



# Evaluation of Quality of Auditable Pharmaceutical Transactions and Services Program: The Case of Health Centers of Addis Ababa, Ethiopia

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## ABSTRACT

**Background:** Pharmaceutical system is one of the crucial parts of the health system building blocks and a vital section to realizing universal health coverage and the overall achievement of the sustainable development goal. However, studies showed that a poor pharmaceutical system is a reason for insufficient access to essential medicines, wastage of scarce resources, and widespread health hazards, noted in the world.

**Objective:** To evaluate the Auditable Pharmaceutical Transactions and Services (APTS) program quality and status of implementation, outcomes, and its challenges for implementation, in the pioneer health centers of Addis Ababa, Ethiopia.

**Methods:** Two types of study designs were used; one was an exploratory design for the evaluation of the dispensary service quality, and the other was a descriptive design for program implementation status, outcome, and challenge. Both qualitative and quantitative data collection methods were applied. For data collection, the self-administered questionnaire, key informants' interviews with staff participants in the pharmacy service area, and observation and document review were used. For the dispensary service quality assessment, a total of 500 patients were interviewed for data collection. 40 pharmacists were included in self-administered questionnaires. For the in-depth interview, data were collected from all of the five; medical directors, finance, and pharmacist head of the five pioneer APTS implementing HCs, in Addis Ababa, which were a total of 15.

**Results:** The overall dispensary service quality aligned with client satisfaction assessed by Service Quality (SERVQUAL) model results in 1.1, which is a positive gap score showing the client's satisfaction with the service quality. With regards to the implementation status of the APTS program, the health centers implemented 83% of process implementation to 72% of service availability in the health centers, and the overall average status of APTS implementation is 78%. Also, the health center's average outcome implementation was 72.8. The findings of the evaluation and the judgment matrix showed the APTS program improved the dispensary service quality, client satisfaction, and client knowledge.

**Conclusion:** Based on the judgment matrix, there is good client satisfaction, implementation status, and outcome of the APTS program in the health centers. However, the implementation is affected by the shortage of manpower, and capacity building in the facility.

**Keywords:** APTS; SERVQUAL; Pharmaceutical; Health center; Implementation

**Abbreviations:** APTS: Auditable Pharmaceutical Transactions and Services; SIAPS: Systems for Improved Access to Pharmaceuticals and Services; USAID: United States Agency for International Development; HSTP: Health Sector Transformation Plan; WHO: World Health Organization; EFY: Ethiopian Fiscal Year; FMOH: Federal Ministry of Health; NGO: Non-Governmental Organizations; IT: Information Technology; RHB: Regional Health Bureau; ART: Anti-Retroviral Therapy; DSM: Drug Supply Management

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## INTRODUCTION

A well-functioning health system guarantees equitable access to essential medical products, vaccines, and technologies that assured quality, safety, efficacy, and cost-effectiveness, and their scientifically sound and cost-effective use [1]. Those components involved in this health system function may be conceptualized as a division of a pharmaceutical system. Moreover, the pharmaceutical system is all structures, people, resources, processes, and their interactions within the broader health system that aim to help people get and stay healthy [2].

Systems for Improved Access to Pharmaceuticals and Services (SIAPS) was a United States Agency for International Development (USAID) funded program, which works in partnership with local governments and partners to build strong pharmaceutical systems that deliver safe, timely, and quality pharmaceuticals and healthcare services, through a pharmaceutical system strengthening approach [3].

The SIAPS program was implemented in some low- and middle-income countries. In the path of its work, the program developed and applied several tools and approaches in support of these different technical intervention areas in different countries [4].

In Ethiopia, the derivative of the SIAPS program named "Auditable Pharmaceutical Transactions and Services (APTS)", was developed in 2010, and has been implemented to strengthen pharmaceutical systems and quality healthcare services. The program was initiated and piloted in Debre Markos Hospital Amhara Region, on July 30, 2010, and then applied in different regions [5]. In addition, the government of Ethiopia in Health Sector Transformation Plan (HSTP) aimed to implement APTS in all health facilities by 2020, by taking a vast medicines procurement plan to improve access to essential medicines and specialties at Health Centers (HCs) [6].

The APTS program is a priority strategy in the HSTP and in different regions of health facilities to improve pharmaceutical logistics and supply chain management. After 2016, there are 123 Hospitals and 7 HCs that implemented the APTS program [7]. Five of the HCs implementing APTS are located in Addis Ababa city administration. Hence, this evaluation study prepares to investigate the program implementation in the pioneer HCs of Addis Ababa.

### Statement of the problem

The APTS programs are being implemented as a priority strategy in Ethiopian HSTP and in different regions of health facilities to improve pharmaceutical logistics and supply chain management. Also, the programs are intended to scale up to all of those not implementing the program. Following this, in Addis Ababa city administration the program has been implemented in selected five high-performing HCs, starting from December 2017, and is currently being implemented in 13 HCs in total.

World Health Organization (WHO) shows, that over 50% of all medicines are prescribed, dispensed, or sold wrongly and among those patients, half of them take them wrongly. This misuse of drugs results in the wastage of scarce resources, extensive health hazards, and drug resistance and tolerance. Furthermore, globally around two billion people, over half of the poorest in Asia and Africa are well-known to have insufficient access to essential medicines and vaccines or none at all.

In Ethiopia different challenges are seen in the pharmaceutical system; as a report, stated there is a major deviation from

recommended norms on prescriptions and in uses for the treatment of antibiotics, and also Health Facilities experienced; stock-outs of 35% for essential medicines, and medicines in stock expiry rate nearly 8% [8]. Additionally, the pharmaceutical system is exposed to theft, pilferage, and misappropriations, because of lack of transparency and accountability in managing medicines and financial transactions [9]. For instance, issuing medicines to dispensing units is based on an approved request from each unit. Nevertheless, there are no means to effectively control the medicines destination, of those issued from the main store [10].

Moreover, the baseline assessment of one of the hospitals before APTS implementation showed that; the wastage of medicines due to misuse, expiry, theft, and pilferage was 10%, Patient knowledge of correct dosage was 54% and Patient satisfaction was 23% also, another study of patient satisfaction on the overall outpatient pharmacy services showed that from the total of 323 respondents accounted, 46.1% were dissatisfied and the remaining 53.9% are satisfied [11-13]

To solve the above-mentioned facts, the Federal Ministry of Health (FMOH) approved and implements APTS regulations in different hospitals in the nine regional states and both City administrations. However, the program at the HCs level is only implemented in the selected 7 HCs of Addis Ababa and Oromia region [14,15].

So, this evaluation is used to provide a practical picture of the current APTS program situation in the pioneer HCs of Addis Ababa, and to provide baseline information to track changes and improvements for the program implementation. Also used as reference points for the expansion of the program to another health facility.

### Objectives of the study

The general objective of the study is to evaluate the APTS program: quality and status of implementation, outcomes, and its challenges for implementation, in the pioneer HCs of Addis Ababa, Ethiopia. The specific objectives of the study include the evaluation of the APTS program service quality in the dispensary pharmacy; improving patient knowledge on correct dosage and satisfaction with services, evaluation of the implementation status of the APTS program in the pioneer HCs, evaluation of the outcomes of APTS implementation in reducing medicines expiry, measuring the outcomes of APTS in increasing revenue from sales of medicines, detecting the challenges and successes of the program implementation in the pioneer HCs.

### Conceptual framework

The Conceptual framework for evaluation of the APTS program is adapted from Logic Model Flowchart, March 2021 as depicted in Figure 1 below.

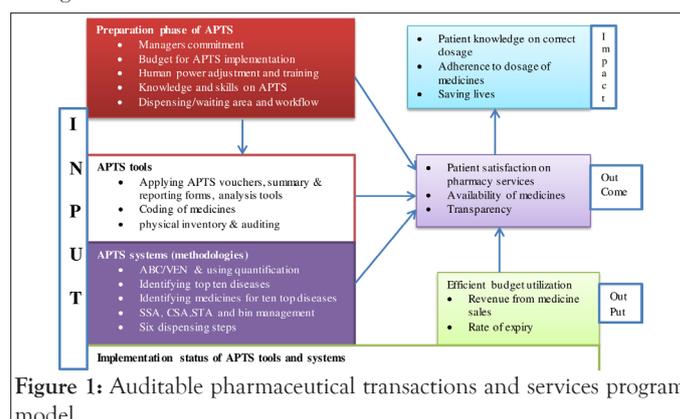


Figure 1: Auditable pharmaceutical transactions and services program model.

## MATERIALS AND METHODS

### Study area and period

The study area for this evaluation is the Addis Ababa city administration, which is the capital city of Ethiopia. There are 11 public hospitals, 37 private and Non-Governmental Organizations (NGO) hospitals, and 100 HCs, while 4 more HCs are under construction. 144 pharmacies, 257 Clinical pharmacists, and 246 pharmacy technicians are also in the city, those are working in the public sectors of Addis Ababa [16]. And, there are 268 specialty clinics, 318 private medium clinics, and 152 all-type primary clinics which are providing services for the population until the end of the 2010 Ethiopian Fiscal Year (EFY). And currently, in Addis Ababa, the APTS program has been implemented in more than 23 health facilities [17]. Data was collected from March 14 to 25, 2022.

### Evaluation approach

There are different approaches to conducting evaluation, the best two approaches are; the formative one, which is conducted during implementation to provide information on what is working and how efficient in quality it is, to determine how improvements can be made. The second one summative evaluation (depending on the type of intervention, the time frame may range from a few months to several years) is undertaken, not only at or close to the end, and after the conclusion of an intervention to assess the impact, but it also conducts at a particular stage, to assess effectiveness and results. Evaluating by using, both approaches need to ensure internal consistency as well as consistency with the overall results chain [18]. So, to answer the evaluation questions of this study, both approaches will be used.

### Evaluation design

The design of this evaluation study was a multiple case study designs and was directed by using both qualitative and quantitative methods. Under the case study we used two types of designs based on the recommendation of the project STAR checklist for determining evaluation designs the selected two sub-designs that were used are:

**Exploratory case study:** to investigate service quality of pharmacy dispensary for customers (community).

**Descriptive case study:** to identify implementation status, outcome, and challenges related to the APTS program indicators and key result areas.

### Populations and sampling

**Study population:** The Study populations for the structured interview questionnaire were all patients who got services from the five pioneers of APTS-implementing HCs, in Addis Ababa. The study population for self-administering questionnaires was all staff of the pharmaceutical service area of the pioneer APTS implementing HCs, in Addis Ababa. The study populations for in-depth interviews were the key informants, about the implementation of APTS in the five pioneer HCs of Addis Ababa. The study populations for the observation and document review were the pharmacy department service area and documents of the APTS HCs, in Addis Ababa.

**Sampling units:** The sampling units of interview questioners were those patients who got service in the HCs dispensary pharmacy during the period of data collection, were willing to participate, and fulfilled the inclusion criteria, in the pioneer APTS HCs of Addis Ababa. For self-administration questionnaires, the sampling units were all pharmacists of those HCs, who are willing

to participate and fulfilling the inclusion criteria, during the period of data collection. For in-depth interviews, the sampling units were all medical directors, finance, and pharmacist head of the selected APTS HCs.

**Sample size:** For patient interview questionnaires, a total of 500 patients were included as a sample size of 100 patients per facility, based on the WHO recommended sampling technique stated in the following sections. The sample sizes for the in-depth interview involves data which were collected from all five; medical directors, finance, and pharmacist head of the five pioneer APTS implementing HCs, in Addis Ababa, which were a total of 15. The sample sizes for self-administered questionnaires were all pharmacists who fulfilled the inclusion criteria in the entire five pioneer APTS implementing HCs. Therefore, a total of 40 pharmacists were included in self-administered questionnaires.

**Sampling procedure and technique:** For patient interview questionnaires to assess service quality, patient knowledge of dispensed medicines, and patient satisfaction with pharmacy services, the two types of recommended convenience sampling techniques were;

- The first one is by FMOH which allowed a sample size of 75 patients per health facility, to evaluate the APTS program. 75 patients are considered as the maximum number of patients at peak hour or 50% of the maximum patient load in Urban HCs of Ethiopia, as stated in the guideline.
- The second one is that of WHO recommended sampling technique, which allowed at least 100 patients per facility, will be sampled.
- So, using a convenient sampling technique and based on the recommendation of WHO, 100 patients per facility were sampled; a total of 500 patients were included in the study. The data was collected for 2 weeks from Monday to Friday until the number of patients reached 100 in each of the 5 HCs.
- For self-administered questions, the data was collected by administering it to all pharmacists of the HCs.
- For the qualitative assessment of the program, a key informant was purposively identified and the data was collected using an in-depth interview guide.
- Also, for document reviews data was collected by revising various data sources like; monthly reports, ABC/VEN analysis documents, and all stock status analysis documents of the past two years, 2010 and 2011 EFY, HCs.

### Data collection methods

The data collection mechanisms that were used for this evaluation are a quantitative method and supplemented qualitatively. The assessment of the quality of dispensary service in HCs focuses to identify patients' needs and expectations, both perceptions and expectations of service were measured. The Service Quality (SERVQUAL) instrument was modified based on, the questionnaire on the level of service quality of pharmaceuticals adopted.

The modified instrument was containing twenty-four pairs of statements (one pair for patients' perceptions and the other for expectations about pharmacy service). The questionnaire is based on a Likert scale of a five-point, structured about five service quality dimensions that are: reliability, responsiveness, assurance, empathy, and tangibles. The other instruments of data collection, which were adopted, were used by modification in the

context of the HCs and in line with the evaluation objectives and indicators. For quantitative assessment, the following five data collection activities were incorporated.

Patient exit interviews were conducted at the pharmacy service point of exit, an infrastructural assessment and workflow at the dispensaries of the HCs, Observation of pharmaceutical service area and a review of records, a series of provider interviews among pharmacy staff of the HCs, and a checklist to assess the availability and expiry of key medicines.

Also, for qualitative assessment, in-depth interviews were conducted with medical directors, finance, and the pharmacist head of the five pioneer APTS implementing HCs.

### Data management and analysis

The collected data was critically checked for its completeness then coded and entered by using Epi-Data and exported to SPSS version 23, by Information Technology (IT) professionals and reviewed by the principal investigator. 10% of the data for the client exit interview was reentered on SPSS and employed reliability tests to check the instrument's internal consistency.

The data was analyzed using the gap score determined by the service quality gap model, which indicates overall patient satisfaction. According to this model, the service quality uses a function of the gap between perception and expectations, and can be modeled as:

$$Q = \sum_{i=1}^k (P_{ij} - E_{ij})$$

Where, SQ=overall patients' satisfaction (service quality); k number of attributes.

$P_{ij}$ =Performance perception of stimulus i concerning attribute j.

$E_{ij}$ =Service quality expectation for attribute j that is the relevant norm for stimulus i.

This evaluation measured the APTS implementation status of the HCs, by understanding, determining, and measuring the input, structure, and process indicators of APTS implementation, in the HCs' pharmaceutical service.

## RESULTS AND DISCUSSION

### Results from quantitative data

Client care and satisfaction; It includes the following,

**Socio-demographic characteristics of the clients:** Among the total 500 clients surveyed, more than two third (67%) were female. 35.8% of them (179) are in the age range of 30-39 years.

With regards to marital status, (54.6%) of the participants were married with the lowest of 11.4% widowed. In terms of the level of education, 35% of participants had completed primary school and 1% of them are unable to read and write. More than 62% of participants whose educational levels were secondary and primary school were more than two-thirds. One-fourth of the participants are employed at a privately owned company, followed by 21.2% of governmental employers.

**Client care:** Most of the participants visited the health center repeatedly; accounting for 54.8%, and the rest of them visited the facility for the first time. The mean number of medicines prescribed and dispensed for the patient was 2.35 and 1.26 drugs respectively. Of those participants 22.6% of a patient prescribed one drug, 35.6% prescribed 2 medicines, and also for 28.4 %, 11.8 %, and 2% of clients prescribed 3,4 and 5 drugs respectively as shown in Table 1.

**Table 1:** Number of medicines prescribed for the patient.

Medicines prescribed	N	Mean	Std. Deviation
Total number of medicines prescribed for the patient	500	2.35	1.019
Total number of medicines dispensed to the patient	500	1.26	0.715

### Result of dispensary SERVQUAL model (client satisfaction):

The dispensary service quality of the HCs assesses, through the SERVQUAL model by subtraction of the client's expectations from their perception of the service of the dispensary. The overall client perception and expectation in the dimension of tangibility were; 3.26 (SD-1.27) and 1.16 with a standard dilation of 0.94, respectively. The selected HCs' total dispensary service quality from the perspective of the client was a positive score that ranges from 0.74f for the convenient operating hours of the dispensary to 1.41 for the appearance of the pharmacy. The patient satisfaction in the dimensions of the SERVQUAL model was a positive gap score with a minimum score of 1.04 for the reliability dimension and a maximum score of 1.16 for the dimension of tangibility. The overall gap score of the dispenser service quality that was assessed using the SERVQUAL model from the perspective of the patient was a 1.11 gap score which is presented in Table 2.

**Table 2:** The HCs overall service quality mean and gap score with the dimensions of SERVQUAL model.

SERVQUAL model	Clients perception		Clients' expectation		P-E (the gap score)
	Mean	Std. deviation	Mean	Std. deviation	
Tangibility	3.26	1.27	2.1	0.94	1.16
Reliability	3.18	1.32	2.14	0.98	1.04
Responsiveness	3.31	1.28	2.19	1.05	1.12
Assurance	3.3	1.27	2.15	1.01	1.15
Empathy	3.27	1.24	2.2	1.06	1.06
Total	3.26	1.28	2.16	1.01	1.11

## Pharmacy professional's satisfaction, perception, and knowledge about APTS

**Pharmacy professional's knowledge of APTS:** As shown in Table 3, the proportion of trained staff for APTS was 50% with an equal proportion of untrained staff. Concerning the knowledge of pharmacy professionals toward APTS pillars, out of the 20 trained staff, 22.5% of them know only 1 pillar of APTS, and only one pharmacy professional mentioned four pillars from the 5 APTS pillars.

**Table 3:** Knowledge of pharmacy professionals on APTS pillars.

APTS pillars	Frequency	Percent
Zero pillar	1	2.5
One pillar	9	22.5
Two pillar	5	12.5
Three pillar	4	10

Four pillar	1	2.5
Five pillar	0	0

**Pharmacy professional's perception of APTS:** The majority 67.5% of the professionals alleged that APTS helped to improve the availability of drugs and only 60% of them believed that APTS is used for improving patient satisfaction. Also, the overwhelming majority 33 (83%) of the participant believed that APTS is used to improve the transparency of pharmaceutical transactions. Concerning workload, 60% of the participants alleged that APTS implementation increased workload. However, responses were less satisfactory concerning improving the rate of expiry of medicines, security of the medicines, and budget utilization. The Perception of those 33 (82.5%) participants was aligned with the idea of "APTS is a vital initiative to improve pharmacy service". Also, the perception of Professionals in the overall implementation of APTS was assessed and 70% responded that the program is poorly implemented, and 25% of them perceived that the program was progressing well toward the full objective as revealed in Table 4.

**Table 4:** Perception of pharmacy professionals on APTS.

APTS	Disagree/Strongly		Neutral		Agree/Strongly agree	
	No	%	No	%	No	%
APTS implementation improved availability of drugs	5	13%	8	20%	27	68%
APTS implementation increased my workload	8	20%	8	20%	24	60%
APTS implementation improved job opportunities for pharmacists	6	15%	9	23%	25	63%
APTS application has reduced expiry of medicines.	16	40%	9	23%	15	38%
APTS implementation has reduced theft of medicines.	9	23%	7	18%	24	60%
APTS implementation has not helped to reduce damage to medicines.	9	23%	7	18%	24	60%
APTS has improved transparency of pharmaceutical transactions.	3	8%	4	10%	33	83%
APTS has improved the record-keeping practices of the pharmacy.	5	13%	12	30%	23	58%
APTS implementation has improved patient satisfaction.	11	28%	5	13%	24	60%
Other HCs units like laboratory, OPD and delivery are better satisfied in the service they get from the pharmacy department after the start of APTS	7	18%	12	30%	21	53%
Introduction of collective responsibility shared by all pharmacy professionals in a unit improved accountability.	3	8%	18	45%	19	48%
The assigning of bin locations in dispensaries to pharmacists improved the supply of the medicines.	8	20%	10	25%	22	55%
The assigning of bin locations in dispensaries to pharmacists improved the security of the medicines.	12	30%	18	45%	10	25%
APTS has improved predicting of the medicines needed.	11	28%	7	18%	22	55%
APTS has reduced the waiting time of patients to get pharmacy services. (Note: initial point of the service is contacting the Rx evaluator.)	6	15%	18	45%	16	40%
After the implementation of APTS, workflow improved.	11	28%	12	30%	17	43%
After the implementation of APTS, Rx evaluation improved.	7	18%	15	38%	18	45%
After the implementation of APTS, medication counseling has improved.	5	13%	17	43%	18	45%
APTS implementation has increased the attrition rate of pharmacy professionals.	5	13%	11	28%	24	60%
APTS implementation has improved budget utilization efficiency.	11	28%	19	48%	10	25%

APTS should be expanded to all health facilities.	10	25%	13	33%	17	43%
In general, APTS is a vital initiative to improve pharmacy service.	5	12.50%	2	5%	33	82.50%

**Pharmacy professional's satisfaction:** The satisfaction of pharmacy professionals was assessed based on different components; 80% of the professionals were satisfied by the supervisor's support and the team leader's listening to their case. Also, 78% were satisfied both by colleagues' work responsibility in the health center and by the responsibility of the people for their job.

Moreover, concerning professional satisfaction; their job and the HC's way of promoting the staff were 65% and 55% respectively. And 63% of the staff has a sense of pride in their job. Additionally, 63% of the professionals responded that 'I have too much to do at work and that 45% were satisfied with the way of explanation in Work assignments. However, 78% and 75% of the respondents are not satisfied with the payment for their work considering the responsibilities and for transport and medication respectively. Considering everything the overall satisfaction of the professionals was 63%, while 28% were dissatisfied as shown in Supplementary Table 1.

### Results from qualitative data

**Availability of services:** The health center that implemented pharmacy service can include an outpatient pharmacy (dispensary), store, drug information, Anti-Retroviral Therapy (ART) pharmacy, and Drug Supply Management (DSM) office based on the APTS guideline. Of those five HCs, all of them were found to have an outpatient pharmacy, ART pharmacy, and store. Drug information services were being provided by those four HCs. However, only those 3 HCs were established as DSM officers and emergency pharmacy services.

The mean number of patients served per day at dispensaries of the HCs was found to be 107.8. On average, in APTS sites, each pharmacy staff member served 35 patients per day, (as per the APTS stated goal). However, in those HCs, each pharmacy staff served an average of 53.9 which are higher than the standard set in APTS guidelines as demonstrated in Table 5.

**Table 5:** Type of pharmacy services available at the selected APTS HCs.

No	Services	Number of health centers	%
1	Outpatient pharmacy	5	100
2	ART pharmacy	5	100
3	Store	5	100
4	Drug information system	4	80
5	Drug supply management (DSM) officer	3	60%
Average percentage			83%

### Tools, structure, and systems for APTS implementation:

The result from the observation checklist in the dispensary of the health center's pharmacy was, 100% of the HCs fulfilled; with an adequate patient waiting area, and a room that secures the privacy of patients and is secure from theft. The overall percent of APTS-required Structure and Systems changes establish across the HCs was 80%.

APTS implementation must be supported by a well-designed system and tools, to meet the desired objectives. From this perspective, the assessment result showed that; on average 78%

of basic APTS tools are presented in the HCs which ranges from 20% of tablet counting trays and functional computers, that 100% availability of model 19, Scissors, etc.

The studies were assessed by choosing 15 process indicators of APTS recommendations, to investigate the extent to which the HCs adhere to the program. Consequently, among them, all 5 HCs were; assessed for the availability of key drugs, Monthly service reports, assigned bin owners, and assessment of prescriptions. However, only two HCs implemented internal coding, financial reports, and a Monitoring and Evaluation (M and E) mechanism for APTS. Regular supportive supervision by Regional Health Bureau (RHB) was the least-observed requirement (20%). The average APTS process implementations were 72% in the selected HCs as shown in Table 6.

**Table 6:** APTS implementation process indicators.

No	Process	Yes (n)	%
1	Regular assessment of availability of key medicines	5	100%
2	Internal coding	2	40%
3	Monthly service report	5	100%
4	Monthly financial report	2	40%
5	Regular patient satisfaction survey	4	80%
6	Assigning bin owners	5	100%
7	Bin location system	4	80%
8	Conducting prescription review	5	100%
9	Workload analysis	3	60%
10	Stock status analysis	4	80%
11	VEN analysis	4	80%
12	ABC analysis	4	80%
13	ABC/VEN reconciliation	4	80%
14	Establishment of M and E mechanism for APTS	2	40%
15	Regular supervision by the RHB	1	20%
Average			72%

**Effective Work force deployment:** The availability of adequate and motivated human resources is one of the critical APTS implementation enablers as APTS system design assumptions. The survey team's observation of the Outpatient Department (OPD) pharmacy was conducted using a prepared checklist;

it documented that the average availability of the required personnel was 71%. The least fulfilled categories were dedicated accountants and Patient assistants, 60% and 20%, respectively.

Concerning attrition, all (100%) of the interviewed health center pharmacy heads were worried about the insufficient staff levels in pharmacy departments to effectively implement the program. As a result of inadequate salary, workload, lack of incentive system, and the human recourse policy which limits the number of staff in the pharmacy, it did not align with the APTS standard.

Concerning capacity building, in the assessment from a self-administered questionnaire for staff in pharmacy departments out of 40 pharmacy personnel only 20 (50%) had received training on APTS. Also, the results from key informant interviews showed that; 4 (80%) of pharmacy heads, 3 (60 %) of medical directors, and only 40% (3) of the finance head of those HCs took training related to APTS as shown in Table 7.

**Table 7:** Human resources at dispensaries of the health facilities for APTS implementation.

No	Category	Available no of HCs	%
1	Presence of biller/evaluator with dedicated counter for Rx evaluation	5	100%
2	Cashiers adjacent to biller	4	80%
3	Pharmacy accountant dedicated to pharmacy section	3	60%
4	Cleaners	5	100%
5	Patient assistant	1	20%
6	Presence of counseling pharmacist	5	100%
7	Presence of processor	2	40%
Average			71%

**Transparency and accountability of transactions:** As depicted in the following Figure 2; except that for (60%) of implementation in daily financial and 80% in pharmaceutical auditing at least once a year, all indicators of Transparency and Accountability of Transactions were conducted in the HCs.

To assess the availability of medicines we measured the availability of 32 key medicines at the HCs dispensary and stores on the day of the visit. In this regard, a higher proportion of medicine was available at 88%, with lower availability of 53%. The average proportion of available key medicines was 71%. Results of the interviewees of all pharmacy heads reported that the average day to conduct a physical inventory was 1 day.

**Efficient budget utilization:** To utilize the pharmaceuticals budget efficiently, 4 (80%) of the HCs analyzed their stock, VEN, and ABC analysis in a quarterly regular pattern, while one of them conducted this every year. The assessment showed that the percentage of expired medicines on a monetary basis, which is one of the core indicators for efficient budget utilization, was reported quarterly in 2011 EC in the selected 3 health facilities, and the year 2012 EC fiscal year was conducted only in those of 4 HCs regularly. However, those of 2 HCs in 2011 and those of 1 in 2012 EC were not reported quarterly in a regular pattern, as

shown in Figure 3 below.

The average percentage of expired medicines (based on monetary value) of the selected health facility in the fiscal years of 2011 EC and 2012 EC, showed that the wastage rate varies in HCs, with a minimum rate of 2.90% and a maximum of 5%, with the average expiry rate 484382.6 Birr (3.58%) in 2011 EC budget year. In the budget year of 2012 EC, the rate decreases as compared to the previous fiscal year, with the average expired medicines of the HCs of 2.7% which ranges from 2.2% to 3.4% in the years of 2012 EC.

The requested budget in the 2011 EC fiscal year ranges from 3,000,000 Birr to 3,500,000 Birr and in 2012 EC was increased, with a maximum of 3.8 million and a minimum of 3 million. Also, the budget that approved and utilized in all HCs was showed an improvement from the budget year 2011 to 2012 as depicted below in Figure 4.

The properties of budget utilization from the approved budget range from 76% to 106% and the average utilization of the budget in 2011 was 92%. The average property of the HCs budget utilized was 99% and the average percentage Growth of Budget utilization was 7%.

**Generation of information:** This study noted that the average implementation of the HCs' Generating information was 68% which ranges between 40% of regular feedback from Regional Health Bureau (RHB) and 100% of Submitting monthly service reports. As reported by the pharmacy head; there is a gap in the drug purchasing process, which was not performed or purchased based on the finding of VEN and ABC analysis, because of the lack of the requested drugs in the Federal drug supplier agency as presented in Table 8.

#### **Challenges to the implementation of the APTS program:**

The qualitative report collected by in-depth interviews of medical directors, pharmacy heads, and finance heads, and questionnaires from staff indicated that they considered the system to be a very important tool for performance evaluation, improvement of patient satisfaction, generating information for decision-making, and bringing transparency and efficiency. The system is proved to be one of the key priorities of the management and board of all HCs included in the study.

However, the shared challenges they recorded, faced throughout the implementation of APTS were; inefficient manpower as recommended by APTS, lack of regular supportive supervision from sub-city and regional officers, lack of capacity building (new staff was not trained and no refreshment for those previously trained) and high workload in the pharmaceutical service.

Also, the medical directors of HCs reported that insufficient budget allocation for pharmaceutical services as requested, and the program was ignored by higher managers and officers as the previous time, were the major challenges to implementing the APTS performance as intended. Moreover, the monthly financial report and the average revenue generated from sales of medicines were not conducted regularly as reported by the finance head.

**Evaluation matrix of analysis and judgment:** The dispensary service quality (client satisfaction) was assessed using gap scores of the SERVQUAL model and the judging criteria are based on the SERVQUAL model principle which is a positive gap score means that patients were satisfied with the service quality, while a negative gap score means that clients were dissatisfied.

Based on this, the overall gap score of the APTS HCs was 1.11 which is a positive gap score. The overall judgment matrix shows

the program's process is Good (78%). The high scores are on average implementation process (89.2%) whereas availability of recommended service is 72%. The overall judgment matrix shows the program's process is Good (72.8%). The high scores are on

Transparency and Accountability of Transactions (84%) whereas the Generation of information is the lowest score of 60% as demonstrated in Table 9.

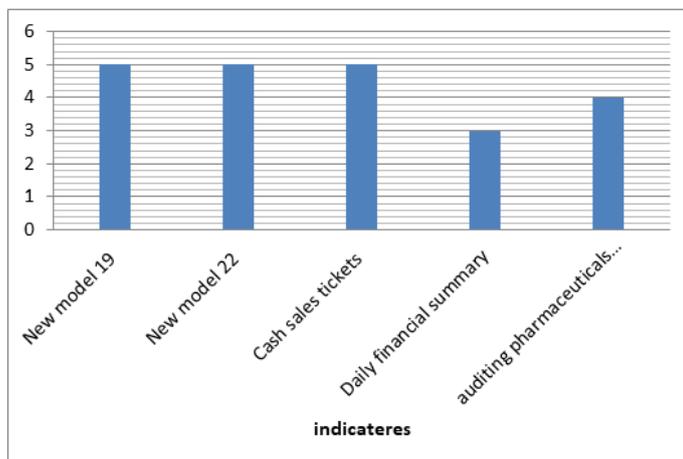


Figure 2: Implementation of transparency and accountability of transactions indicators. Note: (■) number of HC'S conducted.

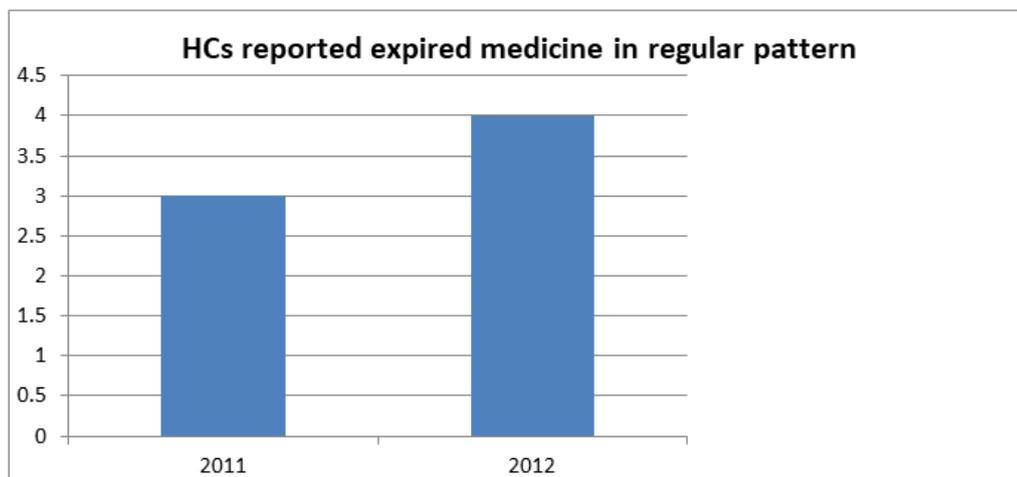


Figure 3: Health centers that reported expired medicine in regular pattern.

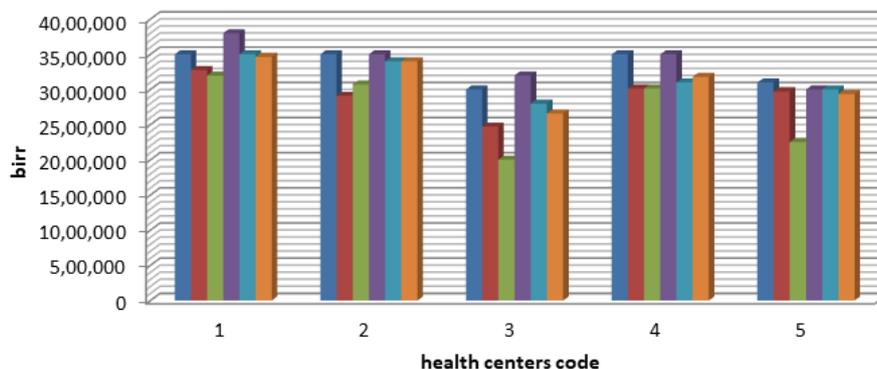


Figure 4: Pharmaceuticals budget requested, approved, and used trends in year 2011 and 2012 EC. Note: (■) 2011 requested, (■) 2011 approved, (■) 2011 utilized, (■) 2012 requested, (■) 2012 approved, (■) 2012 utilised.

**Table 8:** Generating information for decision making, APTS implementing sites (n=5).

Indicators	Yes (n)	%
Submitting monthly financial report	4	80%
Submitting monthly service report	5	100%
Produce daily summary service report	3	60%
Regular feedback from RHB	2	40%
Measuring patient satisfaction	3	60%
Average		68%

**Table 9:** Judgment matrix of the implementation status of the health centers.

Evaluation question	Key result area	List of indicators	O*	W*	S*	JP*	JR*
What is the status of the program implementation in the health center	Program implementation (100%)	The health centers Overall properties of the APTS implementation process	83	20	17	##	Very Good
		Properties of health centers with Availability of tools/resources for APTS	80	30	24	##	Very Good
		% of health centers that makes Structural changes in the facilities dispensaries required for APTS implementation	78	25	20	##	Good
		Proportion of the health center have APTS recommended pharmacy services available		25	18	##	Good
			72				
Average score of APTS implementation status				##	78	##	Good

Note: ## \* Judgment matrix.

## DISCUSSION

### Client care and SERVQUAL model

This evaluation was focused on the program; service quality in the dispensary of pharmacy, overall implementation, outcome, and challenge for implementation. The overall patient knowledge of correct dosage was measured by drug use Indicators (dose, frequency, and duration). The mean of patient knowledge of correct dosage became 93.5% which is slightly similar to that of 92.9%, of studies conducted in hospitals.

And the patient knowledge of frequency and duration were 82.2% and 85.5% respectively. However, there is a difference in the study conducted by Adinew, 12 which is 96.4% and 76.6% of knowledge on frequency, and duration respectively. The reason for the increment in patient knowledge was evaluated by considering various factors including the lower number of clients in the health center than in a hospital, a radical shift in pharmacy dispensing flow and the infrastructure, the dispensary having two doors, and manpower adjustment.

The mean number of medicines prescribed and dispensed for the patient was 2.35 and 1.26 drugs with a standard deviation of 1.02 and 0.72 respectively. And the overall actual dispensing proportions were 88%, which gets from 1 drug to 3 drugs. The result is almost similar to the study conducted in Amanuel Hospital

and the result of Adinew, 12 which were the actual dispensing medicine proportions of 87.5% and 87.2% respectively.

In one study that was conducted in Indonesia, 20 the SERVQUAL model found a gap of -0.487 in services delivered in the pharmacy department, which is different from the gap score of this study. The discrepancy between this probably bearing in mind various factors, the positive gap may relate to the structural and system change in the pharmaceutical service related to APTS, as well as the Indonesian client's economical and lifestyle level may increase the expectation.

In this regard the principle of the SERVQUAL model, as expressed in the perceived level of service is lower than the expected level, the result is unacceptable quality and customer satisfaction will not be achieved, when the reverse is true service quality is accepted and the customer will be satisfied. When perceived service equals expected service, this result is ideal quality and the achievement of customer satisfaction achieved.

The findings of the evaluation and the judgment matrix showed that the APTS program improved the dispensary service quality, client satisfaction, and client knowledge about dispensed medicines at the selected HCs level.

**Pharmacy professional satisfaction, perception, and knowledge:** The evaluation of the pharmacy professional's satisfaction;

Perception and knowledge about APTS resulted; in only 50% of the professionals getting training about APTS, which is almost similar to that of the study of Amanuel hospital 52% of trained manpower.<sup>14</sup> In this regard there is a knowledge gap among the pharmacy staff about APTS, because of this only 2.5% of them know 4 key results areas (pillars of) APTS, 10% knows 3 result area and the rarest of them knows below 3 pillars.

The majority 67.5% and 60% of the professionals preserved the importance of APTS to improve the availability of drugs and patient satisfaction respectively. This is unlikely with that of one study 80.9% and 16.7% of drug availability and patient satisfaction respectively. Additionally, 83% of the professionals believed APTS implementation improves the transparency of pharmaceutical transactions, almost similar to the study, 14 of 92.5%. Also, regarding workload, 60% of the participants alleged with APTS implementation increased their workload, which is smaller to one study, where the workload increased, but the proportion is 100% in the hospital study.

However, the professionals are dissatisfied with the importance of APTS in the reduction of the rate of expiry of medicines that is likely with the study, which is 38% and 31% respectively. The pharmacy professionals' satisfaction ranges from a maximum of 80% in working relations with higher managers to a minimum satisfaction of 3% in payment. The overall satisfaction was 63% and with the dissatisfaction property of 28% in their job, which is unlikely with that of 31% satisfaction and 57.1% of dissatisfaction.

**Implementation status of the APTS program:** The average score for the APTS implementation process that was assessed using 15 selected process indicators was 72%, which ranges from 20% for regular supervision by the RHB to 100% for Monthly service reports, assigning bin owners, and conducting a prescription review. The final overall APTS program implementation status of the HCs, from the judgment matrix, was 78%, which is good as per the judgment parameter, which is smaller compared to that of 83.6%, in the study conducted.

### Outcomes of the APTS program implementation

**Efficient budget utilization:** The assessment of the selected HCs' budget utilization showed that; 4 (80%) of the HCs conducted and reported expired medicine in a regular pattern in the year of 2012 EC, which is a rate of expiry of 2.7% in the monetary value of 424417.4 Birr. Additionally, the budget utilization of the average propriety of the HCs budget utilized was 92% in 2011 and 99% in the year 2012, and then the average percentage Growth of Budget utilization of 7%. Based on the judgment matrix the overall scores of Budget Utilization are 77.6% which is almost the same as 72% of Budget Utilization in the study conducted.

**Generation of information:** The result of this study on the generation of information ranges from 40% of regular feedback from RHB and 1% of Submitting monthly service reports wan an overall score of 60% which is lower than that of 91% of studies in hospitals. This may be because of the availability of resources and man manpower in the hospital.

**Transparency and accountability of transactions:** In this regard the overall implementation of the HCs is 84% which ranges from 74% HCs reporting expired medicines (based on monetary value) to 80% of HCs that conduct ABC/VEN reconciliation annually, this is the same for 85% of another study in hospitals.

**Workforce development, deployment, and organization:** The mean implementation status of this result area was 69.5% which ranges from 60% of HCs that perform workload analysis to that

80% of HCs with cashiers fully dedicated to managing. In this result area, another study found it to be 82.1%. The difference may evaluate from different perspectives like lack of manpower and capacity building in the HCs. According to the judgment matrix of the outcome of the APTS, the overall outcome of the HCs is good scores and average of 72.7%.

## CONCLUSION

This study showed the importance of APTS implementation for the HCs' pharmaceutical services. The program contributes by improving the quality pharmaceutical of services which is important for client satisfaction by; improving client knowledge of the dispensed drug, medicines availability, and reducing wastage. The overall APTS program implementation statuses are good even if they vary among HCs. The HCs that fulfill the recommended program structure, tool, and system have got better outcomes in terms of improvement in the availability of prescribed medicines, patient knowledge of the correct dosage, patient satisfaction on pharmacy services, budget utilization, transparency and accountability of transactions, and in generation of information. However, the program implementation is challenged by deficient manpower, the gap in capacity building, and insufficient support from the Regional Health Bureau (RHB). This negatively affects health care quality by increasing workload and decreasing professionals' satisfaction. A lesson learned from this study is that the APTS program solves most health system challenges that affect pharmaceutical services like; manpower, budget utilization client care, satisfaction, information generation, and transparent transaction. So, all health facilities should be regarded APTS as a powerful tool for making system-wide changes in practices at public health facilities.

## LIMITATIONS OF THE STUDY

The COVID-19 pandemic made data collection from clients and staff result in additional costs due to the implementation of recommended preventive measures. The difficulty in implementation of some of the COVID-19 preventive measures might have temporarily affected the clients' and staff's responses to the questionnaires.

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