process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods including services, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements (1). Logistics management activities typically include inbound and out bound transportation management, fleet management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply/demand planning, and management of third party logistics services providers (1,2).

Logistics activities as the operational component of supply chain management, including quantification, procurement, inventory management, transportation and fleet management, and data collection and reporting (3). These components are in a continuous cycle where all components are interconnected, so decisions made at a single point directly impact other parts of the cycle (4, 5). Supply chain management includes the logistics activities plus the coordination and collaboration of staff, levels, and related functions (1-3).

Health logistics system is responsible to ensure every customer able to obtain and use quality health supplies (1, 3) . However developing a supply chain that can manage thousands of different and quality health commodities required to provide a comprehensive range of Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome (HIV/AIDS) & Tuberculosis (TB) related services can be challenging(3, 4).

The purpose of a laboratory logistics system is to obtain and move commodities in a timely fashion to the places where they are needed at a reasonable cost with acceptable quality (5). If insufficient or poor quality lab reagents are available to perform like CD4 count or other tests to provide information for clinicians, the patient's immune status is at the point where ART is indicated, initiation might be delayed, thus the patient dies before getting Antiretroviral Treatment (ART) (4, 6).

Ethiopia pharmaceutical including laboratory commodity supply chain management system had several problems like non-availability, unaffordability, poor storage and stock management and irrational use (7). However to overcome these problems Pharmaceutical Fund and Supply Agency (PFSA) became established and empowered to reorganization and consolidation of logistics functions (i.e., central procurement, storage, distribution, LMIS, and inventory control) (8,9).

Ethiopia has number of health intervention programs that requires efficient supply chain systems (8). In 2004 national assessment of the existing public health pharmaceutical supply system identified a number of challenges in the supply chain of health commodities (8, 9). Hence Integrated Pharmaceutical Logistic System (IPLS) is the primary mechanism through which all public health facilities obtain essential and vital pharmaceuticals by fulfilling the six rights of logistics system through implementing effective, efficient and simple system (7- 9).

Logistics Management Information System (LMIS), inventory control system and storage of pharmaceutical are the main component of IPLS at facility level (7). Each component (sub-system) has its own indicators of measurement; thus the status of IPLS implementation can be measured through those different indicators of the sub systems (7, 10). These indicators can also be used to check for leakage in the system, track timeliness in updating bin card records, and determine the extent to which facility laboratory complete and submit LMIS reports (10, 11).

1.2. Problem statement

People with HIV infection need comprehensive services along a continuum from the point of infection through testing, treatment, monitoring and palliative care (3, 12). Offering HIV testing and counseling should become standard practice wherever they are likely to enhance the health and well-being of the individual (3, 6, and 12). However; underdiagnoses and misdiagnosis of infectious diseases in cluding HIV resulting from a lack of laboratory testing with quality laboratory commodities, can lead to incorrect prescribing of treatment, wastage of resources, and poor patient clinical management (4, 6, 12).

TB has become a major public health problem globally, particularly in Africa and Asia; this situation has been further complicated by the need to expand laboratory diagnosis services with well-functioning logistic system to address the challenges posed by the epidemic of HIV/AID, and the emergence of multidrug resistant (MDR) and extensively drug-resistant (XDR)TB(13,14).

Managing supply chains in support of laboratory diagnostic services is a formidable challenge, especially in developing countries (15, 16). In a given diagnostic laboratory a large number of products are required for diagnosis, treatment & monitoring variety of diseases such as HIV and TB (15, 16). However this usually poses difficulties to manage, efficient and effective laboratory logistic system (16 - 19).

In Ethiopian, laboratory logistics system was weak, consistently being hampered by several systemic problems that cause frequent stock outs of critical items, thus impeding continuous and quality testing (8, 9). A study conducted in Addis Ababa in the public health facilities showed that 60.5% and 37.2 % of health facilities were stocked out for at least one ART monitoring and TB laboratory diagnostic reagents within six months of time before the assessment and at the time of visit respectively (20).

In Ethiopia IPLS recommends all pharmaceuticals including laboratory commodities and supplies to be managed by store managers (7, 10). However with regard to laboratory commodities, store managers/pharmacy professionals are not well trained and familiarized with the laboratory products specifications, Varity of packaging, unique characteristics, special

storage and management of short shelf life products; moreover, due to demand variability, rapid change of laboratory diagnostic technology, and also the same commodity may be used for a variety of different tests, and different diagnostic methods to diagnosis one disease; it is becoming time consuming and difficult to store managers to calculate actual consumption, ordering and resupplying HIV/ADIS and TB laboratory commodities (21-23).

Therefore, this study attempted to assess the implementation of IPLS using the availabilities and utilization of selected IPLS tools in public health facilities in Addis Ababa.

2. Literature Review

2.1. Integrated Logistic system (ILS)

ILS is exponentially more complex than managing various supply chains vertically; it may take some time before commodity availability can be guaranteed in the new system. A study conducted in Nicaragua showed that, the supply chain is strengthened throughout the integration process; commodity availability may not automatically improve because of the integrated system is exponentially more complex than managing various supply chains vertically (24). In contrast another study conducted in Tanzania on integrated logistic system (ILS) evaluation conformed that 75% of the respondents confident to in their ability to implement the system. Among the 1,181 participants which were trained on the ILS each hospital were send up to 4 participants and each health center also send up to 3 participants. 82% & 67% of facilities had stock cards/bincards and updated regularly respectively (25).

However, in Ethiopia IPLS is premature, the system helps to ensure better linkages between all functions, levels, and actors in the supply chain and a single information system for pharmaceutical management rather than multiple and vertical systems for different programs and departments can improve the timeliness, completeness, and consistency of data collection (8).

2.2 Supply chain management of HIV/ADIS and TB commodities in Africa

Studies conducted in Botswana to assess the status of supply chain system showed that the current laboratory system is the consistent interruption of testing services resulting from unplanned activities, reagents stock outs and expiries, excessive emergency order situations that interrupts the supply plan and lack of documented procedures was also identified, the occurrences of stock-outs is an important indicator of poor inventory management, stock outs of reagents and supplies translate into the inability of a laboratory to perform tests (26).

In 2009 in Malawi supply chain assessment conducted in selected facilities showed that the system result in inefficiency, Observation of the stock cards during the field visits showed that many were not kept up-to-date or well-maintained. Supplies were overstocks, stock outs, and

waste of resources 60%, 20% and 8% of the district-level laboratories were stocked out of Chemistry, hematology reagents and HIV test reagents respectively on the day of the visit (27).

Qualitative and quantitative baseline survey was conducted in Ghana Laboratory Logistics System showed that 60% of the facilities were fully stocked on the day of the visit, 83.3% the facility store follow first-to-expire, first-out (FEFO) principles and Expired products were typically separated from usable supplies; most facilities had functioning cold chain storage, but the temperature was rarely monitored, and the power supply was not reliable to guarantee continuous cold storage (28).

Similar study conducted in Lesotho showed that medicine supply management system SOPs had only 17% of the hospital pharmacy. 53% of facilities had stock cards to keep track of reagents. Only 33% of laboratories had and used requisition/issue vouchers for ordering and receiving supplies. All laboratories reported that reagents were not stored according to the first expiring, first out (FEFO) practice, none of the laboratories practiced the separation of damaged/or expired supplies from usable products. of most serious concern was the low number of facilities where the temperature in the pharmacy was properly controlled. It is concluded the placing of orders were erratic and inconsistent the extensive number of commodities used by laboratories makes logistics management more complex; moreover management and supervision of this component of the supply chain is poor (29).

A cross-sectional study that conducted in Zimbabwe public health institutions showed that 35% of the facilities visited reported ever having received formal logistics training in completing forms and calculating reorder quantities. In addition, only 41% of the facilities reported receiving a logistics supervisory visit. 80% of the facilities had stock cards but only 75% of them were found to maintain stock cards for rapid test kits. (30)

A national health commodity survey conducted in Rwanda showed that 39% and 42% of the laboratory were stock-outs of HIV test kits & reagents respectively during the past six months of before surveyed, when a key informant interview conducted in one referral level laboratory experienced frequent shortages because of bureaucratic procedures, although some laboratories surveyed had excellent inventory management systems that included separation of like items in

storage areas, bin cards for each storage item, and up-to-date records on movement of stock, other laboratories had partial or nonfunctioning inventory management systems (31).

In depth assessment of supply management system in Tanzania conducted in 2008 showed that of the twenty tracer items it was found about 50% were out of stock for a period ranging from 1-120 days, Also 78% of the respondents affirm that very minimal initiatives are in place to provide continuous training on supply chain activities to Health facility staffs, the study has also found that factors such as error in forecasting non adherence to FEFO lead to both un-availability and expiry of health products at facility level. These along other factors such as receiving supplies excess of order, or with short expiry dates or supplies not based on what was demanded are contributed to stock out of lab products (32).

Study conducted in Kenya on stock status and logistics system assessment in 2006; the survey collected data on both stock on hand, stock outs on the day of visit, stock outs during the previous six months prior to the survey, and the frequency and duration of stock outs during the same 6 month period. The finding showed that the performance of the logistics systems at district stores was better than at the health facilities. More than 70 percent of district/health center stores use stock cards to manage health commodities. This contrasts with the availability and use of stock cards at the facilities level; Data collectors also observed the accuracy of the balance on stock cards at those facilities that both managed the product and had stock cards available and also for a stock card to be considered accurate, no discrepancies could be found between the stock card and the physical count. The study examined the level of compliance with 14 guidelines for proper storage, assessing through direct observation and interview questions asked of facility staff (33).

2.3 Supply chain management of HIV/ADIS and TB commodities in Ethiopia

An assessment conducted on impact of the national HIV/AIDS laboratory logistics management information system on the harmonization of laboratory commodities in Ethiopia claimed that, after implementation of the vertical national HIV/AIDS laboratory logistics management information system; stock outs for ART laboratory monitoring tests, emergency orders and Commodity wastage were decreased significantly. In addition, laboratory reagents and related

supplies were arriving on time in quantities needed. As a result, patients waiting time for tests have been reduced significantly (9).

In contrast; a cr oss-sectional descriptive study to assess the status of laboratory LMIS used for managing H IV/AIDS a nd T B l aboratory commodities a t s elected p ublic h ealth f acilities, in Addis Ababa of the previous vertical laboratory logistic system were showed that majority of the facilities (60.5%) were stock out for at least one ART monitoring and TB laboratory reagents and the highest stock out rate was for chemistry reagents. Sixteen facilities (37.2%) had stock outs at the time of visit for at least one ART monitoring and TB laboratory commodity. standard LMIS formats w as us ed w ith 50% of t he a ssessed ho spitals a nd 54% of he alth c enters were us ed stock/bin c ards f or all H IV/AIDS a nd T B l aboratory c ommodities i n m ain pha rmacy s tore, among t hese onl y 25% and 20.8% of t hem w ere upda ted with a ccurate i nformation m atching with the physical count done at the time of visit for hospitals and health centers respectively (20).

Study c onducted i n unp ublished dr aft n ational IPLS s urvey result s howed t hat availability o f blank bi ncards, IFRR a nd R RF i s hi gh a t hos pitals a nd he alth c enters (above 90 p ercent) . Higher percentage of hospitals and health centers utilized bincards for the assessed products, the percentage of updated bincards was found to be similar across all health facility levels. Close to two-thirds of us ed bi ncards w ere upda ted. The d ata qua lity of bi ncard c ross c hecking w ith t he physical count for each of the selected products on the day of the visit, the comparison is done at two l evels o f a ccuracy. A bi ncard w ith no di screpancies be tween t he bi ncard a nd t he ph ysical count are considered accurate 91 percent in hospitals and 87 percent in health centers were used IFRR a nd 86 pe rcent of hos pitals a nd 64 pe rcent of he alth c enters ha ve a r esupply s chedule posted and 83 percent strictly follow the schedule for resupply. The utilization of RRF was high (97 percent), both in hospitals and health centers. The exact accuracy of RRF data was found to between 40 a nd 50 pe rcent f or m ost of t he pr oducts; w ith t he average o f 46 pe rcent 87% of pharmacy pe rsonnel 84% of hos pitals a nd 69% of he alth c enters pha rmacy p ersonnel r eceived their training through the national IPLS training program. More than 80% of both hospitals and health cen ters u sually r eceive p roducts r equested w ithin one m onth or l ess t ime. O nly four percent o f t he facilities r eported t hey wait for m ore t han t wo m onths t o receive p roducts a fter they placed orders. 37 percent) reported usually receiving the quantity they ordered.

About 60 pe rcent of facilities r eceived s upervision vi sit i n the pr evious m onth. H owever, 10 percent of health facilities received their last supervisory visits more than 3 months ago and 12 percent of facilities with relatively higher percentage of hospitals (16 percent) had never received a vi sit. N early all of t he hos pitals (97 p ercent) a nd m ajority of he alth c enters (85 p ercent) indicated that the supervision included store management/logistics issues (39).

2.3. Significance of the study

Laboratory di agnostic s ervice i s a d ynamic p rocess f or ne w t ests t o b e i ntroduced w ith ne w technology w hich n eeds ne w a nd va riable c ommodities, t he e xtensive number of c ommodities used by laboratories makes logistics management more complex. So that the study will helping to extract & provide first-hand information for the supply chain stake holders and policy makers working on logistic area to reinforce and or appreciate existed IPLS to and to amend if there are gaps t o m ake e fficient an d ef fective s upply chain m anagement i n t he ar ea o f m anaging laboratory commodities.

3. Objective:

3.1 General objective

- To assess the implementation of the Integrated Pharmaceutical Logistics System (IPLS) in the management of HIV/AIDS & TB laboratory commodities at public health facilities.

3.2 Specific objectives

- To describe implantation of IPLS status using availabilities and utilization of IPLS records and reports for HIV/AIDS & TB laboratory commodity inventory management.
- To assess facilities stock status on selected HIV/AIDS and TB laboratory commodities on the day of visit and in the last six months
- To identify management related factors affecting IPLS implementation for HIV/AIDS & TB laboratory commodities at public health facilities.

4. Materials & Methods

4.1 Study area

The study was conducted in Addis Ababa (AA) city administrative, Ethiopia. Addis Ababa divides in to 10 sub cities and 116 districts with a total land area of 54,000 hectares or 540 km^2. According to the 2010 census, the population is estimated at about 3 million people (34, 35). The potential health service coverage of AA is only 21% (35, 36). The city has 42 hospitals, 36 health centers, 35 health posts and 359 clinics (34, 36). From 42 hospitals 11 are public, 6 are under Addis Ababa Regional Health Bureau, 5 are specialized referral hospitals, 3 are uniformed forces (military), and 4 are non governmental organization (NGOs) and the rest 24 are private hospitals, and currently under construction health centers are completed and starting provide service to public and the total number of health centers has been increased to 69.

The study area is chosen because of the most accessible area and facilities are nearby to Addis Ababa PFSA hub, this will help for better implementation of IPLS compared to other parts of the country and poor functioning of the system in such area will enable to see how severe the problem will be in the rural areas of the country.

4.2. Study design and period

A facility based cross-sectional descriptive study was conducted from Dec 1/2013 – Apr 30/2014 on the implementation of IPLS for HIV/AIDS monitoring and TB diagnostic reagents management. Both quantitative and qualitative data were collected.

4:3. Source of population

The source population was all the facilities getting HIV/AIDS and TB laboratory commodities from Addis Ababa PFSA branch. This includes all public health facilities providing laboratory services for HIV and TB diagnosis, monitoring and treatment services. These facilities are all federal specialized hospitals, all hospitals under AARHB, sub-city pharmaceutical & medical supply distribution unit, all health centers under AARHB, Addis Ababa Regional Health Bureau (AARHB), Addis Ababa Regional Laboratory (AARL) and Ethiopian Public Health Institute

(EPHI), facility store man and laboratory head were interviewed at each facility. The sub-city pharmaceutical supply & distribution logistic officers were the principal persons who monitor and support the system in their respective facilities; they were interviewed with different checklist, and explained their opinion on the implementation of the system.

4.4. Study population

Five federal specialized hospitals, six hospitals under AARHB, twenty six health centers under AARHB, ten sub-city pharmaceutical & medical supply distribution pharmacy service, one AARHB store, one AA regional laboratory and national referral laboratory (EPHI) were included in this study using a stratified random sampling method.

4. 5. Sample Size

Sample size was calculated according to the guide to conducting Supply Chain Assessments Using the Logistic System Assessment Tool (37) and Logistic Indicators Assessment Tool (38); for generating representative samples for a LIAT survey, a margin of error at or below 10 percent and a confidence level at or above 95% and assuming that 50% of the facilities are poorly functioning IPLS implementation due to lack of similar study in Ethiopia.

The general formula for calculating a sample size is:

$$n = z^2 * p\,(1-p)/m^2$$

Where:

n = required sample size

z = the value of the confidence level of 95% = 1.96

p = 0.5. Therefore, when implementation status is unknown, 0.5 will be used

m = margin of error (at 10% m = 0.1)

Therefore: - $n = 1.96^2 * 0.5(1- 0.5)/0.1^2$

n = 3.842 *0.25/0.01

n = 96

Where there is a predetermined population (e.g., total number of facilities in the region and zone), the sample size generated from the above equation needs to be multiplied by the Finite Population Correction (FPC) factor. For this purposes, the formula can be expressed as:

New n = n/1+ [(n-1)/N]

Where:

New n = the adjusted new sample size

N = the population size (50)

n = the sample size obtained from the general formula (96)

New n = 96/1 + [(96 – 1)/50

New n = 96/2.9

New n = 33 facilities

4.5.1. Sampling procedures

A total of 50 public facilities involving in supply chain of HIV/AIDS and TB laboratory diagnostic commodities were listed and can serve as a sampling frame. A stratified random sampling method is used to create different strata according to their type of facility. These includes 5 federal hospitals, 6 hospitals under A ARHB, one A ARHB store, one regional laboratory and one national referral laboratory (EPHI) and 26 health centers under AARHB. However; based on the above calculation the adjusted sample size is 33 public facilities. Then these facilities were selected from each stratum using proportionate to their size. Thus, 3 federal hospitals, 3 hospitals under A ARHB, 17 health centers under A ARHB, 7 sub city pharmacy units, one regional laboratory and one national referral laboratory (EPHI) were the sample

population and also selected randomly, sampling procedure is annexed (annex-1). All pharmacy and laboratory Individual units within the facility were involved in this study.

4.6. Inclusion criteria

All ART monitoring laboratories performing CD4, hematology, and chemistry tests or refer samples for CD4 testing but performing hematology or chemistry tests, also perform rapid HIV testing, AFB smear examination, and supporting the implementation of the system.

4. 7. Exclusion criteria

Those facilities that don't providing ART laboratory monitoring services

4.8. Data collection techniques

Quantitative & qualitative data collection methods were used for this study

4.8.1. Quantitative method

A structured questionnaire (annex-IV) which was originally developed by USAID/DELIVER (37) and customized to our context to collect quantitative information from health facility's store and laboratory department was implemented. The data was collected in the same language as recorded but interviewers are trained health professionals who have experience on laboratory logistics system and interview was conducted in Amharic. Furthermore physical counts of HIV/AIDS and TB laboratory commodities were conducted in order to check data quality by comparing the actual counts with the available records.

Three data collectors with first degree in medical laboratory science experience in laboratory commodity management were participated in data collection after taking two days training. Data was collected & completed over a two-week period, with provision of intensive supervision. The laboratory commodities covered in the assessment of ART monitoring chemistry, hematology and CD4, and AFB testing laboratory reagents and supplies of tracer products.

The sources of data for the assessment was physical counts of HIV/AIDS and AFB testing laboratory commodities, bin cards, IFRR (internal facility report & resupply form), RRF(report requisition form). Interviews was held with store managers of facility pharmacy store, laboratory managers at hospitals and health centers, pharmaceutical supply & distribution sub process logistic officers in sub-cities. Indicators to be measured and data sources are summarized in the following table.

Table 1: List of Indicators and data sources

Indicators	Data Source(s)
I. Logistics Management Practices	
1.Percentage of facilities available bin cards	availability of bin cards in facilities and stores
2.Percentage of facilities using bin cards	Usage of bin cards in facilities and stores
3. Percentage of facilities store with bin cards updated	Presence of updated bin cards and evidence of some updated bin card in facilities stores
4. percentage of facilities available of IFRR	Availability of IFRR at facility store/laboratory
5. Percentage of facility completed and submitted IFRR to facility store with regular schedule	Presence of IFRR reports and evidence of utilization in facilities stores
6. Percentage of facilities available RRF	Availability of RRF at facility store
7. Percentage of facility complete and send report to PFSA hub every two months	RRF complete and send to higher body
8. percentage of facility with IPLS SOP manual	IPLS SOP manual at facility store
II. Personnel	
1. Percentage of facility with number of pharmacy professionals	Respondent

2. Percentage of facility with work experience of facility store man	Respondent
3. Percentage of facility with educational background	Respondent
4. Percentage of facilities with staff trained in IPLS	Respondent
5. Percentage of facilities with staff trained in laboratory commodity management training	Respondent
6. Percentage of facility laboratory commodity management by different educational background	Respondent
7. Percentage of facilities with laboratory staff in IPLS orientation	Respondent
III. Supportive supervision on HIV/AIDS laboratory commodities	
1. Percentage of facilities store managers receiving supportive supervision within a reasonable amount of time	Respondent and IPLS supervisor's action plan developed
2. Percentage of facilities laboratory department receiving IPLS supportive supervision within a reasonable amount of time	Respondent and IPLS supervisor's action plan developed
IV. Storage practice	
1. Percentage of facilities adhering to storage guidelines	Visual observation
2. Percentage of facility store with functional and reasonable No of refrigerator	Observation from facility store
V. Data quality of RRF	
1. Percentage of facility with valid RRF report	i. Check ending balance of the previous report become beginning balance of the next

	report ii. Quantity r eceived c olumn concede w ith Model 19 or PFSA STV iii. Loss and adjustment concede with bincard of tracer products iv. Ending balance of RRF with bincard balance of tracer products
2. P ercentage o f facility w ith accu rate r eport o f at least two reporting period of RRF	i. V erified C alculated Consumption" i ndicated on the RRF to the verified CC (BB + QR - EB +/- Loss/Adj.) ii. Verified Maximum stock =CCX2 iii. Qty Ord. = Max Stock – EB
3. P ercentage o f facilities w ith co mplete S OH, Quantity r eceived. E nding ba lance , a nd Loss/Adjustment	i. Observe at least two reports
VI. Product Availability	
1. P ercentage o f facilities s tocked o ut o f t racer product at time of visit	respondent, a nd bi n card b alance, ph ysical inventory of the tracer products
2. Percentage of facilities stocked out within six months o f b efore t he as sessment t he t racer product	Respondent, bi ncard r ecords of t he t racer products
3. p ercentage o f f acilities w ith f requency o f stock o uts w ith in th e la st s ix mo nths o f th e tracer product	Respondent, bi ncard r ecords of t he t racer products
4. percentage of facilities with days of stock out of the tracer product	Bncard records of the tracer products

The questioner was used to provided information on the indicators like the availability of laboratory commodities for HIV/AIDS and TB diagnostics service on day of visit, stock out frequency and average duration of stock outs (days of stock out), percentage of facilities with personnel trained and oriented on IPLS, percentage of facilities that have expired commodities, percentage of facilities with bin cards, IFRR, & RRF availability, percentage of facilities with IFRR & RRF reporting rate, percentage of facilities with acceptable data quality of RRF & IFRR, percentage of facilities with completeness of bin cards, percentage of facilities resupplied ordered quantities at lab and facility stores.

The above indicators were measured as follows: (1) commodity availability (2) duration of stock outs by collecting information from bin cards, from RRF of days of stock out (3) stock data quality by comparing bin cards to physical inventory and reports to IFRR & RRF this tool also annexed (annex-V) and (4) storage conditions by visually inspecting facilities with bench mark of standard storage guideline and check temperature recordings log.

The indicators were measured the percentage of facilities stocked out of one or more HIV/AIDS and TB laboratory commodities on day of visit, percentage of facilities where HIV/AIDS and TB laboratory commodities physical inventory count matches balance on bin card, percentage of facilities with staff trained or orient on IPLS, percentage of facility laboratories that has provided IPLS orientation, percentage of facilities recording essential logistics data properly, percentage of facilities sending RRF to directly PFSA hub or sub cities logistic officers for data aggregation and percentage of facilities compliance with each proper storage guidelines.

4.8.2. Qualitative method

Key informant interviews were conducted with the key designated supply chain managers using standard point of discussion (annex-VI) adapted from logistics system assessment tool (LSAT). This tool is designed to facilitate a comprehensive quality assessment of the separate components that make up a logistics system and it was developed by USAID DELIVER project (38). The key informant interviews were conducted with key informant of central PFSA, AA PFSA branch, Addis Ababa City Administration Health Bureau, AA sub city pharmaceutical and supplies logistics officers to understand the challenges facing the logistics systems and to obtain a

description of the supply chain management system for HIV/AIDS and TB laboratory diagnostic commodities.

The interviewer was conducted by principal investigator. The in-depth interview was focused on how to identify strengths and weaknesses in the IPLS implementation in regarding to the management of HIV/AIDS and TB laboratory commodities and also associated factors like training and supervision.

In-depth interview participant

PFSA central of distribution directorate of program products= 1

AA branch PFSA distribution of program products= 1

AA regional health bureau Pharmacy unit= 1

AA sub city pharmacy unit who are not involved in quantitative method = 3

Total interviewed = 6

4.9. Variables of the Study

4. 9. 1. Dependent Variable

- Availability of IPLS implementation tools
- Availability selected HIV/AIDS & TB laboratory commodities
- Accuracy/validity of logistic data for inventory management
- Frequency of stock outs
- Duration of stock out

4.9.2. Independent Variables

- Demographic characteristics
- IPLS training
- Management supports

4.10. Data quality

The data collection tool was tested in three non-sampled facilities in Addis Ababa to ensure the validity of the survey tool. After the data collection tools pretested, appropriate modification was made to standardize the questionnaire. Data collectors were trained and provide written interpretation for logistics variables. the principal investigator make frequent checks on the data collection process to ensure the completeness and consistency of the gathered information; data was double entered to enable cross-checking during analysis as well.

4.11. Data analysis procedures

The quantitative data was entered and analyzed using the Statistical Package for the Social Sciences version 20 (SPSS). Descriptive statistics was computed (mean, median and percentage) and results were presented using tables and graphs. Chi-square was computed to see the association between selected IPLS implementation indicators with reported management supports. The qualitative portions of the study (in-depth interview) were transcribed and summarized in narrative format

4.12. Ethical consideration

Approval from Addis Ababa University (AAU) Institutional Review Board of the Faculty of Medicine (IRB) and research and ethical committee of Addis Ababa Health Bureau were provided, then a letter in forming the facility administrators were written from the school of clinical laboratory science and Addis Ababa Regional Health Bureau (AARHB). There were a high degree of confidentiality during data collection and no one name of any health facility and participating subjects were put in the result instead the aggregate result of the facilities and summary results of in-depth interview were projected.

4.13. Operational Definitions

RRF data validation:- means checking the correctness data by Comparing the "Ending Balance" indicated on the bin card to physical count at the time of visit, Comparing the "Beginning Balance in the Store" to the "Ending Balance in the Store" of the previous report (which should be equal), Comparing t " Loss and Adjustment" indicated on the RRF to the

quantity in the Bin Card, Comparing the "Quantity Received" on the RRF with the "Quantity Received" on PFSA STV/DIC or Facility Model 19 within the reporting period, Comparing "Ending balance" indicated on the RRF versus Quantity at the end of the reporting period as indicated on the Bin Card, Comparing "Calculated Consumption" versus the sum of quantities issued on the "Quantity Issued" column of the bin card during the recent reporting period. And comparing the "DOS" on RRF versus "DOS" indicated on the bin card.

Accuracy of RRF data: - means Comparing "Calculated Consumption" indicated on the RRF to the verified CC (recalculating the CC as "SOH at the start of the period + Quantity Received – SOH at the end of the period +/- Loss/Adj.). Comparing "Maximum Stock Quantity" indicated on the RRF to the verified "Maximum Stock Quantity" (recalculating the "Maximum Stock Quantity" as CC X 2).

Acceptable storage practice: - the facility should full filled at list greater than 80 % of the storage guideline

Bin card: is IPLS/LMIS format which records received or issued data

Commodities: - are include reagents and test kits, laboratory equipment and supplies, condoms, and other medical supplies and equipment such as specimen collection tools

Facility *Maximum/minimum (max/min) ICS:* means each facility to set and hold maximum stock level for four months and minimum stock level for two months of consumption

Facility Report and Requisition System:- the facility should continuous RRF reporting to PFSA branch, timely Reporting (within 10 days from the last date of the previous reporting interval) and timely re supply (Duration of time for PFSA to deliver supplies after receiving RRF from health facilities

IPLS Implementation means :- if the facility availed and used all recording and reporting tools, products that required, established Man/Min inventory control system, acceptable storage practice, established internal reporting and resupplying system, facility report, requisition and re supply System and management ownership (Institutionalization of the system)

Internal Facility Report Resupplied Form: - is IPLS format that is used for reporting and resupplying laboratory commodities from the facility store to the laboratory

Internal Report and Re Supply System: - measured through IFRR reporting rate of the laboratory, average IFRR reporting rate of the laboratories, data Quality (% of facilities with acceptable quality IFRR that is accurate and valid), Percentage of facilities with timely IFRR reporting, that is according to the calendar and schedule developed, Percentage of facilities with timely internal re supply, that is according to the calendar and schedule developed

Maximum Stock level: - In IPLS the maximum stock level designed and holds to facilities is four months of stock

Minimum stock level: - In IPLS the minimum stock level designed and holds to facilities is two months of stock

Overstock*:* A supply imbalance that occurs when stocks exceed the established maximum level may result in losses due to expiry.

Product Availability: - the amount of stock on hand at the time of visit

Reporting period: - the reporting interval of the facilities to the respective hub is every two months

Stock out on the day of the visit: - was defined as not having any available stock on the day that the data collector arrived

5. Result

5.1. Characteristics of study Health facilities and study participants

A total of 33 public health facilities involved in HIV/AIDS and TB laboratory commodity management were participated in this study, of these 6 (9.1%) were federal and specialized hospitals, 3(9.1%) regional hospitals, 17(51.5%) health centers, 7 (21.2%) sub-city pharmaceutical and medical supplies pharmacy unit, 3 (9.1%) regional and referral laboratories. At these facilities, 33 (55.2 %) pharmacy and 26(44.8%) laboratory professionals were the principle person managing ART and TB laboratory commodities at facility (Table 2).

Table 2: Characteristics of study facilities and professional involved in managing HIV/ADIS laboratory commodities at selected Public Health Facilities, Addis Ababa, 2014

Variables	Number(n)	Percent (%)
Health facilities		
Federal specialized hospitals	3	9.1
Regional hospitals	3	9.1
Health centers	17	51.5
Addis Ababa sub cities pharmaceutical and medical supplies distribution units	7	21.2
National and regional lab	3	9.1
Total	33	
Professionals at involved at facility		
Pharmacist	33	55.0
Laboratory technologist and tech	26	43.3
Others	1	1.7

5.2. Organizational Structure and Supply Chain for HIV/AIDS and TB laboratory Commodities in IPLS

5.2.1 Flow of HIV/AIDS and TB diagnostic laboratory commodities and Information in Addis Ababa

Fig 1 shows that the flow of HIV/AIDS and TB laboratory commodities and information observed during our facilities assessment. Central PFSA delivered ART monitoring HIV/AIDS and TB laboratory commodities to Addis Ababa PFSA hub and federal specialized hospitals and EPHI, where flow of commodities continue, to Addis Ababa regional health bureau through Addis Ababa PFSA hub , which was then channeled to regional laboratory , hospitals and sub city pharmacy unite . The sub city pharmacy unites then dispatches these commodities to health centers.

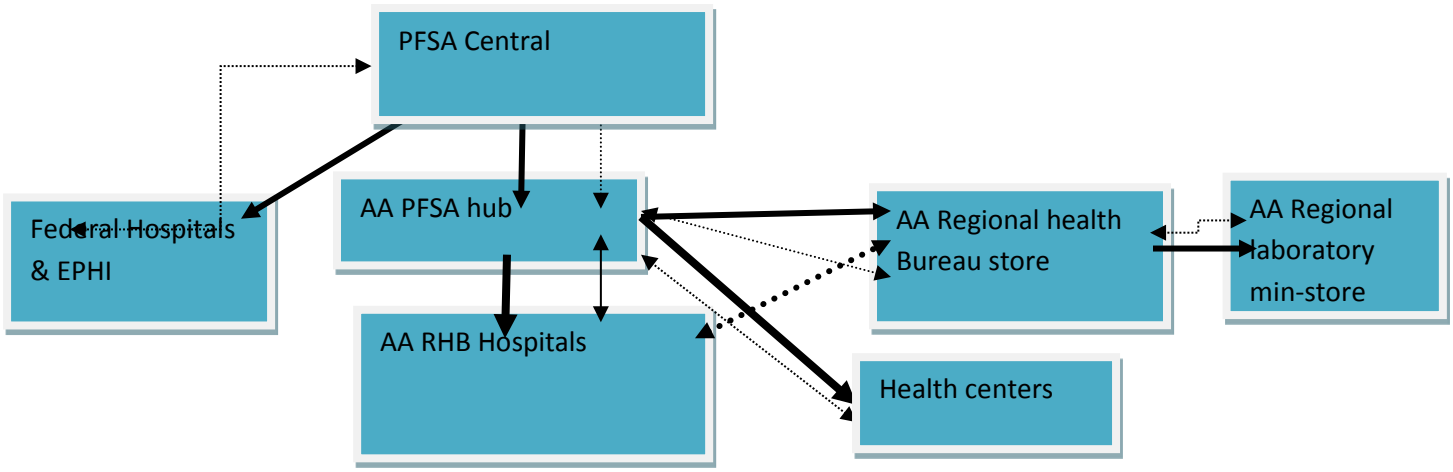

Figure 1:

Figure 1 Flow of HIV/AIDS laboratory commodities and Information in IPLS

Flow of HIV/AIDS laboratory commodities

Flow of Information with RRF

5.2.2 Flow of HIV Rapid Test Kits (RTK) and TB diagnostic laboratory commodities and its information in the existing situation

Fig 2 also shows that PFSA central is responsible to delivered HIV test kits and TB laboratory commodities up t o r egional he alth bur eau and f ederal hos pitals ba sed on a llocation or distribution pl an, from R HB s ub c ity pha rmacy c oordinators a re di stributing t o he alth c enters. AA R egional h ealth bu reau also r esponsible t o de livered t o r egional l abs a nd AA regional hospital

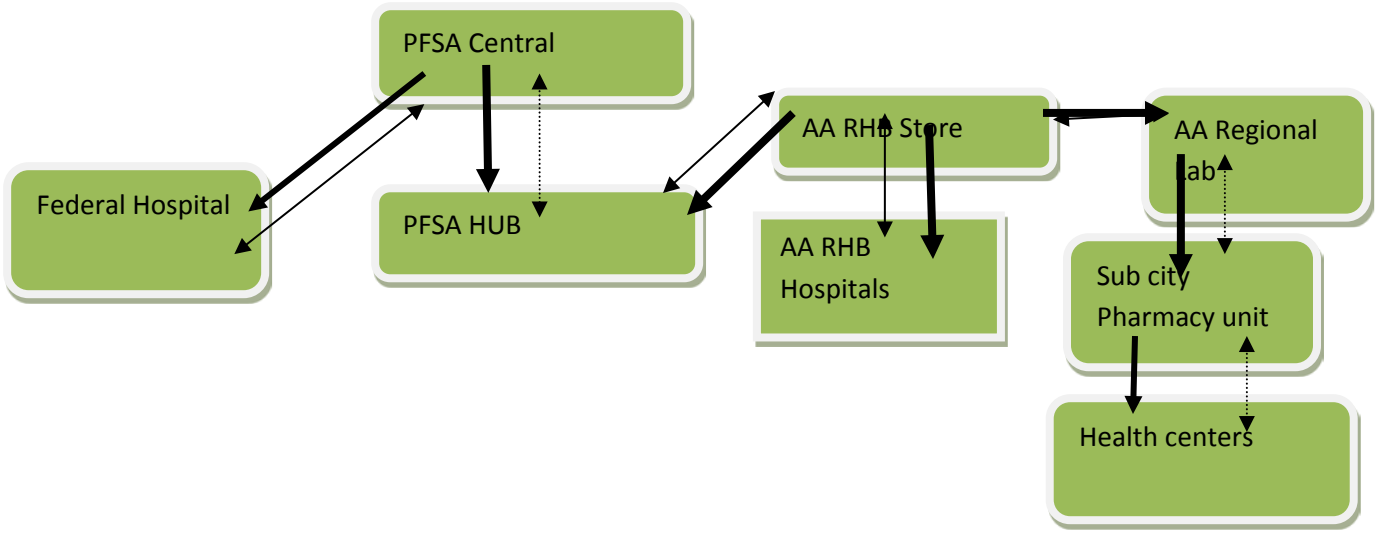

Figure 2: Flow of RTK and TB diagnostic commodities and information with RRF flow

Flow of RTK & TB laboratory commodities

Flow of Information

5.3. Training of professionals on IPLS implementation

As shown in **table 3,** 24(72.7%) and 17(51.5%) of the facilities had 1-5 IPLS and Lab commodity management trained pharmacy staffs respectively.

Table 3: Training profile of facilities on IPLS and Lab commodity management for HIV/AIDS and TB laboratory commodities, Addis Ababa, 2014

IPLS trained staff per health facility	No	%
None	3	9.1
1-5	24	72.7
6-10	2	6.1

Above 11	4	12.1
Lab commodity management trained staff per health facility		
None	14	42.4
1-5	17	51.5
6-10	NA	NA
Above 11	2	6.1

Figure 3 showed that 85% of the facilities had IPLS SOP manual as reference document for especially for IPLS untrained staff

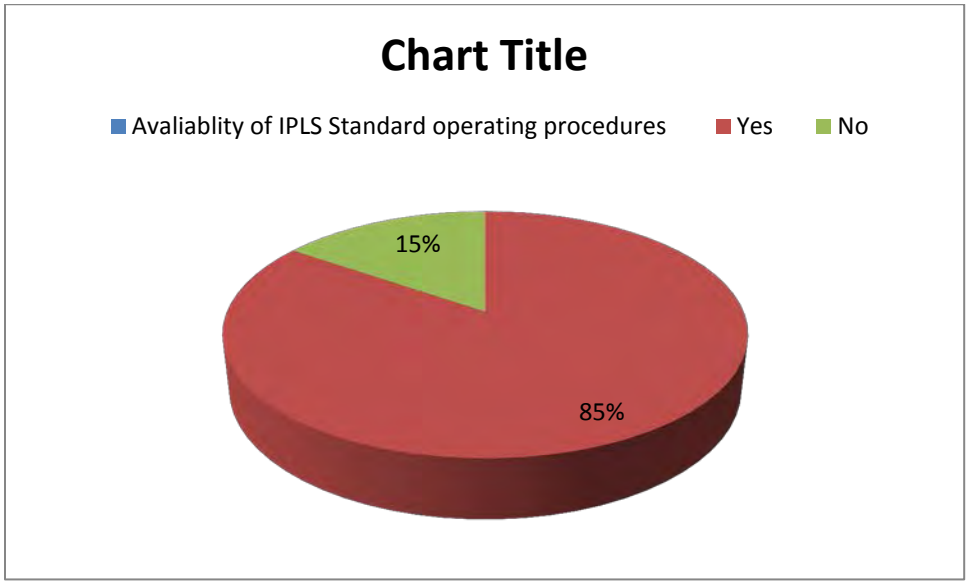

Figure 3 availability of IPLS Standard Operating procedure (SOP)

5.4. Availability and utilization of IPLS records

5.4.1 Availability and utilization of bincard , IFRR and RRF at selected health facilities in Addis Ababa

A total of 25(96.2%) of the facility reported the availability of bincards, IFRR and RRF. Of these, 16(61.5%) updated bincard regularly, 22(84.6%) reported the existence of completed IFRR and 24(92.6%) responded RRF completed and sent every two months. A total of 22(84.6%) of the facilities reported the availability of IPLS Standard Operating Procedure (SOP) (Table 4).

Table 4: Availability and utilization of IPLS recording and reporting format for selected HIV and TB laboratory diagnostic commodities at facilities, Addis Ababa, 2014

Variables	Number	%
Bincard availability	25	96.2
Yes		
No	1	3.8
IFRR availability		
Yes	25	96.2
No	1	3.8
RRF availability		
Yes	25	96.2
No	1	3.8
Bin card used and updated		
Yes	16	61.5
No	10	38.5
IFRR competed and reported		
Yes	22	84.6
No	4	15.4
RRF completed and reported		
Yes	24	92.3
No	2	7.7
Used other reporting format		
Yes	2	7.7
No	24	92.3

RRF report send to PFSA		
Yes	25	96.3
No	1	3.7
RRF report sending to PFSA in every two months		
Yes	24	92.3
No	2	7.7
Frequency of RRF reporting		
Monthly	1	3.8
every two months	23	88.5
Quarterly	1	3.8
No RRF reporting schedule	1	3.8

5.4.2. Utilization of bincard , IFRR and RRF according to health facilities

Figure 3 the graph shows that utilization of bincard, IFRR and RRF were 33.3%, 76.5%, and 100 % at hospitals, while 76.5% , 94.1% and 94.1% of health centers respectively.

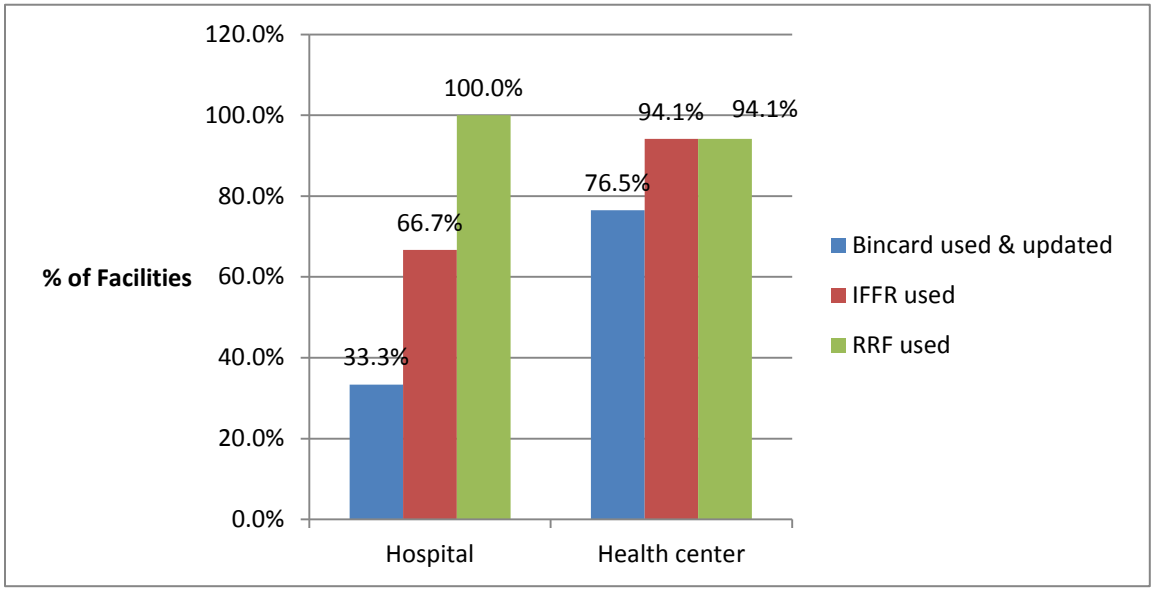

Figure 4: Utilization of bincard, IFRR and RRF according to health facilities in Addis Ababa

5.4.3 Utilization of bincard for tracer HIV and TB laboratory commodities

Table 4 shows reported bincard utilization of facilities for selected HIV/AIDS and TB laboratory diagnostic commodities. Of these 15(57.7%) and 5(35.7%) used bincard for KHB, CD4 reagents and 13(39.4%) for TB reagents (1% Carbol Fuchsin & Acid Alcohol)

Table 5: Utilization of bincard for tracer HIV and TB laboratory diagnostics commodities

Tracer reagents	Bin cards used n (%)
KHB	15(57.7%)
CD4 reagent	5(35.7%)
CD4 control	4(28.6%)
FACS flow	3(23.1)
Detergent	4(33.3%)
Diluent	4(20%)
DBS Kit	4(12.1%)
BD Vacationer 4ml tube	8(32%)
1% Carbol Fuchsin	13(39.4%)
Acid Alcohol	13(39.4%)

5.5. Stock Availability

Table 6 shows, 22(84.6%) of facilities reported that HIV/AIDS and TB laboratory commodities were not refilled as per requested quantities. A total of 24 (96%) of facilities reported one or more reagents experienced stocked out during the last six months.

Table 6: Trend of HIV/AIDS and TB diagnostic reagents supplies at selected health facilities Addis Ababa, 2014

Variables	Number	%
Stock re fill per request quantities		
Yes	4	15.4
No	22	84.6
Stocked out during the last six months		

Yes	24	96
No	1	4
Over stocked after resupplied		
Yes	14	56
No	11	44

5. 5.1 Stock outs on Day of Visit and during the last 6 months

As shown in table 7, 10(41.6%), 12(54.5%) and 11(46.7%) of facilities were stock out for SGPT, BD vacationer, 4ml test tube and 1% Carbol Fuchsin respectively on the day of the visit while 7(43.8%), 9(64.7%) and 9(69.8%) of facilities were stock out for SGOT, SGPT and Acid alcohol respectively during the last six months. However; only 1(33.3%) and 1(25%) facility had stock out for CD4 reagent and detergent. Average duration of stock outs in days was found to be highest for BD vacationer 4ml tube, DBS kit and SGPT reagents 86, 70 and 64 days respectively. The lowest average duration of stock outs were for detergents, 12 days and CD4 reagent 21 days. Mean number of stocked out frequency within the last six months were 2.3 and 1.5 times for 1% Carbol Fuchsin and DBS kit respectively.

Table 7:- Percentage of facilities stock out for laboratory commodities on the day of visit, reported stock outs during the last 6 months, average duration of stock outs and mean number of stock outs in the last 6 months Nov 2013-Apr 2014)

Commodities	No of Facilities bin card updated	Facilities stock out on the day of visit n (%)	Facilities stock out any time in the past months % (n)	Mean # of days (range) of stock outs in the past 6 months	Mean # of times stock outs in the past 6 months
KHB	5	7(29.2%)	6(33.3%)	64(8-180)	1
SGOT	6	9(37.5)	7(43.8%)	54(2-90)	1
SGPT	8	10(41.7%)	9(64.3)	64(30-90)	1
CD4 reagent	5	4(33.3%)	3(9.1%)	21(0-60)	1

CD4 control	2	1(11.1%)	1(33.3%)	40(0-80)	1
Detergent	3	4(40%)	1(25%)	12(0-33)	1.5
Diluent	0	3(30%)	0(0%)	30(0-60)	1.3
DBS kit	3	9(56.3%)	3(60%)	70(0-120)	1
BD Vacationer	6	12(54.5%)	6(60%)	86(1-180)	1.5
1% Carbol Fuchsin	9	11(47.8%)	5(38.5%)	36(0-120)	2.3
Acid Alcohol	11	9(69.2%)	9(69.2%)	46(0-180)	1.4

5.6. Data Accuracy

Review of two reported RRF from Dec 2013 to Mar 2014, it was found that facilities had discrepancy on calculated consumption of RRF Vs Quantity issued column of bincards were17 (68%), ending balance column of RRF Vs ending balance column of bincard at the day of reported were 15(60%) and quantity received column of RRF Vs quantity received on STV (stock transfer voucher of PFSA document or model 19 of facility document also 13(52%). Of reported IFRR for two consecutive periods only 4(16%) facilities had discrepancy in Loss and adjustment column of IFRR Vs Loss and adjustment column of bincard were reported from facility laboratories.

5. 6.1.Data completeness of RRF and IFRR

Table 8 showed that 24(92.3%) & 21(87.5%) facilities had completed data items of RRF and IFRR respectively. Only 2(7.7%) and 3(7.7%) of facilities had incomplete of RRF and IFRR data respectively.

Table 8: Number of facilities and percent with accurate/valid RRF report with comparing different report and document and IFRR and RRF data completeness, Addis Ababa, 2014

Accuracy/validity of RRF and IFRR	Yes	NO
Verified calculated consumption indicated on the RRF	17(68%)	8(32%)

(CC=beg. Bal. +QR*-SOH*+/- Loss/Adj.*)		
Verified M ax s tock qua ntity i ndicated on t he RRF(CCx2)	19(76%)	6(24)
Verified Q uantity o rdered i ndicated o n the R RF (Max stock quantity – end. Bal.	16(64%)	9(36%)
Valid Beg. Bal. of this reporting period RRF Vs end. Bal. of the previous RRF report	16(64%)	9(36%)
Valid Q uantity r eceived of R RF V s Q R of S TV** or model 19 valid	12(48%)	13(52%)
EB* of RRF Vs EB of bincard valid	10(40%)	15(60%)
Loss/adj. of RRF Vs Loss/adj. of bincard valid	13(52%)	12(48%)
CC* of RRF Vs Quantity issues of bincard valid	8(32)	17(68%)
DOS* of RRF Vs DOS of bincard valid	8(32)	17(68%)
IFRR of SOH of start of the period and SOH at the end of the period	20(80%)	5(20%)
Loss/adj. of IFRR Vs Loss/adj. of bincard	21(84)	4(16%)
IFRR o f CC v erified b y (Beg. Ba l. +QR+-loss/adj. – SOH)	21(84%)	4(16%)
Completeness of RRF and IFRR		
RRF includes beg. Balance	24(92.3%)	2(7.7%)
RRF includes Stock on Hand data	24(92.3%)	2(7.7%)
RRF includes Quantity loss/adj. data	24(92.3%)	2(7.7%)
RRF includes Quantity received data	24(92.3%)	2(7.7%)
Completeness of IFRR		

IFRR includes beg. balance	21(87.5%)	3(12.5%)
IFRR includes Stock on Hand data	21(87.5%)	3(12.5%)
IFRR includes loss/adj. data	21(87.5%)	3(12.5%)
IFRR includes Quantity received data	21(87.5%)	3(12.5%)

* CC-calculated consumption, QR- Quantity Received, loss/adj. –Loss and adjustment, SOH – Stock On Hand, Beg. Bal- Begging balance, EB- Ending Balance, DOS- Days Of Stock out, STV- Stock Transfer Voucher

5.7. Storage practice of HIV/TB laboratory diagnostic commodities

Table 9 showed the facilities storage practices for HIV/AIDS and TB laboratory commodities, majority of the health centers and hospital reported using standard guideline for storage of laboratory commodities. Of these 5(83.3%) of hospital observed arranged and labeled expiry and manufacturing date and separated damaged and expiry products.

Table 9: Storage practices of health facilities for HIV/AIDS and TB laboratory commodities, Addis Ababa, 2014

Storage conditions	Hospital (n=6)	Health Center(n=17)
Products arranged and labels, expiry date and manufacturing date	5(83.3%)	15(88.3%)
products stored in FEFO manner	4(66,6%)	15(88.3%)
Damaged and expiry products are separate	5(83.3%)	16(93.7%)
Products are protected from direct Sun light	5(83.3%)	16(94, 1%)
Cartons are protected from water and humidity	4(66,6%)	16(94.1%)
Storage area is free from harmful insects and rodents	4(66,6%)	16(94.1%)
products are stored at appropriate temperature	3(50%)	16(94.1%)
Store room in a good conditions(clean, trash removed, shelf	3(50%)	15(88.3%)

organized)		
Store room space sufficient for existing products	3(50%)	10(58.8%)
Fair Safety equipment is available and accessible	3(50%)	12(70.8%)
Products are stored separately from insecticides and chemicals	4(66.6%)	100(100)

5.8. Association between selected IPLS implementation indicators with reported management supports

As indicated in Table 10, management supports on IPLS implementation were associated with availability of completed RRF, verified of beginning balance and loos/adjustment RRF data respectively (X^2= 22.2, p< 0.00; 4.167, p <0.041; 6.83, p< 0.013). This table also showed that management support was associated with availability of completed and submitted IFRR (X^2 = 5.71, p<0.042).

Table 10: The relationship between management supports on IPLS implementation with IPLS implementation tools, Addis Ababa, 2014

IPLS format availability	Management Support on IPLS implémentation		Chi-square	P. Value
	Yes	No		
RRF completed and reported				
Yes	16	1	22.2	0.00*ϒ
No	9	0		
Valid /verified ending balance of RRF				
Yes	8	2	2.778	0.096
No	7	8		
Valid/ Verified beginning balance of RRF				
Yes	12	4	4.167	0.041*
No	3	6		
Valid/verified Loss/Adj. of RRF				
Yes	11	2	6.83	0.013*

No	4	8		
Valid/Verified calculated consumption				
Yes	11	6	4.9	0.484
No	4	4		
IFRR Include SOH, Quantity received & Beg. Bal				
Yes	15	6	5.71	0.042*
No	0	3		

* Statically significant $P < 0.05$, ^{Y} p value produced from Fisher exact test

5.9. Result of In-depth interview

Logistics program managers and officers who are involved in logistic activities were interviewed about IPLS implementation status and identified strength and challenges. Table 11 showed the summary findings from in-depth interview with key Informant.

Table 11:- strength and weakness of IPLS key area responded by key informant interview Addis Ababa, 2014

Key area	Strength	Weakness
IPLS strengthening	IPLS integrate the fragmented distribution of products and minimized the cost for transportation, expiry ,over stock and frequent stock out All most all facilities have adequate amount of recording and reporting formats Building capacity of facilities through IPLS training and supportive supervision Creating management ownership of the system through IPLS orientation supported facilities to implement IPLS	Luck of institutional ownership Lack of strong supportive supervision Lack of coordination among stakeholders High turnover of trained man power No accountability at facility, and poor enforcement by facility manage Unavailability of cold chain at AA hub to store cold temperature lab items No monitoring and evaluation of the system is established

	through supportive supervision and OJT	
Data quality	AA PFSA hub communicated & provided feedback w ith facilities f or correcting data qualities on time	high v olume f acilities a re not s end R RF w ith completed, valid an d ac curate report and not bincards are not recorded and updated regularly Most facilities do not calculate their consumption a ccurately a nd r equested hug e amount of laboratory reagents
Product availability	Most facility bimonthly RRF report were collected a nd r esupplied based on their requested quantity	standard r eagent inventory c ontrol practice were not followed bi n cards w ere not r egularly updated Laboratory reagents at facility Specifically co ld chain items ar e se nd t o l aboratory as t he sam e time SOH at store is zero, so artificial stock out is reported frequent st ock o ut an d er ratic distribution of HIV ART lab reagents TB & R TK l aboratory reagent distribution system is too long shortage of l aboratory pr oducts within t he system causes sense of loss ownership

6. Discussion

In this study, IPLS implementation for HIV/AIDS and TB diagnostic laboratory commodities were assessed using the availability of IPLS implementation tools. Availabilities of IPLS recording and reporting formats (bincards, and IFRR and RRF) were reported in 92.6% of facilities. These findings are comparable with unpublished national IPLS survey in 2014, in which availability of commonly IPLS implementation tools were above 90% (39).

Our finding showed that 85% facility reported the availability of IPLS SOP which is higher than study conducted at Lesotho (29) where only 17% had SOPs for managing medical supply. This may be due to SOPs was provided during IPLS training to each facility staff and the SOP document was used as reference materials for untrained staffs.

In our study utilization of bin cards were found 33.5% in hospital and 76.5% in health centers, which is lower than the study conducted in Addis Ababa, where 50% hospitals and 54% of health centers (20) reported utilization of bin card, The lower utilization of bin card in hospitals in this study may indicate poor implementation of IPLS. This might be due to large amount of line items/products integrated in one system through IPLS and managed in hospital pharmacy store, where updating of bin card becoming a tedious and time consuming exercise. On the other hand higher utilization rate of bincard at health center might be due to the implementation of quality management system which enforced standard inventory control system & storage practice. These finding are consistent with a report in Kenya, where more than 70 % of district/health center use bin/stock cards to manage health commodities (33).

This study showed that 24 (96%) of facilities reported one or more reagents stocked out during the last six months which was higher than in Ghana laboratory logistic system (26) where about 60% facilities experienced at least one laboratory commodities within six months . This may due to the increased scaling -up of ART services in the facilities.

The result of the assessment revealed that thirteen (50%) and eleven (42.3%) of facilities reported the existence of IPLS implementation supportive supervision within the last month and last three months respectively. These finding are lower than with a reported by Desilgen A et al.

in Addis Ababa (20) and findings from unpublished national IPLS report (39). This might be IPLS implementation sites increased in number which makes supervision less frequent.

This study showed 10(41.6%), 12(54.5%) and 11(46.7%) of facilities reported stock out of SGPT, BD vacationer tube and 1% Carbol Fuchsin respectively on the day of the visit Similar finding was also reported in Malawi, 2009 60%, 20% and 8% (27) were stock out of chemistry, hematology and HIV test reagents respectively. This may imply that stock out of one or more HIV/AIDS and TB laboratory commodities could affect the service provision of the ART and TB program.

Our assessment of IPLS showed 7(43.8%), 9(64.7%) and 9(69.8%) of facilities reported stock out for SGOT, SGPT and Acid alcohol respectively during the last six months which has different rate of stock out for different HIV/TB lab commodities compared with similar study conducted by Desalegn. A et al. in Addis Ababa (20), where evaluation of vertical logistic system reveled 75%, 50% and 52% facilities stocked out for similar lab commodities during the last six months. We might speculate integrated system by itself couldn't avoid stock out. These were supported by Nadia. O et al, who reported availability of commodities may not be automatically, improve as a result of the integrated system which is exponentially more complex than managing various supply chains vertically (24).

Our result shows only 8 (32%) of facilities had valid and verified RRF, calculated consumption(CC) of RRF Vs Quantity issued of Bincards and days of stocked out of RRF Vs days of stocked out of bincards which is lower with 2014 unpublished national IPLS survey reported (39) in which 46% facilities had valid and verified RRF. This difference might be due to the large sample size in the national survey. Alternative explanation for low proportion of valid RRF in the facilities might be the wrong assumption to be resupplied by reporting inflated consumption. The qualitative data also point out " *Most facilities do not calculate their consumption accurately and requested huge amount of laboratory reagents"*.

Accurate and complete commodity data are critical for logistics system performance. The key informant responded that "*high volume facilities are not sending RRF with complete, valid and accurate report and bincards are not recorded and updated regularly and most of the facilities*

do not known their consumption and requested huge amount of laboratory reagents". These may causes artificial stock out within the system and over stock to the facilities

As observed in our study majority of health centers meet the standard storage criteria, 100% products are stored separately from insecticides and chemicals, nearly 88.3% of health centers stores practiced first expiring, first out (FEFO) procedures, It was different from the study done in Addis Ababa and Lesotho in which only 70% and 33% (20 and 30) failed to adhere the standard guideline for storage of lab commodities respectively. The higher proportion of health center adhered to standard guideline for storage of lab commodities might be related due to current initiative by Addis Ababa regional health office to improve the status of store by renovating and constructing new store that meet the requirement of storage guideline

7. Strengths and limitations of the study

7.1 Strengths of the study

- Combination of both qualitative and quantitative method helps to supplement and triangulated the findings each other
- Most of the data collectors were logistic oriented and performed onsite observation of storage guideline, physical count of tracer items to rechecked with bincards balance

7.2 Limitation of the study

- The sample size was not large enough for some specific indicators
- The assessment was not included PFSA central and AA PFSA hub.
- The study was done only in Addis Ababa where facilities are nearby AA PFSA hub and relatively more accessible for distribution of commodities and collection of logistic information
- Lack of similar studies especially in Ethiopia related to made difficult for comparing and contrast results.

8. Conclusions and Recommendation

8.1 Conclusions

Majority of the facilities reported the availability and utilization of IPLS implementation tools for managing HIV/AIDS and TB laboratory commodities, though 24(96%) of facilities were experienced one or more reagents stocked out for HIV/AIDs and TB laboratory commodities in the last six months, which provide , in part an indication of failure to implement IPLS in full scales.

8.2. Recommendations

- All TB and rapid test kits should be integrated with other pharmaceuticals
- Bincards should be updated regularly in all facilities for all products
- PFSA should work strongly to avail all products required for HIV/AIDS and TB diagnostic
- Facilities need strong support to improving their RRF data quality
- Hospitals management should enforced to utilized reporting and recording IPLS tools

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10. Annexes

Annex I. Sampling Procedure

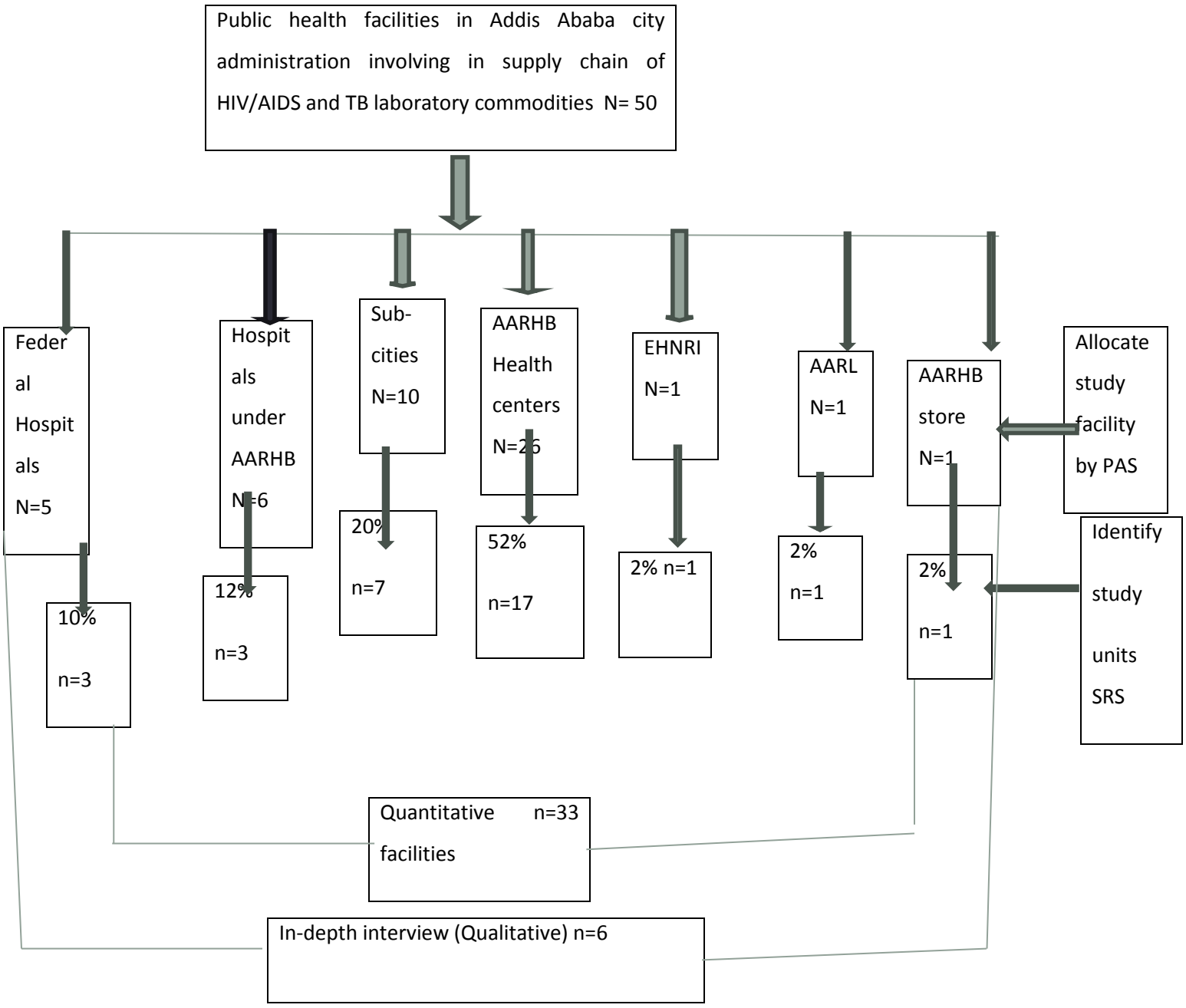

Figure 5: Sampling flow

NB: A) PAS- proportional allocate to size

B) SRS- Simple Random Sampling

Annex II. Information Sheet (English Version)

Addis Ababa University Medical Faculty, School of Medical Laboratory Sciences

Dear Participant,

My name is Alemwork Tilahun, Post graduate student of Addis Ababa University, School of Medical Laboratory Sciences; I am going to conduct study and collect data on IPLS implementation status for selected HIV/AIDs and TB laboratory commodities and the overall laboratory commodity management practices in public health facilities in Addis Ababa. The objective of the study is to collect current information on the implementation status of the Integrated Pharmaceutical Logistics System (IPLS) in the management of HIV/ AIDS & TB commodities and associated factors at governmental health institutions. The information you provide will be used to improve the integrated pharmaceutical logistic system in the management of laboratory commodities and better quality service provision to the clients. The study will identify gaps and challenges and provide recommendations for proper interventions of government and logistic interventions for the future. If you decide to participate, we will guarantee that there is no any influence related to study but only request you that to provide all relevant information regarding the study. We cannot guarantee, however, that you will receive any benefits from this study. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Your name will not be written on the questionnaire or be kept in any other records. Your participation is voluntary and you are free to withdraw your consent and to discontinue participation at any time without consequence. Your participation or not, do not have any influence for your position or responsibilities in your health facility. The interview may take about 45 - 60 minutes. For the successes of our study, you are kindly requested to respond genuinely and voluntary with patience. Your signature below indicates that you have read the information above and have decided to participate in the study.

Thank you for your participation;

Contact address of PI, 0911102321

Annex III. Consent form in English

I_____ here by giving my consent to provide accurate

Information about the implementation status of the Integrated Pharmaceutical Logistics System (IPLS) in the management of HIV/ AIDS & TB commodities in health facility as recommended by the researcher/data collector and to answer those logistics questions. I understand there is no problem within my position in the health facility by participating in this assessment at the beginning as well as at the end of the study. I believe that the result of the study will help PFSA and health facilities Management to improve the overall logistic system and provision of quality service to the public as a whole

Participants Name _____ Signature_____ Date_____

.

Researcher's Name_____ Signature _____Date_____

Annex IV. Questionnaire

Assessment of Integrated Pharmaceutical Logistics System for Human Immunodeficiency Virus and Tuberculosis Laboratory Commodities in Public Health Facilities, Addis Ababa, & Fine-fine Zuria zone of Oromia Ethiopia Data Collection Tool

"Good day. My name is _____.My colleague and I am representatives of this research team. We are conducting a survey of health facility store and dispensing unit (facility laboratory) to de termine t he a vailability of l aboratory c ommodities f or H IV a nd T B di agnosis a nd monitoring an d g eneral characteristics of th e in tegrated p harmaceutical lo gistic s ystem in th e management of laboratory commodities. Your facility was selected by chance to be included in the study. The assessment will provide information enabling the PFSA and RHB to implement appropriate i nterventions to imp rove IPLS p erformance. A ll o f th e in formation c ollected is strictly c onfidential. W e w ill n ot r efer to in dividual f acilities in th e r eport, b ut r ather will describe the overall picture of all facilities. Do you have any questions? May we proceed?

First, ask the following questions of the person in-charge or pharmacy head/store manager. After asking questions 01 -07 under section I, visit the storeroom, or storage area where the HIV/AIDS & TB laboratory commodities are managed. If you are referred to another staff member for the stocktaking e xercise, i ntroduce t he s urvey goals a nd obj ectives a s you di d dur ing t he introduction. Hand the respondent the list of products that are included in the survey, and explain that we will refer to the list for some of the following questions.

Section I: Facility Services and Infrastructure

Information about Interview	
Date: Interviewer/s Name: signature	DAY MONTH YEAR
Checked by: supervisors name _____	Signature----------

No.	Question	Code Classification	Go To/ Comments
01.	Name of the facility		
02.	Region		
03.	Zone		
04.	Woreda		
05.	City/town:		
06.	Supplying Hub:		
07.	Facility Code:		

08	Type of facility	Regional Health Bureau and store--1 Regional laboratory--2 Hospital--3 Health center --4 Sub-city store—5 National laboratory (EHNRI) store --6 Other(Specify) _____9	
09	Provide ART Service	Yes—1 No---0	
10	Provide ART lab monitoring service	Yes—1 No--0	

Section II: Background Characteristics of the Respondent

No.	Question	Code Classification	Go To
01.	Name, title and mobile phone number of person interviewed for this survey	Name: _____ Title: _____ Mobile number: _____	
02.	Number of years and months you have worked at this facility?	Years: _____ Months: _____	

03.	Are you the primary person responsible for managing drugs and medicine products at this facility?	Yes 1 No……0	
04.	How many staff the facility has under the pharmacy unit?	Number of pharmacy unit staff /_____/	
05.	How many of them are trained in IPLS?	Number trained /_____/	
06	How many of them are trained in laboratory commodity management?	Number trained /_____/	
07.	Educational qualification of pharmacy unit staff	# of staff with Degree /_____/ # of staff with Diploma /_____/ Other # /_____/	
08	Who is / are the principal person responsible for managing laboratory commodities that are used for HIV and TB diagnosis and monitoring at this facility? Multiple responses are possible.	Pharmacist …….. 1 Pharmacy Technician……..2 Laboratory technologist..…3 Lab technician …….4 Druggist …….5 Nurse ……..6	

Ask the following questions of someone in charge of managing/overseeing HIV/AIDS and TB laboratory commodities. After asking the questions in this section, visit the warehouse, storeroom, or storage area where the laboratory commodities that are used for HIV and TB diagnosis and monitoring products listed are managed.

Section III. IPLS Implementation in related HIV/AIDS and TB laboratory commodities

No.	Questions	Code Classification	Go To/ Comments
01	Are the following LMIS Formats, Job Aides and SOPs are available at the facility? (Ask for documents to verify)		
	Bin Cards	Yes 1 No 0	
	Internal Facility Report and Requisition Voucher (IFRR)	Yes 1 No 0	
	Facility Report and Requisition Form (RRF)	Yes 1 No 0	
	Standard Operation Procedure (SOP) for IPLS	Yes 1 No 0	
02	Do you use the following stock keeping logistics forms to manage HIV/AIDS and TB laboratory commodities in this facility? Must be verified by checking sample(3-5 product bin cards) completed		
	A. Bin Cards	Yes 1 No 0	
	B. Other (specify)_____	Yes 1(specify)_____ No 0	
03.	What LMIS forms do you use for reporting/ordering? Multiple responses are possible. Must be verified with completed report		
	A. IFRR	Yes 1 No 0	
	B. RRF	Yes 1 No 0	
	C. Other	Yes (specify) 1 No 0	

04	The he alth f acility c ompiles a nd s ends RRF f or H IV/AIDS a nd T B l aboratory diagnostic commodities r eports to higher level?	Yes 1 No 0	If No➔0
05	If yes, to who: Multiple responses are possible. DO NOT READ THE RESPONSES	PFSA……1 RHB……..2 Sub-city /ZHD Health Office…….…..3 WoHO.……4 Don't Know…….5 Other (specify)_____9	
06	If yes, how often are these LMIS (RRF) reports s ent to th e h igher le vel (PFSA/sub city/zone)? Multiple responses are possible. DO NOT READ THE RESPONSES	Monthly 1 Bimonthly (every two months)…...……2 Quarterly…….……..3 Semi-annually…… 4 Annually 5	
07.	When was the last time this facility sent RRF? Must be verified with completed report	Never 1 Within the last month……..2 2 months ago 3 3 months ago 3 More than 3 months ago…… 4	

08.	Does a ll t he c olumns i n R RF a re completed f or al l HIV/AIDS a nd T B laboratory commodities? Must b e v erified w ith last c ompleted report.	Yes 1 No 0 Completed report not available 9	
09.	Does t he f acility l aboratory us e IFRR for re gular r eporting on HIV/AIDS a nd TB laboratory commodities? Must be verified with completed report	Yes----- 1 No----- 0	
10.	How di d you l earn t o c omplete t he forms/records used at this facility? Multiple responses are possible.	Formal Trainings IPLS……1 Pre service Trainings……..2 Other informal trainings (Specify)_____3 On-the-job t raining (other s taff fro m facility)…….4 On-the-job tr aining (someone o utside f acility).....5 Never been trained……..6 Other (specify) 9	
11.	How m any em ergency orders h ave you placed in the last 3 months? If available, ask for documents to verify using RRF	None 0 1 1 2 2 3 3 More than 3……..4	

12	What a re t he di rect s ources of s upply f or t he f ollowing pr ogram c ommodities a t t his facility? Multiple responses are possible.		
	for C hemistry, he matology, C D4 reagents & their supplies	PFSA……1 RHB……..2 Sub-city ZHD…….……..3 Woreda……4 Health Center…….5 Other (specify)_____9	
	TB laboratory diagnostic reagents	PFSA……1 RHB……..2 Sub-city /ZHD…….……..3 Woreda……4 Health Center…….5 Other (specify)_____9	
	RTK for HIV diagnostic	PFSA……1 RHB……..2 Sub-city ZHD…….……..3 Woreda……4 Health Center…….5 Other (specify)_____9	

13	On a verage, f or a nor mal or der approximately how l ong i t doe s t akes between sending an order and receiving product f rom P FSA or R HB or ot her source. (Main resupply point)?	Less than 2 weeks 1 2 weeks to 1 month 2 Between 1 and 2 months 3 More than 2 months 4	
14	Does th e f acility usually get th e quantities o f a ll H IV/AIDS a nd T B laboratory commodities orders?	Yes 1 No 0 Don't know 9	If YES or DK ➔17
15	Does th is f acility n ormally c ollect o r d elivered a ll H IV/AIDS a nd T B la boratory commodities?		
	HIV/AIDS l aboratory diagnostic reagents	Collect……1 Are delivered……..……..2 Both (explain) _____ 3	
	RTK & TB diagnostic reagents	Collect……1 Are delivered……..……..2 Both (explain) _____.....3	
16	Who is responsible for transporting all HIV/AIDS and TB laboratory commodities to your facility?		
	HIV/AIDS l aboratory diagnostic reagents Multiple responses are possible.	PFSA……1 RHB……..2 Sub-city /ZHD……..……..3 Woreda……4	

		Hospital…….5 Health Center……..……6 Other (specify)_____9	
	RTK & TB diagnostic reagents Multiple responses are possible.	PFSA……1 RHB……..2 Sub-city/ZHD…….…..3 Woreda……4 Hospital…….5 Health Center……..……6 Other (specify)_____9	
17	When did you receive your most recent supervision visit? Check visitors book, if necessary.	Never received 1 Within the last month 2 1 - 3 months ago 3 3 - 6 months ago 4 More than 6 months ago 5 *Other (specify) 9*	
18	The last supervision visit that included HIV/AIDS and TB laboratory commodities management was by: Multiple responses are possible.	PFSA……1 RHB……..2 Sub-city/Zone Health Office…….…..3 Woreda……4	

		Health Center……..5 Partner(specify)_____ 6 Other (specify)_____9	
19	Did your last supervision visit include HIV/AIDS and TB laboratory commodities management/logistics (e.g., bin cards checked, logistics reports checked, storage conditions checked etc)?	Yes 1 No 0 Don't know 9	
20	Do you have a functioning refrigerator(s) to store cold chain lab reagents including HIV test kits?	Yes (specify number ____) 1 No--- 0 Not applicable---9	
21	To record the actual temperature, look at the internal thermometer inside the refrigerator—ideal temperature is between 0 and +8 degrees centigrade. (Note if thermometer is broken or missing.)	Temperature (in centigrade) _____	
22	Is the temperature chart up-to-date? (To be up-to-date, there must be an entry for the day before the visit).	Yes -----1 No------0	
	Data quality		
23	Are the calculations on the RRF accurate? (check to see if they are accurate and tick into the boxes below)		

	a. Comparing "Calculated Consumption" indicated on the RRF to the verified CC (recalculating the CC as "SOH at the start of the period + Quantity Received – SOH at the end of the period +/- Loss/Adj.).	Yes-----1 No---------0	
	b. Comparing "Maximum Stock Quantity" indicated on the RRF to the verified "Maximum Stock Quantity" (recalculating the "Maximum Stock Quantity" as CC X 2).	Yes-----1 No---------0	
	c. Comparing "Quantity Ordered" indicated on the RRF to the verified "Quantity Ordered" (recalculating the "Quantity Ordered" as "Maximum Stock Quantity" – "Ending Balance in the Store").	Yes-----1 No---------0	
24	Are the data reported on the RRF valid? (check to see if they are valid and tick into the boxes below)		
	a. Comparing the "Beginning balance in the Store" to the "Ending balance in the store" of the previous report.	Yes-----1 No---------0	
	b. Comparing the "Quantity Received" on the RRF with the "Quantity Received" on PFSA STV/DIC or Facility Model 19 within the reporting period.	Yes-----1 No---------0	
	c. Comparing "Ending balance" indicated on the RRF versus Quantity at the end of the reporting period as indicated on the Bin Card.	Yes-----1 No---------0	
	d. Comparing the "loss and adjustment" indicated on the bin card with RRF loss and adjustment column of the reporting period.	Yes-----1 No---------0	
	e. Comparing "Calculated Consumption" versus the sum of quantities issued on the "Quantity Issued" column of the	Yes-----1 No---------0	

	bin card during the recent reporting period.		
	f. Comparing the "DOS" on RRF versus "DOS" indicated on the bin card.	Yes-----1 No---------0	
25	Does management (Head of the health facility, CEO, Medical Director, and DTC) take supportive actions for the implementation / improvement of the IPLS		
	a) Has management enforced the use of a regular schedule for internal reporting and resupply?	Yes-----1 No---------0	
	b) Has it enforced use of IFRR for reporting & resupply?	Yes-----1 No---------0	

Thank you for your time and information. You have been very helpful. Our remaining question will require looking at products in the storeroom and speaking with the person who oversees the store.

Questioners for laboratory personnel: Introduce all team members and ask facility representatives to introduce themselves. Explain the objectives of this survey:

No	Questions	Code classification	Go to
1	Name, title and mobile phone number of person interviewed for this survey	Name: _____ Title: _____ Mobile number: _____	
2	Number of years and months you have worked at this facility?	Year----- months------	
3	Who is the principal person responsible for managing HIV/AIDS and TB laboratory commodities at this facility?	Pharmacist ……..….1 Lab technologies……..2 Lab technician……..3	

		Other (specify) -----9	
4	Do you use the following stock keeping recording & reporting IPLS forms to manage HIV/AIDS and TB laboratory commodities in this facility?		
	A. bin card B. stock cards C. IFRR D. others ----------	Yes ------1 No----------0 Yes -------1 No----------0 Yes ------1 No----------0 Yes ------1 No----------0	
5	Do IFRR of HIV/AIDS and TB laboratory commodities include the following?		
	A. Stock on hand B. Quantities used C. Losses and adjustments	Yes -----1 No---------0 Yes -----1 No---------0 Yes ---1 No---------0	
6	How did you learn to complete the bin card & IFRR used at this facility laboratory? (Circle all that apply.)	During IPLS DU orientation-----1 On-the-job training ---------2 Never been trained-------3 Other (specify)---------9	
7	When did your receive your last supervision visit or OJT that how to manage laboratory commodity (e.g. bin cards checked, IFRR, and expired stock removed, supplies checked)?	Never received.....1 Within the last month.....2 Within the last 3 months.....3 Within the last 6 months.....4 More than 6 months ago.....5 Other (specify) ----------9	

8	Are t here an y HIV/AIDS an d T B laboratory commodities you usually run out of before resupply?	Yes.....1 No 0	If N O go to Q11
9	If yes, l ist t he f our most f requent HIV/AIDS a nd T B l aboratory commodities.	----------	
10	Do you h ave r eporting & r esupplied schedule	Yes .....1 No 0	
11	Are t here an y HIV/AIDS an d T B laboratory c ommodities y ou usually have a s urplus o f b efore r esupply? A t the time of visit	Yes .....1 No 0	If N O go to Q14
12	If yes, list the four most frequent?	List four most frequent items ---------- -------	
13	Do you ha ve a f unctioning refrigerator(s) t o s tore c old c hain l ab reagents including HIV test kits?	Yes (specify number ____) 1 No--- 0 Not applicable---9	
14	To r ecord t he actual t emperature, l ook at th e in ternal th ermometer in side th e refrigerator—ideal te mperature is between 0 an d +8 d egrees c entigrade. (Note i f thermometer i s br oken or missing.)	Temperature (in centigrade) _____	
15	Is the temperature chart up-to-date? (To be up-to-date, there must be an entry for the day before the visit).	Yes -----1 No------0 0	

16	Do you inform machine functionality status to the facility store man	Yes -----1 No------0 0	
	Data quality of IFRR		
17	Do u use IFRR in the laboratory	Yes -----1 No----------0	if No, skip
18	Are data of IFRR at laboratory unit valid and accurate? Check a few sample copies of the IFRR	Yes ----1 No-------0	
	a. Comparing the "SOH at the start of the period" to " SOH at the end of period" of the previous report	Yes ----1 No-------0	
	b. Comparing "Loss and Adjustment" indicated on the IFRR to the actual physical count of damaged/expired items or transferred to or from other dispensary units (whenever possible).	Yes ------1 No----------0	
	c. Comparing "Calculated Consumption" indicated on the IFRR to the verified CC (recalculating the CC as "SOH at the start of the period + Quantity Received – SOH at the end of the period +/- Loss/Adj.).	Yes --------1 No------0	

Questioners for sub city pharmaceutical and medical supplies logistic officers

No.	Question	Code Classification	Go To

01.	Name, t itle and m obile phone num ber of person interviewed for this survey	Title/position : _____ Mobile number: _____	
02.	Number of years and months you have worked at the sub city/RHB?	Years: 1_____ M onths: __9_____	
03	Are you t rained o n IPLS S upportive supervision skill training	Yes 1 No 0	1
05	Are you t rained on l aboratory c ommodity management training	Yes 1 No 0	1
05	Have you pr ovided S S on I PLS implementation to your respective facilities	Yes 1 No 0	1
06	If yes for Q 4 how frequent	Bimonthly 1 Quarterly 2 Bi annually 3 Annually 4	1
07	Do you i ncluded i n your S S H IV/AIDS l ab commodity m anagement i n IPLS implementation	Yes 1 No 0	1
08	Have you de velop a ction poi nt on pr ovided OJT to laboratory dispensing units in regarding to IPLS implementation	Yes 1 No 0	1
09	Are your respective facilities send to you copy of HIV/AIDS laboratory commodities RRF	Yes 1 No 0	1
10	If yes f or Q 9 do you a ggregate a nd s end t o higher level for monitoring and evaluation	Yes 1 No 0	0
11	Do you t hink R RF da ta of your r espective facilities are valid and accurate	Yes 1 No 0	0
12	If yes for Q 10 how frequent	Bimonthly 1 Quarterly 2	

		Bi annually 3 Annually 4	
13	Are your respective facilities send their consumption report of RTKs and TB reagents	Yes 1 No 0	0
14	If yes for Q12 how frequent	Bimonthly 1 Quarterly 2 Bi annually 3 Annually 4 No regular schedule 5	
15	Are you distributed RTKS and TB reagents based on their consumption report	Yes 1 No 0	1
16	How frequent you distributed to your respective facilities of those products	Bimonthly 1 Quarterly 2 Bi annually 3 Annually 4 No regular schedule 5	2
17	Are you delivered those products to your respective facilities	Yes 1 No 0	0
18	Have you faced stock out of RTKS and TB reagents currently in your distribution system	Yes 1 No 0	1
19	Have you faced stock out of RTKS and TB reagents within six months of time in your distribution system	Yes 1 No 0	1
20	Do you think needs special training for management of HIV/AIDs, RTKs and TB laboratory diagnostic commodities	Yes 1 No 0	1
21	What is your comment on IPLS implementation status on regarding HIV/AIDs, RTKs and TB laboratory diagnostic commodities		

Section V Product Availability

Table1. Stock Status (Specify a full six month period prior to the survey; and the day of visit)

Column:

1. Name of all tracer products that will be counted

2. Unit of count for the product

Note: Columns 1 and 2 will be filled out before questionnaires are printed for the survey.

3. Record whether or not the product is available at this facility, answer Y for yes or N if no.

4. Check if the bin card is available, answer Y for yes or N for no.

5. Check if the bin card has been updated within the last 30 days, answer Y for yes or N for no. Note: If the bin card was last updated with the balance of 0 and the facility has not received any resupply, consider the bin card up-to-date.

6. Record the balance on the bin card.

7. Record if the facility has had any stock out of the product during the 6 month period from --/--/ -- /--/ 2014, answer Y for yes or N for no.

8. Record how many times the product stocked out during the 6 month period from --/--/ -- /--/ 2014 according to bin cards, if available.

9. Record the total number of days the product was stocked out between --/--/ -- /--/ 2014, only.

10. Record the quantity of product issued from the storeroom between --/--/ -- /--/ 2014, only.

11. Record the physical count in the storeroom.

12. Record if the facility experiencing a stock out of the product on the day of the visit, answer Y for yes or N for no. If products are available outside the storeroom there is no stock out. Visually verify that usable products are in stock.

13. Record if the facility has expired products. If there are products that are near expiry (within one month), note the product and quantity in the comments section

Table 12: Stock Status table of tracer products

	Product	Units of count	Managed at this facility? (Y/N)	Bin card avalable? (Y/N)	Bin card updated? (Y/N)	Balance on bin card	Stock out most recent 6 months (Y/N)	Number of stock outs	Total number of days stocked out	Total issued (most recent 6 months)	Physical inventory—Store room	Stock out today? (Y/N)	Availability of expired product (Y/N
	1	2	3	4	5	6	7	8	9	10	11	12	13
1	KHB	50											
2	SGOT	kit											
3	SGPT	kit											
4	CD4 reagent	50											
5	CD4 Control	25											
6	FACS flow	20 lit											
7	Detergent	20 lit											
8	Diluent	20 lit											
9	Cell pack	20 lit											
10	Cell Clean	50 lit											
11	DBS kit	50											

12	BD Vacationer tube 4ml	100											
13	BD vacationer needle	100											
14	Carbol Fuchsin	500 ml											
15	Acid Alcohol	500 ml											

Section VI. Storage Conditions

Items 1–17 should be assessed for all facilities for products that are ready to be issued or distributed to SDPs and for store rooms in all SDPs. Place a check mark in the appropriate column based on visual inspection of the storage facility; note any relevant observations in the comments column. To qualify as "yes," all products and cartons must meet the criteria for each item.

No	Description	Yes	No	Comment
1	Products that are ready for distribution are arranged so that identification labels and expiry dates and/or manufacturing dates are visible.			
2	Products are stored and organized in a manner accessible for first-to-expire, first-out (FEFO) counting and general management.			
3	Cartons and products are in good condition, not crushed due to mishandling. If cartons are open, determine if products are wet or cracked due to heat/radiation (fluorescent lights in the case of condoms, cartons right-side up for Depo-Provera®).			
4	The facility makes it a practice to separate damaged and/or expired products from usable products and removes them from inventory.			
5	Products are protected from direct sunlight at all times of the day and during all seasons.			
6	Cartons and products are protected from water and humidity during all seasons.			
7	Storage area is visually free from harmful insects and rodents.			
8	Storage area is secured with a lock and key, but is accessible during normal working hours; access is limited to authorized			

	personnel.			
9	Products are stored at the appropriate temperature during all seasons according to product temperature specifications.			
10	Roof is always maintained in good condition to avoid sunlight and water penetration.			
11	Storeroom is maintained in good condition (clean, all trash removed, sturdy shelves, organized boxes).			
12	The current space and organization is sufficient for existing products and reasonable expansion (i.e., receipt of expected product deliveries for foreseeable future).			
13	Products are stacked at least 10 cm off the floor.			
14	Products are stacked at least 30 cm away from the walls and other stacks.			
15	Products are stacked no more than 2.5 meters high.			
16	Fire safety equipment is available and accessible (any item identified as being used to promote fire safety should be considered).			
17	Medicines are stored separately from insecticides and chemicals.			

Annex V. Key Informant interview guide

List of questions interviewed the respective respondent

1. What is your opinion on the IPLS implementation in regarding HIV/AIDS & TB laboratory commodities in your respective health facility?

The informant person describe on IPLS implementation status

Discuss the laboratory supply chain (flow of information and product) in the region/sub city/facility

Existence of Bincard, IFRR, RRF, SOP and Job aid for IPLS implementation

Practice of using IPLS recording and reporting formats

How are they tracking and reporting of logistics information to higher body

How do you feel the importance of tracking logistics information?

What is your opinion regarding the organizational support for the IPLS implementation in regarding to HIV/ADIS & TB laboratory commodities management with in the IPLS?

Discuss management ownership on IPLS implementation

Discuss the importance of supervision for improving IPLS implementation

Describe the challenges that the program is currently facing in implementing IPLS in the management of the HIV/ AIDS and TB diagnostic commodities.

What is your opinion to implement IPLS in the management of HIV/ AIDS and TB diagnostic laboratory commodity

Collect their ideas and opinions of the informant interviewed and arranged in table of the strength and weakness of facilities to implement IPLS specifically for HIV/AIDS and TB diagnostic ART laboratory reagent. Analyze and discuss the results.

Annex VI. Amharic version consent form

ለጥናቱ ተሳታፊወች የተዘጋጀ የፈቃደኝነት መግለጫ ቅጽ (ኮንሰት)

እኔ ..... የ ኤች አ ይቪ ኤድስ ና የ ሳንባ ነቀርሳ ን የ ላ ቦ ራቶሪ ግ ብአ ቶችን በ ተመለከተ ለ ምጠየ ቀው ጥያቄ ትክክለኛ መረጃ ለ መስጠት ፍቃደኝነቴን እገልጻለሁ፡ ፡ በ ጥና ቱ ወቅ ትም ከ መጀመሪ ያ እ ስ ከ መጨረሻ ምንም አ ይነ ት እ ኔ ን የ ሚነዳ ሁኔታ እንደለለ ተረ ድቻለሁ፡ ፡ ጥናቱም እኔ ለምሰራበት ጤና ድር ጅት ብቻ ሳይሆን ለሌሎች ተመሳሳይ ድር ጅቶች በተለ ይም የኤች አ ይቪ ኤድስ ና የ ሳንባ ነቀርሳ ምር መራና ከ ትትል ለ ሚያ ደርጉ ድር ጅቶችሁሉ እ ን ደሚጠቅ ም እውቄያ ለሁ፡ ፡ ጥናቱ በሚጠና ቀ ቅ በ ት ጊ ዜም የ ሁሉን ም የጤና ድር ጅቶች ጥንቅር መረጃ እ ን ጅ የ አ ን ድ ጤና ድር ጅት መረጃ ብቻ እንደማይቀርብ ተረድቻለሁ፡ ፡

የ ተሳታፊ ስም .....ፊርማ .....ቀ ን .....

የ ተመራማሪ ስም ..... ፊርማ .....ቀን .....

ለዚህ ጠቃሚ ጥናት ስለተባበራችሁኝ አመሰግናለሁ፡ ፡

ማሳ ሰ ቢያ ፣ ስ ለ ጥና ቱ ተጨማሪ መረ ጃ ከ ፊለ ጉ በ ነ ዚህ ስ ልክ ቁጥሮች ይደውሉ

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