

Addis Ababa University
School of Commerce
Logistics and Supply Chain Management Unit

Factors Affecting Pharmaceutical Procurement Practices and Availability of Life Saving Pharmaceuticals in the Case of Public Hospitals of Ethiopia

By
Fikreslassie Alemu Kibret

Advisor
Tariku Jebena (PhD)

A thesis submitted to Addis Ababa University, School of Commerce in partial fulfilment of the requirements for the Degree of Master of Arts in Logistics and Supply Chain Management

October 2018
Addis Ababa, Ethiopia

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DECLARATION

I, Fikreslassie Alemu, declares that this thesis work entitled "*Factors Affecting Pharmaceutical Procurement Practices and Availability of Life Saving Pharmaceuticals in the Case of Public Hospitals of Ethiopia"* is my original work in partial fulfillment of the requirement for the award of Degree of Master of Arts in Logistics and Supply Chain Management. I also declare that it has never been presented in this or any other university and that all resources and materials used in the thesis have been duly acknowledged.

Student Name: Fikreslassie Alemu

Signature: _____

Place of submission: _____

Date of submission: _____

STATEMENT OF CERTEFICATION

This thesis, entitled *"Factors Affecting Pharmaceutical Procurement Practices and Availability of Life Saving Pharmaceuticals in the Case of Public Hospitals of Ethiopia"*, has been submitted for examination with my approval as a university advisor. In my opinion, this thesis is suitable for submission in partial fulfillment of the requirements for the award of Degree of Master of Art in Logistics and Supply Chain Management.

Advisor Name: Tariku Jebena (PhD)

Signature: _____

Date of submission: _____

Addis Ababa University

School of Commerce

Logistics and Supply Chain Management Unit

This is to certify that the thesis carried out by **Fikreslassie Alemu**, entitled: "*Factors Affecting Pharmaceutical Procurement Practices and Availability of Life Saving Pharmaceuticals in the Case of Public Hospitals of Ethiopia"* and submitted in partial fulfillment of the requirements of the Degree of Master of Art in Logistics and Supply Chain Management complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

APPROVAL OF BOARD COMMITTEE

Chairperson ---------- Signature ----------

Research Advisor ---------- Signature ----------

Internal Examiner---------- Signature ----------

External Examiner---------- Signature ----------

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ACRONYMS AND ABBREVIATIONS

CI	Confidence Interval
FDRE	Federal Democratic Republic of Ethiopia
FMHACA	Food, Medicine and Heath Care Administration
FMOH	Federal Ministry of Health
FPPA	Federal Public Property and Administration Agency
HSTP	Health Sector Transformation Plan
IPLS	Integrated Pharmaceuticals Logistics System
MSH	Management Sciences for Health
OECD	Organization for Economic Co-operation and Development
OFAG	Office of Federal Auditor General
PFSA	Pharmaceuticals Fund and Supply Agency
PP	Public Procurement
PPA	Public Procurement Agency
PPP	Public Pharmaceutical Procurement
RDF	Revolving Drug Fund
RHB	Regional Health Bureau
SOP	Standard Operating Procedure Manual
SPSS	Statistical Package for Social Sciences
SRS	Simple Random Sampling
STD	Standard Tender Documents
UNCITRAL	United Nations Commission on International Trade Law on Procurement of Goods, Construction and Services
USAID	United States Agency for International Development
WHO	World Health Organization
WTO	World Trade Organization

ABSTRACT

Inefficient pharmaceutical procurement practices contribute for non-availability of pharmaceuticals in public hospitals of Ethiopia. The purpose of the study was to determine factors affecting public pharmaceutical procurement practice and availability of life saving pharmaceuticals in the case of public hospitals of Ethiopia. A Quantitative research using deductive approach that employed a descriptive correlational research design was conducted in August,2018. Stratified random sampling technique was applied to select a sample size of 95 hospital from the total population size of 258 public hospitals. Structured self-administered questioners were used to collect data from pharmacy professionals who were involved in the procurement of pharmaceuticals in the hospitals. Descriptive and inferential statistics were used to study factors affecting the public pharmaceutical procurement practice while simple linear regression model was used to determine the influence of public pharmaceutical procurement practice on availability of pharmaceuticals. The multiple regression analysis revealed that there is a positive association and a significant effect of procurement institutional organization, procurement staff competency and procurement internal controls on pharmaceutical procurement practice. The analysis also concludes public procurement regulations and nature of pharmaceuticals are found to have insignificant influence on public procurement practice. The simple linear regression model concludes that pharmaceutical procurement practice has a significant effect and a positive linear relationship with availability of pharmaceuticals in public hospitals of Ethiopia. In this study, the average availability of a basket of 20 tracer pharmaceuticals is found to be 90 percent and 76.16 percent on the day of data collection and within six months prior to the study time. The study recommends improving the availability of pharmaceuticals through strengthening the public pharmaceutical procurement practice with respect to organizational structure, capacity of procurement staff competency, internal control, revising the public procurement regulation, capacitating the public and private pharmaceutical suppliers.

Key Words: *Pharmaceutical procurement practice, availability of pharmaceuticals, procurement institutional organization, procurement staff competency and procurement internal controls*

CHAPTER ONE: INTRODUCTION

This chapter introduces background to the study, statement of the problem, research objectives, research hypotheses, significance of the study, scope and limitations of the study. It is the part of the study that lays down the foundations of the research problem on factors affecting the pharmaceutical procurement practice and availability of life saving pharmaceuticals in the case of public hospitals of Ethiopia.

1.1Background of the study

Public procurement (PP) is a public policy tool for translating development finance into predetermined economic and social outcomes (Ellmers, 2011). Public procurement is a key tool to promote objectives of an economic, environmental and social nature gaining much attention globally over the past decades (Pamela, 2015). According to Thai (2009), public procurement systems are basically built on four pillars: procurement laws and regulations, procurement workforce, procurement process and methods, and procurement organizational structure.

Pharmaceuticals procurement is an important part of efficient drug supply and is critical for all levels of health care institutions. An effective procurement process seeks to ensure the availability of the right medicines in the right quantities, at the reasonable price, and at recognized standards of quality (MSH, 2012). Considering huge volumes of purchase on pharmaceuticals and essential role of pharmaceuticals for the health and well-being of populations, a sound procurement system is therefore crucial for ensuring health of the citizen and quality of services (Ombaka, 2009).

In 2009, the Government of Ethiopia enacted procurement and property administration proclamation No 649/2009 to regulate the public procurement practice. The proclamation established the Federal Public Property and Administration Agency (FPPA), which is accountable to the Ministry of Finance and Economic Development, as a body responsible for regulation and monitoring of public procurement activities. The proclamation has a legal framework of Public Procurement Proclamation No 649/2009 and supported by public procurement directive, procurement manual, standard tender documents (STD) and guidelines (FDRE, 2009a). The procurement rules, regulations and manuals of the regional states are also based on the federal

model (Amdework and Aemiro, 2014). The proclamation defines Public Procurement (PP) as procurement by a public body using public fund.

Pharmaceuticals are an integral component of health care systems worldwide, thus, weaknesses in governance of the pharmaceutical system negatively impact health outcomes especially in developing countries (Baghdadi-Sabeti and Wondemagegnehu, 2006). A well implemented supply chain system reduces the likely hood of stock outs and overstocks that can waste scarce resources and lead to product expiration, especially given the special features of pharmaceuticals (MSH, 2012). Therefore, managing pharmaceutical procurement is a formidable challenge, especially in developing countries. Without strong pharmaceutical procurement system, programs will inevitably waste valuable resources through prolonged and frequent stock outs, overstocks and losses (John snow, 2010, John Snow, 2011).

The Ethiopian pharmaceutical supply chain system has been consistently being hampered by several systemic challenges that caused frequent stock outs of critical commodities, thus impeding continuous services to patient (PFSA, 2016; Shewarega *et al*, 2015). To address these challenges, the Pharmaceuticals Fund and Supply Agency (PFSA) was established by the Drug Fund and Pharmaceuticals Supply Agency Establishment Proclamation No 553/2007 with the objectives to avail and supply public health institutions with quality assured essential pharmaceuticals at affordable prices in a sustainable manner and to create enabling conditions for enhancing the accumulation of the fund in its revolving and cost recovery process. PFSA is also mandated to implement efficient and effective pharmaceutical procurement and distribution systems and implement short, medium and long-term plan for procurement, storage and distribution of pharmaceuticals (FDRE, 2007).

The Ethiopian Health Sector Transformation Plan (HSTP, 2015/16 - 2019/20 P.44) indicated that the performance of both public and private importers in supplying medicines in response to hospital's requests in Addis Ababa were poor (44.7%). The availability of key medicines at the dispensaries of 17 Federal and Addis Ababa City Government hospitals ranged from 33.3% to 100% at the time of visit indicating much effort to ensure the continuous availability of needed pharmaceuticals. It has indicated that local manufacturers cover up to 20% of the pharmaceuticals demand of the country. It has also indicated that procurement lead time for some pharmaceuticals and medical equipment is still long due to various reasons (FMOH, 2015).

Cognizant to the pivotal role of availability pharmaceuticals, the HSTP aspires to improve that the pharmaceutical supply chain and logistics management practice of the country by increasing availability of essential drugs to 100%, reducing wastage rate to less than 2% and reducing procurement lead-time from 240 days to 120 days through various strategic initiatives. However, the Ethiopian public procurement guideline states that the estimated lead time for procurement of goods to be 175 to 441 days for international competitive bidding (ICB) procurements and 91 to 259 days for national competitive bidding (NCB) procurements which does not conform with the health sectors target.

A study examining the public pharmaceuticals procurement practice in Ethiopia (Haymero, 2015) discovered that the public pharmaceutical procurement practice of Ethiopia is greatly compromised by the low financial thresholds and lack of special considerations of pharmaceuticals nature in the regulations. It has also indicated short comings including absence of clearly defined central oversight of public bodies, shortage of experienced management and procurement staffs, lack of transparency in the procurement processes, absence of procedures for modern form of procurement activities and unclear institutional arrangement for the management of public procurement process. Public pharmaceutical procurement practice is one of the factor that affects availability of pharmaceutical and requires a full understanding of the factors that affect the procurement practice.

Considering these challenges, this study attempts to assess factors affecting public pharmaceutical procurement practice and availability of life saving pharmaceuticals. Thus, the study will help to design effective interventions that improve the public pharmaceutical procurement practice of the country and help to improve the availability of pharmaceuticals.

1.2 Statement of the problem

Successful provision of health services depends on the continuous availability of pharmaceutical to the public (PFSA, 2016) which in turn depend on effective pharmaceutical procurement system. However, efficient and effective pharmaceuticals procurement in resource-limited countries is challenging, requires innovative approaches and need to be built on sound supply chain and procurement principles (Paul, 2011).

The availability of essential drugs is reported to be one of the challenges in public health facilities of Ethiopia (FMOH, 2015). The Ethiopian Health Sector Transformation Plan (HSTP, 2015/16 - 2019/20 P.44) indicated that the performance of both public and private importers in supplying medicines in response to hospital's requests in Addis Ababa were poor (44.7%). The availability of key medicines at the dispensaries of 17 Federal and Addis Ababa City Government hospitals ranged from 33.3% to 100% at the time of visit indicating much effort to ensure the continuous availability of needed pharmaceuticals. Other studies conducted to assess the health commodities supply chain management in selected public health institutions in Ethiopia also shows that lack of adequate supply of products, frequent stock-outs, frequent emergency order of drugs, understocking, significant variation in availability of key medicines and poor supply performance of importers (Tilahun and Geleta, 2016; FMOH, 2015).

The pharmaceutical procurement practice is a major determinant of availability and total cost of pharmaceutical. Some developing countries have relatively successful public-sector procurement programs, but in many countries, pharmaceutical procurement continues to be less successful, despite extensive reform efforts (MSH, 2012). In Ethiopia, the 2018 Office of Federal Auditor General (OFAG) report also indicated that significant number of procurements are carried out without following the proper procurement legal framework. It also reported that insufficient implementation and enforcement of drug procurement, weak human and institutional capacity for drug procurement at the federal, state as major limitations in the procurement practice of the country. These inefficient procurement practices resulted in poor health outcomes, wastage of scare resources in most of low and middle-income countries (Daniel, Tegegnework, Demissie, & Reithinger, 2012; Jones Snow Incorporation, 2011).

Inefficient public procurement practices contribute for non-availability, un-affordability, poor stock management of drugs and affect supply chain practices (Shewarega *et al.*, 2015). A study conducted in Ethiopia, indicated that the pharmaceutical procurement practice has various short comings including low level of compliance to the procurement regulation, long lead time, shortage of experienced procurement staffs, lack of transparency in the procurement processes and others (Haymero, 2015). Several studies have been conducted on public procurement practice; however, most of the studies did not adequately address and investigated factors affecting the public pharmaceutical procurement practice and availability of pharmaceuticals in public hospitals of

Ethiopian and leaving a major knowledge gap. It's hence against this background that the study was undertaken to determine factors affecting public pharmaceutical procurement practice and availability of pharmaceuticals in public hospitals of Ethiopia. The study will help to fill the missing knowledge gaps, identify challenges, improve availability and design effective interventions.

1.3 Objectives of the study

This study was guided by general and specific objectives as follows:

1.3.1 General Objective:

The general objective of the study is to assess factors affecting pharmaceutical procurement practice and availability of life saving pharmaceuticals in the case of public hospitals of Ethiopia.

1.3.2 Specific Objectives:

The specific objectives of the study are:

1. To determine the effect of public procurement regulations on pharmaceutical procurement practice in public hospitals of Ethiopia
2. To determine the effect of public procurement institutional organizational on pharmaceutical procurement practice in public hospitals of Ethiopia
3. To evaluate the effect of procurement staff competency on pharmaceutical procurement practice in public hospitals of Ethiopia
4. To evaluate the effect of the characteristics of pharmaceuticals on pharmaceutical procurement practice in public hospitals of Ethiopia
5. To determine the effect of procurement internal controls on pharmaceutical procurement practice in public hospitals of Ethiopia
6. To determine the effect of pharmaceutical procurement practice on availability of life saving pharmaceuticals in public hospitals of Ethiopia

1.4 Hypothesis

The objectives of this study will be fulfilled by testing the six hypotheses stated in terms of null hypothesis.

1. H_{01}: There is no significant effect between public procurement regulations and pharmaceutical procurement practice in public hospitals of Ethiopia.
   H_{A1}: There is a significant effect between public procurement regulations and pharmaceutical procurement practice in public hospitals of Ethiopia.

2. H_{02}: There is no significant effect between procurement institutional organizational structure and pharmaceutical procurement practice in public hospitals of Ethiopia.
   H_{A2}: There is a significant effect between procurement institutional organizational structure and pharmaceutical procurement practice in public hospitals of Ethiopia.

3. H_{03}: There is no significant effect between procurement staff competency and pharmaceutical procurement practice in public hospitals of Ethiopia
   H_{A3}: There is a significant effect between procurement staff competency and pharmaceutical procurement practice in public hospitals of Ethiopia

4. H_{04}: There is no significant effect between the characteristics of pharmaceuticals and pharmaceutical procurement practice in public hospitals of Ethiopia
   H_{A4}: There is a significant effect between the characteristics of pharmaceuticals and pharmaceutical procurement practice in public hospitals of Ethiopia

5. H_{05}: There is no significant effect between procurement internal controls and pharmaceutical procurement practice in public hospitals of Ethiopia.
   H_{A5}: There is a significant effect of procurement internal controls on pharmaceutical procurement practice in public hospitals of Ethiopia.

6. H_{06}: There is no significant effect between pharmaceutical procurement practice and availability of life saving pharmaceuticals in public hospitals of Ethiopia.

   H_{A6}: There is a significant effect of pharmaceutical procurement practice on availability of life saving pharmaceuticals in public hospitals of Ethiopia.

1.5 Significance of the study

The proper practice of public pharmaceuticals procurement helps to maintain uninterrupted supply of pharmaceuticals; to prevent oversupply, understock and expiry of products and helps to improve the availability of pharmaceuticals. Therefore, studying factors affecting the public pharmaceuticals procurement practice will provide opportunity to identify and address major challenges in the country. The assessment will also help to further describe how well the public pharmaceutical procurement practice is functioning and affecting the availability of pharmaceuticals, to identify the key factors and strengthen the existing system.

In addition, the study will provide a strong insight on the existing practice, identify non-compliance, inefficiency and challenges on the existing pubic pharmaceutical procurement practice and provides possible recommendations. This can have an immense advantage for different stakeholders; for the managers to make corrective actions, for policy makers to revise the public procurement regulations and review the practices considering the special nature of pharmaceuticals, for researchers to serve as a facilitator for further detail investigations, and particularly, to mitigate and address weaknesses and contribute to enhance public pharmaceutical procurement practices. The study will also propose appropriate intervention to improve and make the pharmaceuticals procurement environment an area which is responsive and supportive to the nation's health policies, programs and needs in availing essential medicines to the public while minimizing negative consequences such as stock outs and interruptions due to bureaucratic delays.

Lastly, the study will contribute to the field of knowledge in public pharmaceutical procurement and other researchers wishing to carry out further research and contribute to existing literature in the field of public pharmaceutical procurement. The research findings, will help other researchers who would want to undertake the same study to come up with more comprehensive research work or highlight the necessary adjustment that were not dealt with in depth by this research.

1.6 Scope of the study

The study will focus to examine factors affecting the public pharmaceutical procurement practice and availability of pharmaceuticals in public hospitals of the Ethiopia. The study will cover the main aspects of public procurement regulations, procurement institutional organizational structure,

procurement staff competency, nature of pharmaceuticals, procurement internal controls on procurement practices in public hospitals of the country. It also determines the effect of the public procurement practice on the availability of life saving pharmaceuticals. Therefore, the results of the study can be generalized to all public health facilities of Ethiopia such as hospitals.

The study will include all public hospitals throughout the country. The study will not cover the public pharmaceutical procurement activities at health centers because of lack of feasibility from

resource and time perspectives. Procurements of a public body from another public body for the provision of goods, works, consultancy or other services are not examined in this study. The study will be conducted with in six-month period and do not cover long-term study. In addition, this research doesn't deal with procurements by state owned enterprises. Moreover, the study will not measure all aspects and cycles of the public pharmaceutical procurement practice such as system selection, quantification and other aspects.

1.7 Limitation of the study

The major limitation of the study is that the data was collected from a sample of staff working at public hospitals. This may not provide insight of the actual practice at other public health centers, regions, woredas and recommends future research to expand the scope to these facilities. The study targeted pharmacy heads and supply chain officers of hospitals who routinely practice procurement of pharmaceuticals and did not incorporate those involved in the procurement process including other procurement practitioners, purchasers, the management, committee members and accounting officers. This study did not measure the effect of public procurement practices with respect to cost, efficiency and effectiveness, transparency, accountability, customer satisfaction and other effects of procurement practices. In addition, budget and the scope are the major limitation of the study which hindered to make an in-depth investigation on the issue further at suppliers, manufacturers, hospitals and health center levels.

Absence of similar published quantitative research articles conducted in public pharmaceutical procurement practice and similar setup limits benchmarking the study. The measurement of the dependent variable, the availability of life saving pharmaceuticals, was conducted based on selected 20 tracer pharmaceuticals; and future studies can include the measurement of other more

number of essential drugs to get comprehensive picture on public procurement practices of hospitals.

The study was an institution based cross-sectional survey conducted in public institutions and limits the generalizability of the findings to the private facilities and other actors in the pharmaceutical supply chain (importers, wholesalers, manufacturers and others). The study also looked only selected independent variables on organizational performance. It did not allow to establish a causal relationship between significantly associated variables and availability of pharmaceuticals, as all variables were measured at the same time. Most of the estimates were based on a one point in time observation. Future research could use a longitudinal study to be able to provide a better understanding on the effect of public pharmaceutical procurement practice on availability of pharmaceuticals over time. A longitudinal survey will also give casual effects of variables. Despite the above limitations, the present study provides useful information on the role of public pharmaceutical procurement practice on availability of life saving pharmaceuticals at hospitals of the country.

1.8 Operational Definition of Terms and Concepts

For this study, the operational definitions for the key terms and concepts are as follows:

- **Availability of tracer pharmaceuticals within six months prior to study**: the percentage of tracer pharmaceuticals continuously available in a health facility within six months prior to study. The long-term product availability can be measured by the percentage of products continuously available in a health facility or PFSA warehouse for the time of interest (6 months). It truly shows whether clients' needs are being met on an ongoing basis (Aronovich, 2010).
- **Availability of tracer pharmaceuticals on the day of visit:** is the availability of tracer pharmaceuticals on the day of visit.
- **Public procurement regulation:** is simply the rules and regulations that are set in place to govern the process of acquiring goods and services needed by an organization to function efficiently.
- **Organizational structure** is a set of explicit and implicit institutional rules and policies designed to provide a structure where various work roles and responsibilities are delegated,

controlled and coordinated. It determines how information flows across the organization departments and how the authority and responsibility for decision making are distributed in organizations.

- **Pharmaceuticals:** Medicines, laboratory reagents, chemicals, medical equipment and supplies
- **Public procurement guideline**: is the public procurement proclamation No. 649/2009 or public procurement directive of 2011 or public procurement manual of 2011 of PPA.
- **Public procurement:** is a public policy tool for translating development finance into predetermined economic and social outcomes (Ellmers, 2011).
- **Stock out:** depleted supply of a given product or products; a zero-stock balance.
- **Supplier fill rate**: The percentage of all items ordered by health facility from supplier over a period that are filled correctly in terms of quantities requested of those items.
- **Line fill rate for tracer drugs**: The percentage of all items ordered to suppliers over a period that are filled correctly in terms of quantities requested of those items.
- **Average lead time**: The average amount of time between facilities place order to supplier and when the products are delivered to a facility. (USAID | DELIVER PROJECT, Task Order 1 (2009, 2010)

1.9 Organization of the thesis

The thesis is organized in five chapters. The first chapter presents the introduction of the study, the second chapter presents review of related literature, the third chapter outlines research methodology of the study, chapter four presents result and discussion, and chapter five presents summary of major findings, conclusion and recommendation. The annex contains data collection instrument and other formats that will be used in the research work.

CHAPTER TWO: RELATED LITERATURE REVIEW

This chapter presents the review of relevant theoretical and empirical literature. It comprises the theoretical review, specific elements of the public procurement practices. The chapter looks the linkages in addition to establishing the existing relationship amongst variables. Empirical studies related to the study variables were reviewed to lay down ground for research. The chapter also attempted to justify the study in addition to reinforcing and underpinning the conceptual framework.

2.1 Theoretical Literature Review

Theories are formulated to explain, predict, and understand phenomena and, in many cases to challenge and extend existing knowledge within the limits of the critical bounding assumptions. The theoretical framework introduces and describes the theory which explains why the research problem under study exists. A theoretical framework consists of concepts, together with their definitions, and existing theory/theories that are used for the study (Njogu and Gichiga, 2016). Theories that are used in this study are described in brief as follows.

2.1.1. Theory of auctions and competitive bidding

Filip, *et.al.* (2011) indicated that auction throughout the community is the generic name that is assigned to the procurement procedures, represented by direct purchase, direct negotiation, request for bids and the actual auctions through which goods are procured in the public sector. For the science of public finance, auction is the key element through which is formed the value of public assets to be acquired. This value is the result of competition between suppliers of goods and services, which intends to provide public assets at the lowest price and best quality. According to Filip, *et.al.* (2011), auction rules are established by public authorities, which set the values of public assets that are expected to be purchased. These estimated values of public assets are the market values or fair values that values that will be allowed by the public authority. Over any of these estimated values, the bidders cannot deliver the goods and services in the auction organized. Hence, the first rule of auctions, namely that the values of goods and services provided for the needs of public authorities cannot exceed their estimated value. These rules of the game

created competition among bidders, are leading eventually to the purchase of public assets whose value is between the estimated and the specific cost of each bidder (Filip, *et.al.*,2011).

2.1.2. Agency theory

Agency theory is concerned with agency relationships. The two parties have an agency relationship when they cooperate and engage in an association wherein one party (the principal) delegates decisions and/or work to another (an agent) to act on its behalf (Eisenhardt, 2004). The important assumptions underlying agency theory is that; potential goal conflicts exist between principals and agents; each party acts in its own self-interest; information asymmetry frequently exists between principals and agents; agents are more risk averse than the principal; and efficiency is the effectiveness criterion. Two potential problems stemming from these assumptions may arise in agency relationships: an agency problem and a risk- sharing problem (Xingxing, 2012). An agency problem appears when agents' goals differ from the principals' and it is difficult or expensive to verify whether agents have appropriately performed the delegated work (i.e. moral hazard). This problem also arises when it is difficult or expensive to verify that agents have the expertise to perform the delegated work (i.e. adverse selection) that they claim to have. A risk-sharing problem arises when principals and agents have different attitudes towards risk that cause disagreements about actions to be taken (Xingxing, 2012).

The assumptions and prescriptions of agency theory fit naturally with the issues inherent in supply chain quality management (Xingxing, 2012). Agency theory determines how procurement officers execute procurement practices on behalf of the hospitals. Existence of poor principle agent relationship leads to low level of top management commitment and this also affects the relationship between institutions, the public and the suppliers. Existence of conflict of interest amongst the agents leads to execution of procurement practices against the procurement the procurement policies and this leads to increased procurement budget and loss of procurement funds. The study thus used this model to determine the effect of procurement regulations for effective implementation of procurement practices in public hospitals of Ethiopia.

2.1.3. Kirkpatrick model

As per Reid Bates (2004), Kirkpartick has developed a very popular evaluation model that has been used since the late 1950s by the training community. The focus is on measuring four kinds

of outcomes that should result from a highly effective training program. Kirkpatrick's model includes four levels or steps of outcome evaluation: Level 1 Evaluation is called Reaction level; Level 2 Evaluation is called Learning level; Level 3 Evaluation is called Behavior level and finally Level 4 Evaluation is called Results level. Kirkpartick Model helps in determining the organization training needs and establishing how employees should be trained to fill the organization skills gaps. The model in important in assessing training need, determining how staff should be qualified, finding out the impact of the offered training and equipping the employees with additional skills (Bates, 2004). The study used this model to evaluate the effect of training on effective implementation of procurement practices in public hospitals of Ethiopia.

2.1.4 Institutional theory

Institutional theory adopts a sociological perspective to explain organizational structures and behavior. It draws attention to the social and cultural factors that influence organizational decision-making and how rationalized activities are adopted by organizations (Dunn & Jones, 2010). The institutional theory is the traditional approach that can be used to examine elements of public procurement. Scott, (2004) identifies three pillars of institutions as regulatory, normative and cultural cognitive. The regulatory pillar emphasizes the use of rules, laws and sanctions as enforcement mechanism, with expedience as basis for compliance. The normative pillar refers to norms and values with social obligation as the basis of compliance. The cultural-cognitive pillar rests on shared understanding on common beliefs, symbols, and shared understanding. In Ethiopia, public procurement is guided by the procurement regulations and guidelines and complied by all the public organizations. This theory is important in explaining the implementation of the public procurement practice, in terms of the structures that public hospitals had put in place to ensure effective implementation and compliance of public procurement rules and regulations.

2.1.5 Systems theory

Systems theory was proposed by Ludwig Von Bertalanffy (1972, 1973) who emphasized that rather than reducing an entity to the properties of its parts or elements, systems theory focuses on the arrangement and relations between the parts which connect them into a whole. In order for the whole to perform, its parts must equally perform so that in fact the failure of the individual parts

culminates into the failure of the whole (Bertalanffy, 1972, 1973). The systems theory well describes the procurement of essential medicines in the country. Public health facilities should have a collaborative network involving all supply chain players in terms of ordering, stocking and consumption of medical supplies with the aid of information communication technologies under the control of public procurement law because if there were a collaborative network between public health facilities and all the involved stakeholders, there would be no issues such as stock out, shortages and wastage of public finances as information would freely flow back and forth the supply chain leading to timeliness of all procurement activities.

2.1.6 Public procurement legal framework models

Public procurement refers to the government activity of purchasing goods and services needed to perform its functions. The concept of PP involves procurement planning, contract placement and contract administration (Arrowsmith, 2010). Public procurement delivers goods and services to the constituents of a government administration, used to achieve socio-economic objectives such as stimulating economic activity; protecting national industries from foreign competition; improving the competitiveness of certain industrial sectors; and remedying national disparities (Thai, 2006). Arrowsmith (2010) contends that the objectives of public procurement are achieved through the legal and regulatory framework.

The public procurement laws and regulations established by policy makers and management executives becomes the institutional framework within which public procurement professionals, and program managers implement their authorized and funded procurement programs or projects. Procurement laws and regulations are the prerequisite for a sound public procurement system which lead to procurement efficiency or inefficiency. They are set in place to govern the process of acquiring goods and services needed by an organization to function efficiently (George and Lucy, 2016). According to Thai (2009), the principal hallmarks of proficient public procurement are economy, efficiency, fairness, transparency and accountability and ethical standards. They clearly cover the whole scope of public procurement, all stages of the procurement process, methods of procurement, ethics and transparency. The ideal procurement laws and regulations should be clear, consistent, comprehensive, and flexible.

According to a report on improving procurement practices in developing country health programs (Arney & Yadav, 2014), the legislative and regulatory framework (policy) covers the legal and regulatory instruments from the highest level (national law, act, regulation, decree, etc.) down to detailed regulation, procedures and bidding documents formally in use. It also covers indicator which verifies the existence, availability and quality of implementing regulations, operational procedures, handbooks, model tender documentation, and standard conditions of contract. Ideally the higher-level legislation provides the framework of principles and policies that govern public procurement. Lower level regulations and more detailed instruments supplement the law, make it operational, and indicate how to apply the law to specific circumstances.

The procurement system cannot be effective in the long run if public servants flouts the rules, regulations and guidelines set by the government. The public procurement legal framework has a national application and the set rules and regulations govern procurement at both the national and county government level. These models were used to explain the Ethiopian public procurement legal framework and the national procurement system.

2.1.7 The Ethiopian public procurement regulations

In 2009, the Government of Ethiopia enacted the federal government procurement and property administration proclamation No 649/2009 and it has established the Federal Public Procurement and Property Administration Agency (FPPA) accountable to the Ministry of Finance and Economic Development to manage the public procurement activities. The legal framework is based on the UNCITRAL Model Law for public procurement and now appears clear and stringent, with a federal procurement proclamation supported by secondary implementing legislation directive and guidelines. The law led to the establishment and operation of the FPPA and the independent complaints board. The law also emphasizes best practices including value for money, non-discrimination, transparency and accountability as the major principles of public procurement in Ethiopia (FDRE, 2009).

The FPPA is a key player in the formulation of public procurement policies and monitoring current practices. The Federal Anti-Corruption Commission has been established since 2002 and has taken its place as a key player in the enforcement of proper conduct in public procurement and fighting corruption. Federal oversight functions have been established (Auditor General and Complaints

Board) and ethical officers have been appointed in many procuring entities. The public-sector code of conduct is widely disseminated. The procurement function is decentralized in that the various Ministries, public bodies and parastatals do their own procurement planning, prepare bidding documents, issue invitation for bids, receive bids and evaluate the bids and make recommendation for award of contracts (Abebe, 2012 & Roman, 2017).

The regulation describes the basic procedures of public procurement. Also, the different methods of public procurement and international procurement are clearly featured. The proclamation in addition, has introduced for the electronic procurement and established a board which reviews complaints on public procurement. Present procurement laws presently apply only to the Federal Government budget and do not cover procurement by parastatals and other public bodies, financed under separate budgets. Also, since regions have the right to implement their own procurement rules covering the regional, the zonal and woreda budgets the procurement proclamation doesn't apply to them. In addition, according to the proclamation (article 3b) "the proclamation doesn't apply to contracts a public body enters with another public body for the provision of goods, works, consultancy or other services at cost." The procurement rules and regulations of the nine regional states are based on the Federal model, the same regulations are reflected in the procurement codes of each individual state (Amdework and Aemiro, 2014). In general, the legal framework of public procurement in Ethiopia comprises the public procurement proclamation, manual, Standard Tender Documents (STD), regulations and guidelines as indicated in Table 2.1.

The Federal Government, to gain economies of scale, also implemented a centralized procurement system in which common user items are selected by the Agency and procurements will be made centrally. Accordingly, the following items which are differentiated as goods and services are identified as common user items. These are; vehicles, stationary items, computers, printers, office furniture, cleaning materials, medicines and drugs, books and magazines, uniforms, electrical equipment, laboratory supplies and equipment, pipes and fittings, filling cabinet, herbicides and insecticides, and laboratory chemicals. On the other hand, the following are identified as common user items (services) which are procured centrally by the Agency. These are; insurance services for government vehicles, vehicles maintenance services, security services, office cleaning services and office machines maintenance services (FRDE, 2011; Tesfahun, 2011).

Table. 2.1. Legal framework of public procurement in Ethiopia proclamation No. 649/2009

Legal framework	Details
Public Procurement Proclamation No 649/2009	Provide a comprehensive legal regime to harmonize and safeguard public procurement
Public Procurement Directive (FPPD)	has thirteen chapters and 52 articles describes procurement ethics, procurement planning, procurement methods and their applications, procedures of international procurement, contract administration, complaints review
Public Procurement Manual	Provides practical guidance and step-by-step procedures for undertaking procurement in accordance with the proclamation.
Standard Tender Documents (STD)	They comprise standard invitation and contract documents for procurement of all values. There are separate standard tender documents for goods, works and services.
Public Procurement Regulations	They contain detailed rules and procedures for all aspects of the procurement system, the operations of Public Procurement Authority (PPA) and procurement entities and the conduct of procurement activities.
Guidelines	issued by the Public Procurement Authority (PPA) which provides supplementary guidance on disposal, single source procurement, margins of preference, framework contract agreements, sustainable public procurement etc.

Source: The Ethiopian Federal Government Procurement and Property Administration Manual, (2010)

Procurement audit plays a vital role in detecting and investigating fraud and corruption in procurement as well as suggesting systemic improvements. In Ethiopia, a legal framework, organization, policy, and procedures for internal and external control and audit of public procurement operations are in place to provide a functioning control framework. Procurement Audit Unit under the Public Procurement and Property Administration Agency is responsible for undertaking procurement performance audits. The Auditor General is largely responsible for financial audits. Whereas performance audit is monitoring of the proper planning before tender; adequate transparency (advertisement); correct choice of procurement method; correct application of award criteria; presence of full procurement file and the proper use of bid documents, financial

audit deals about monitoring of budget compliance; proper disbursement of funds; timely and correct delivery of funds and financial integrity (Belay, 2016; Haftom, 2016; and Roman, 2017).

The government of Ethiopia has also established the PFSA-an autonomous federal organ having its own legal personality with the purpose of guaranteeing a continuous supply of quality assured essential medicines, at an affordable price to public health facilities (FDRE, 2007). PFSA handles forecasting, procurement, storage, and distribution of pharmaceuticals. PFSA procures pharmaceuticals from local and international manufacturers, stores in its central hub and distributes it to health facilities by its 19 branches (PFSA, 2016). Federal and regional public health facilities procure pharmaceuticals directly from PFSA. Public facilities can also procure pharmaceuticals from private suppliers after getting approval and waiver from PFSA whenever pharmaceuticals are not available at PFSA (PFSA, 2016). According to the annual health sector performance report of EFY 2009 (2016/2017), in the year 2009, PFSA procured pharmaceuticals, medical equipment and medical supplies worth of ETB 6.84 billion, which accounts for 80% of the planned procurement in the year. The health commodities, which PFSA is providing to the public health institutions, are majorly of two categories: Free (Program) and Purchase (RDF-Revolving Drug Fund) (PFSA, 2016).

Pharmaceuticals are regulated by different types of legislation and by regulatory agencies for quality. In Ethiopia, Food, Medicine and Health Care Administration and Control Authority (FMHACA) is established by proclamation to ensure the safety and quality of pharmaceuticals. FMHACA's mandates include, among others, the registration, licensing & inspection of pharmaceuticals (FDRE, 2010b). The critical actors in the Ethiopian public pharmaceutical procurement practice comprises of producers, purchasers, health facilities, regulatory agencies, regional health bureaus, procurement authorities and pharmaceutical providers. As of 2010, the country’s national drug list has 1189 pharmaceutical product groups, which are subjected to compliance with the registration requirements of the authority (FMHACA, 2014).

Therefore, this study is based on agent theory supported by theory of auctions and competitive bidding, Kirkpatrick model, stakeholders’ theory, institutional theory, systems theory and public procurement legal framework models as well as the concepts indicated in the Ethiopian public procurement regulations.

2.2 Empirical Literature Review

This section reviews the existing empirical studies on factors affecting effective implementation of procurement practices and availability of pharmaceuticals. In addition, it also looks the effect of the public procurement practice on the availability of life saving pharmaceuticals.

2.2.1 Public pharmaceutical procurement practice

The procurement of essential medicines takes place within the larger framework of a national public procurement system. Efficient public pharmaceuticals procurement should be based on operational, business, information technology, safety and risk management and legal systems, all designed to address an institution's needs of ensuring the availability of the right drugs in the right quantities, available at the right time, for the right patient and at reasonable prices, and at recognizable standards of quality (Arney & Yadav, 2014). A general shift toward decentralization of public procurement has been observed in many developing countries, prompted by legislative reforms aimed to increase local involvement, accountability and availability of products and services (Dickens, Path & WHO, 2011).

First issued in 1994, the United Nations Commission on International Trade Law on Procurement of Goods, Construction and Services (UNCITRAL Model Law) was designed to assist countries in the development of their public procurement systems and provide a framework for procurement regulation. The Model Law has been used as a template which national governments can flexibly use to reform or implement procurement legislation in accord with local circumstances and existing legislation. Generally, the Model Law promotes a procurement system based on a decentralized purchasing and decision-making mechanism and the establishment of a central regulatory or oversight authority (Nicholas, 2011; Arney & Yadav, 2014). As of 2010, lots of countries had enacted legislation based on the Model Law, including the following countries of sub-Saharan Africa: The Gambia, Ethiopia, Ghana, Kenya, Malawi, Nigeria, Rwanda, Tanzania, Uganda and Zambia. The procurement legislations of these countries can therefore be considered generic versions of the Model Law, which share common guidelines and provisions but may differ slightly on specific issues, such as value thresholds for permissible procurement methods (OECD-DAC, 2007; Arney & Yadav, 2014).

The procurement models commonly used by developing country for procurement of pharmaceuticals include centralized procurement, the use of parastatal organizations or autonomous supply agencies, decentralized procurement and the use of procurement agents (SIAPS, 2014; Dickens, Path & WHO, 2011). Although these models can be clearly defined, in practice, their attributes may be combined, and their use adapted to local circumstances. Among many other factors, funding streams, importer presence, donor regulations and national legislation affect the way in which a procurement model operates within a country's public procurement system. However, even in the context of a largely decentralized public procurement system, many health commodities continue to be centrally procured by the national government or procuring entity (Arney & Yadav, 2014).

In most developing countries, the ministries of health and/or centralized government agencies (central medical stores) are largely responsible for the procurement, warehousing and distribution of medicines and health commodities. Centralized procurement may also be carried out by a parastatal or autonomous supply agency, as in Kenya and Tanzania (Dickens, Path & WHO, 2011). In some countries, decentralization has endowed procuring entities with the decision-making authority to choose if to procure from the centralized system. Different health commodities may be procured differently. For example, predominately donor -funded health commodities, including vaccines and drugs for HIV, tuberculosis and malaria, continue to be centrally procured in most countries regardless of decentralization (Arney & Yadav, 2014).

Pamela (2015) stated that PP is one of the main instruments to achieve development goals such as reducing poverty and providing health, infrastructure, education and other services. She further explained that procurement budgets in developing countries account for about 20 percent of government expenditure globally. In Sub Saharan African Countries, PP accounts up to 70 percent of the total public expenditures (Abebe, 2012). For example, Migosi, Ombuki, Ombuki & Evusa, (2013) stipulated that PP accounts for 60% in Kenya, 58% in Angola, 40% in Malawi and 70% of Uganda's public spending. In Ethiopia, Tesfahun indicated (2011) that more than 60% of the total public spending goes to procuring public goods and services. This is very high when compared with a global average of 12-20 % (Tesfahun, 2011). PP represents 18.42% of the world GDP (Gross Domestic Product) and 14 percent of the Ethiopian GDP (Belay, 2016).

Pharmaceutical procurement is a multi-disciplinary process requiring medical, pharmaceutical, managerial, financial and often political expertise. An effective pharmaceutical procurement practices should ensure availability of the right drugs in the right quantities, at the right time, for the right patients at reasonable prices, and at recognizable standards of quality (Baghdadi-Sabeti, 2009). Pharmaceutical procurement is very susceptible to unethical practices. A study undertaken in 2009 demonstrated that transparency, professionalism and equity are some of the major concerning issues related to procurement in healthcare settings. Although a global problem, multiple predisposing factors such as having a weak regulatory authority, lack of regulation enforcement, low staff remuneration, poor procedures and inadequate payment practices, place developing countries at higher risk of corruption (Ombaka, 2009). Lack of transparency can have negative health and economic consequences which can lead to loss of credibility and clients' trust in the hospital services (Baghdadi-Sabeti, 2009). Moreover, this can have greater impact on poorer people because they can neither afford these consequences nor opt for any alternatives, depriving them of access to medicines (Shrestha, Moles, Ranjit & Chaar, 2018).

A case study on the strategic procurement practices of U.S and sub-Saharan African countries stated that public procuring entities responsible for procurement of essential medicines and health commodities used outdated procurement methods, floating tenders' multiple times a year, inflexible forecasts and cumbersome tendering processes due to strict public scrutiny and pressures to be transparent, eventually which brings long lead times and stock-outs, and it hampers the manufacturer's or supplier's ability to plan and respond to the government's needs. But public-sector procurement of health commodities requires more flexibility and responsiveness to change (in population health and in environmental conditions) than procurement of other products (Arney, and Yadav, 2014).

The major challenges in the implementation of the public procurement practices in developing countries are the result of low capacity of procurement professionals, low interaction between procurement entities and the procurement agencies, deliberate controlling of competition, non-compliance with provisions of the law, splitting of contracts into smaller lots, lack of funds, non-cooperation of suppliers and overpricing by bidders. The high adoption of less competitive procurement methods, lack of adequate financial resources, shortage of qualified personnel, splitting of contracts into smaller packages and non- cooperation of suppliers means high cost of

procurement to the state (Ameyaw, Mensah, and Osei-Tutu, 2012). Political interference with the procurement process also poses a challenge to the implementation process and public procurement reforms (World Bank, 2003).

2.2.2 Availability of life saving pharmaceuticals

Pharmaceuticals are indispensable to health systems; by complementing other types of health-care services, they can reduce morbidity and mortality rates and enhance quality of life. Therefore, access to health-care and essential medicines is increasingly being viewed as a fundamental human right (Hogerzeil, 2003). In many countries, expenditure on pharmaceuticals constitutes a large proportion of health expenditure. Pharmaceutical procurement is therefore a major determinant of medicine availability and total health costs. In most developing countries pharmaceutical procurement represent the single largest out-of-pocket health expenditure after personnel costs. Pharmaceuticals also consume the major share of health-related foreign exchange (WHO, 2008).

Effective health care services require that patients get uninterrupted supply of medication. As per the Ethiopian Annual Health Sector Performance Report EFY 2009 (2016/17), the provision of health care service to the public is majorly provided through more than 3,622 functional health centres and 266 functional hospitals (FMOH, 2018). However, the health care services face several challenges in the country. The availability of essential drugs is reported to be one of the challenges (FMOH, 2015). Studies conducted to assess the health commodities supply chain management in selected public health institutions in Ethiopia shows that lack of adequate supply of products, frequent stock-outs, frequent emergency order of drugs, understocking, significant variation in availability of key medicines and poor supply performance of importers (Tilahun & Geleta, 2016; FMOH, 2015).

A competitive and transparent procurement process is one important element of access to affordable pharmaceuticals. The organization of a country's pharmaceutical sector, its capacity for efficient and impartial procurement and the government's procurement practice, are the major critical factors that affect access to pharmaceuticals. Looking at facts about public procurement practices are therefore essential (WHO, 2010). Effective pharmaceutical procurement avoids stock out, losses due to unnecessary expiry, theft and ensure that the desired pharmaceutical products are available in adequate quantity (MSH, 2012). It also benefits public health programs by

increasing program impact, enhancing quality of care and improving cost effectiveness and efficiency (Jones snow Inc., 2010). However, inadequate rules, regulations, structures and absence of a comprehensive procurement policy are among the main challenges for establishing good pharmaceutical procurement practice (Haymero, 2015).

2.3 Conceptual framework of the study

A conceptual framework is a scheme of concepts (or variables) which the research operationalizes to achieve set objectives. It is the main structure that gives the research its form and shape and holds together all the elements in the logical configuration (Mugenda & Mugenda, 2012). In this study, a conceptual framework was developed after a comprehensive review of the relevant theoretical literature and based on rationale showing the relationship between dependent and independent variables. In brief, it was conceptualized that the dependent variable the availability of pharmaceutical influenced by public pharmaceutical procurement practice. In turn, public pharmaceutical procurement practice is influenced by the independent variables which includes public procurement regulations, public procurement institutional organization, public procurement workforce competency, procurement internal controls and nature of pharmaceuticals. The constructs and relationships between research variables are illustrated in the following figure 1.

Public procurement practice is one of the government activities most vulnerable to and affected by various factors. In addition to the volume of transactions and the financial interests at stake, procurement activities are exacerbated by the complexity of the process, the close interaction between public officials and businesses, and the multitude of stakeholders (OECD, 2016). In general, Public procurement practices are built on four pillars: procurement laws and regulations, procurement workforce, procurement process and methods, and procurement organizational structure (Thai, 2009). It is affected by several set of factors where the main ones are described here.

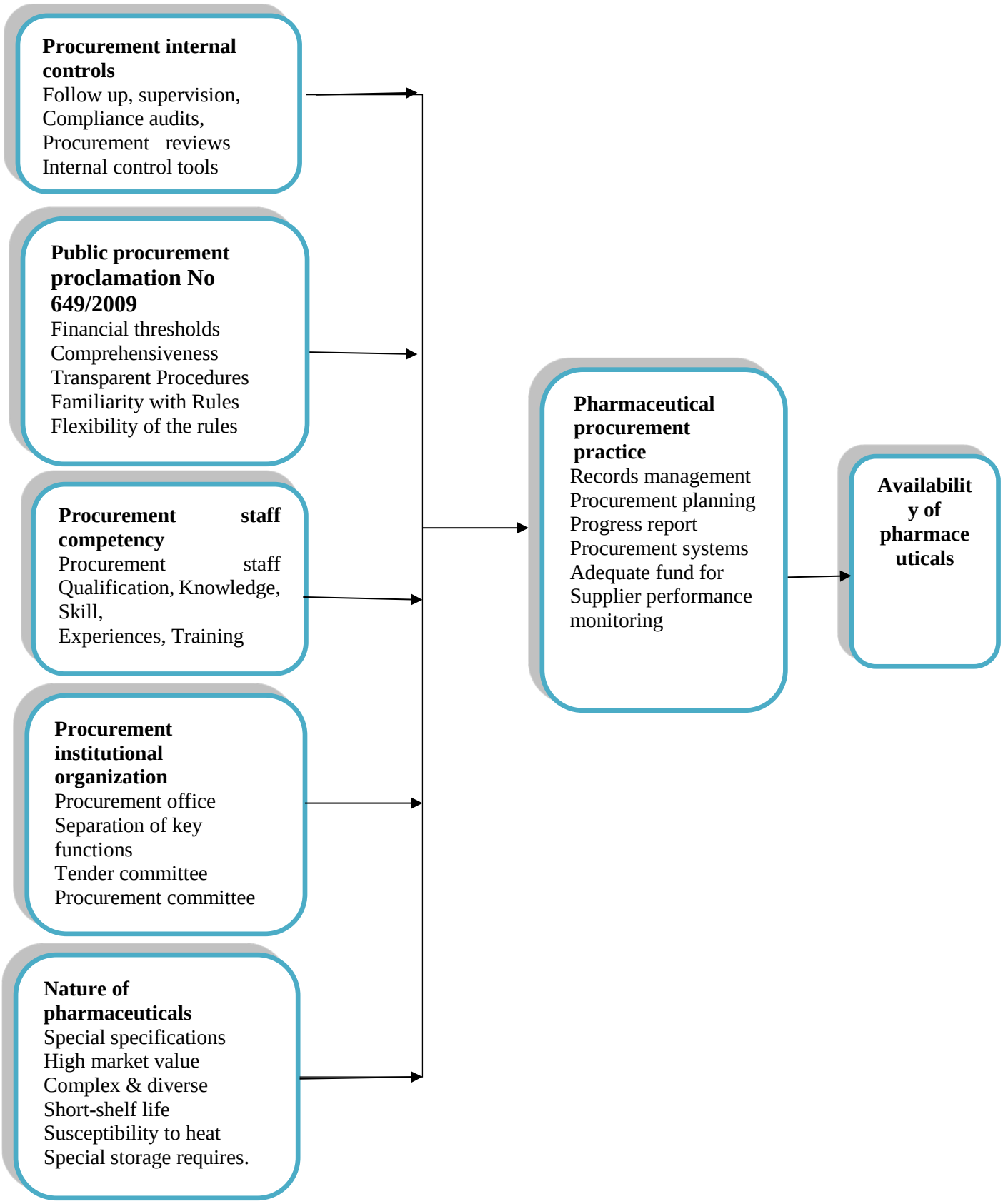


Figure 1: Conceptual framework for factors affecting public procurement practice and availability of pharmaceuticals in public hospital of Ethiopia

2.3.1. Public procurement laws and regulations

A procurement policy is simply the rules and regulations that are set in place to govern the process of acquiring goods and services needed by an organization to function efficiently. The exact process will seek to minimize expenses associated with the purchase of those goods and services by using such strategies as volume purchasing; the establishment of a set roster of vendors and establishing reorder protocols that help to keep inventories low without jeopardizing the function of the operation. Pamela (2015) contends that the level of compliance with procurement regulations greatly influences the efficiency of the procurement procedures in public sector organizations. Putting in place an institution to oversee development and implementation of the public procurement policy improve transparency. However, despite all these regulatory machines, the public-sector procurement process is not in tandem with these legislations.

OECD uses six criteria to assess the implementation legislative and regulatory framework on public procurement. These are implementing regulation that provides defined processes and procedures not included in higher-level legislation; model tender documents for goods, works, and services; procedures for pre-qualification; user's guide or manual for contracting entities; General Conditions of Contracts and procedures suitable for contracting for services or other requirements in which technical capacity is a key criterion (OECD, 2006).

According to Pamela (2015), over 50% of public enterprises in Kenya do not comply with procurement regulations and this has created corruption loopholes and other malpractices on procurement processes. She also notes that application of poor procurement policies and lack of top management support did not promote effective implementation of procurement performance in many governments. The study further notes that many state corporation procurement performances do not fully comply with the procurement regulations.

The Ethiopian public procurement manual sets thresholds for goods, services, consultancy and construction regarding different methods of procurement (FDRE, 2010). According to the proclamation (article 33), open bidding; request for proposals; two stage tendering; restricted tendering; request for quotation and direct procurement methods shall be used in public procurement. Public procurement regulations require procuring entities to plan their procurements (Tesfahun, 2011 and Belay, 2016).

2.3.2. Public procurement institutional organization

The procurement system of a country must be properly developed in conjunction with the country's public procurement and financial management structures so that the procurement and budget disbursement processes support the effectiveness of procurement operations. At the same time, the procurement system must be effectively managed so that responsibilities for policy and regulation, advising contracting entities, handling procurement information and statistics, and overseeing performance monitoring are effectively carried out. Procurement organizational structure whether centralized or decentralized, procurement regulations, rules, and guidance, and internal control policies influence the performance of the procurement function (Arrowsmith, Treumer, Fejø & Jiang, 2011; Arrowsmith, 2010).

The public procurement system's ability to accomplish procurement policies or goals is influenced very much by internal forces including: Interactions between various elements of the public procurement systems, various officials and organizations in the government, and actors and organizations external to sub-agencies; and types of goods, services and capital assets required for an agency's missions (Arney & Yadav, 2014; Thai, 2009).

2.3.3. Public procurement internal controls

Oversight and control of the procurement cycle are not only essential in supporting accountability and promoting integrity in the public procurement process, these processes also generate valuable evidence on the performance and efficiency of the procurement cycle. The OECD recommendation encourages adherents to apply oversight and control mechanisms to support accountability throughout the public procurement cycle, including appropriate processes for complaint handling and sanctions. Effective internal controls are designed to ensure the efficient fulfilment of a public procurement process while safeguarding integrity-related goals and objectives. Internal controls in procurement verify whether legal, administrative and financial procedures are followed and include financial controls, internal audit and management controls. Moreover, harmonized internal control practices ensure consistency in the application of procurement rules and standards across the public sector (OECD, 2016).

2.3.4. Public procurement workforce, proficiency and training

A sound procurement system should have a competent professional workforce equipped with defined skills and knowledge for specified procurement jobs. George and Lucy (2016) reported that effective execution of organization procurement procedures greatly depends on the level of employees' training. A study by Simpson and Power (2007) found that in many African government institutions, many procurement managers are not trained on implementation of effective procurement performance and this contributes to wastage of procurement funds. Thus, governmental entities need to have a comprehensive training program, a comprehensive strategic workforce plan to profile the current staff, and projects staffing needs for the future, to hire, develop, and retain talent (George and Lucy, 2016).

Pharmaceutical procurement regulation is a policy, legal, scientific and technical matter that requires people with specialized knowledge and skills to manage it. Staff must be qualified and trained people with integrity and should be paid well, particularly since medicine regulation involves various stakeholders with commercial interests. There should be code of conduct for staff and they should sign conflict of interest form. Recruitment and promotion of staff must be based on merit and there should be written criteria for recruitment. There should be mechanism for human resources development and mechanisms to empower and motivate staff (WHO, 2004).

The lack of career development path and low salaries of procurement personnel militate against procurement reforms implementation (World Bank, 2004). Ameyaw, Mensah and Osei-Tutu (2012) indicated that lack of proper training on the procurement is a challenge that confronts procurement reforms. In Ethiopia, there is a shortage of experienced procurement staff capable of handling international procurement at the central and regional levels and there is only limited procurement experience at woreda level (Ameyaw, Mensah, and Osei-Tutu, 2012). High turnover of procurement staff in the public service is likely to continue and even increase due to the lack of professional recognition and inadequate salary levels (Abebe, 2012).

2.3.5 Characteristics of pharmaceuticals

Health sector goods, especially pharmaceuticals, differ significantly from the type of goods typically procured in infrastructure, energy, industry, and agricultural projects. For example,

pharmaceuticals differ from other goods in terms of diversity, the terminology used to express their specific chemical and generic characteristics, stability criteria, shelf-life limitations, special storage requirements, susceptibility to heat and light, quick obsolescence, and rigid quality control requirements. Significant price differences can exist between brand name and generic products. The procurement of medical equipment raises additional issues. The use of technology for the diagnosis, treatment, and rehabilitation of people is developing very rapidly. Therefore, the tasks of preparing broad specifications that will encourage competition and carrying out fair and transparent evaluations have become increasingly more difficult. Issues regarding intellectual property rights must also be addressed (World Bank, 2000; Haymero, 2015).

Pharmaceutical procurement is unique compared to other procurement activities. First, anything less than a customer service level of 100% is unacceptable because of the direct impact on health and safety. Ensuring a 100% product availability at a feasible cost represents a huge challenge requiring the supply chain processes to be streamlined towards customer demands. Second, product perishability is another critical issue. Outdated or expired items may be overlooked and dispensed to patients, which could have potentially disastrous effects on both patient care and public relations. Third, complexity of the network system and strict regulations is quite big. Fourth, the pharmaceuticals require special storage and transportation conditions like cold room storage system (2-8oc), deep freeze storage system (< 0oc) and sun-light protected storage area. In addition, pharmaceuticals are affected by changing prescribing polices and guidelines, requirements of bidding process and bid floating time (Mesay, 2016).

The WHO Practical Guidelines on Pharmaceutical Procurement for Countries with Small Procurement Agencies (2002) indicates that appropriate requirements should be provided in bidding documents to ensure quality, safety and efficacy of imported pharmaceutical products. This aspect is particularly important for countries with no local pharmaceutical industry and/or that cannot rely on drugs authorization/registration systems.

The pharmaceutical sector is highly vulnerable to malpractices and unethical practices, due in part to the high market value of pharmaceutical products. Moreover, the stakeholders involved are numerous, diverse and have different objectives. They include researchers, manufacturers, wholesalers, retailers, prescribers, sales representatives, regulators and policy-makers. Corruption can manifest itself in many forms and throughout the medicines chain. For example,

in the form of bribery of a public official to facilitate the registration process of a medicine, favoritism when recruiting new staff or when selecting committee members, fraud or collusion in procurement, or thefts and embezzlement in the distribution chain (WHO, 2006; WHO, 2007).

2.4 Identified Literature Gap

Despite the importance of public pharmaceutical procurement in public hospitals of Ethiopia, the number of studies that have investigated factors affecting the public pharmaceutical procurement practice and availability of pharmaceuticals is very limited in Ethiopia as well as Africa. The study conducted by Haymero (2015) draws much emphasis on public pharmaceutical procurement practice and efficiency of PFSA as per the public procurement guidelines. The study did not address the factors affecting public pharmaceutical procurement practices in public hospital and did not relate with the availability of pharmaceuticals. Procurement studies conducted in other public sectors of the country focused on public procurement reform, the practices of performance-based contracting in public procurement, and the accountability, responsibility, transparency and corruption in the public procurement sector. Similar studies conducted in Kenya by Muhia, Waithera, and Songole (2017) assessed factors affecting the procurement of drugs from a perspective of procurement procedures and challenges. While Shrestha, Moles, Ranjit & Chaar (2018) assessed the medicine procurement in hospital pharmacies of Nepal from a qualitative perspective whether medicine procurement is within the framework of International Pharmaceutical Federation hospital pharmacy guidelines “the Basel Statements”. Study by Silas (2015) attempted to explain factors affecting effective implementation of procurement practices in tertiary public training institutions in Kenya. But have a different setting with the pharmaceutical procurement practice.

These studies have not specifically addressed the factors affecting the effect of public pharmaceutical procurement practices and availability of pharmaceuticals hence developing a major knowledge gap on factors influencing public pharmaceutical procurement practices and availability of pharmaceuticals in public hospitals of Ethiopia. This study aims to fill the missing gaps by determining the public pharmaceutical procurement practices and availability of pharmaceuticals in case of public hospitals of Ethiopia and offering recommendations.

CHAPTER THREE: METHODS OF THE STUDY

This chapter describes the procedures that was used to carry out the study. It deals with research design, population of the study, sampling frame, sample and sampling techniques, research instruments, data collection procedure, data processing and analysis.

3.1 Description of the Study Area and Settings

The Ethiopian Annual Health Sector Performance Report EFY 2009 (2016/17) indicated that the provision of health care service to the public is majorly provided through more than 3,622 functional health centers, 266 functional hospitals and 16,660 health posts (FMOH, 2018). The study was carried out in the public hospitals and PFSA which have direct relation with procurement of pharmaceuticals. The study area is chosen because it is the most convenient to study the public pharmaceutical procurement practice at hospitals; and poor functioning practice of the system in such area will enable to investigate how severe the problem will be in lower level public health facilities of the country.

PFSA, an agency under FMOH established by proclamation № 553/2007, has been working to ensure the availability, accessibility, and affordability of essential medicines with appropriate quality, safety, and efficacy to all public health facilities (FDRE, 2007). Hospitals procure pharmaceuticals to the public from PFSA and private suppliers.

3.2 Research Approach

Quantitative research using deductive approach is used where hypotheses are forwarded, and quantitative data collected to determine whether empirical evidence to support that hypothesis exists or not. Deductive approach is selected to measure the concepts quantitatively, explain relationships between the dependent and independent variables and generalize research findings to a certain extent. In line with this, hypothesizes are deducted from theory and concepts, formulated, tested using quantitative methods such as regression and correlation analysis, mean, mode and median, the outcomes are examined to confirm or reject the theory and modify the theory in instances when hypothesis are not confirmed.

3.3 Study Design

Research design is important as it prepares proper framework within which the research activity is carried out. The study applied descriptive correlational research design. The descriptive design was used since the study gathered quantitative data that described the nature and characteristics of factors influencing the public procurement practices and availability of pharmaceuticals. descriptive research involves observing behavior to describe attributes, objectively and systematically. While the correlation research design was used to determine the extent to which two variables are related. The main objective of descriptive research is to create a snapshot of the current whereas correlational research helps in comparing two or more entities or variables. The correlation design uses correlation coefficient to measure the strength and direction of the linear relationship between the involved variables. The two study designs facilitated towards gathering of reliable data describing the true characteristics of factors affecting public procurement practices and availability of pharmaceuticals in public hospitals of Ethiopia.

3.4. Population of the Study

Population is the entire set of units for which the study data are to be used to make inferences. Target population defines those units for which the findings of the study are meant to be generalized from. The source populations of the study were pharmacy heads and procurement officers who are involved in the management of the procurement of pharmaceuticals in the 266 functional hospitals of the country. The procurement and the pharmacy head staff were targeted since they are the one involved in the execution of key procurement management decisions and hence have technical knowledge. The study population were selected pharmacy professionals who were directly involved in procurement practices and fulfills the inclusion criteria in the source population.

3.5 Inclusion and Exclusion Criteria

All functional public hospitals that manage procurement of pharmaceuticals were included in the study. In addition, all pharmacy professionals who were working in the selected organization with a minimum of having 1 year of service, directly involved in the procurement of pharmaceuticals

were included in the study. Hospitals that have experience of more than two years of service were included in the assessment.

Professionals with less than 1 year of service at the study facility were excluded. Employees who did not participate directly in public procurement practice were excluded from the study. Hospitals that had experience of less than two years of service were excluded from the assessment.

3.6. Sampling Design

3. 6.1 Sample size determination

To determine the sample size of hospitals, for the quantitative cross-sectional survey design, Mugenda and Mugenda (2008) asserts that sampling is part of the statistical practice concerned with the selection of individual or observations intended to yield some knowledge about a population of concern, especially for statistical inferences. They advise that a researcher can use a sample size of 10% to 40% of the total target population as a sample for it to be accepted as a good representative sample. This in turn increases the precision of any estimation methods used. As per the Ethiopian Annual Health Sector Performance Report EFY 2009 (2016/17), there are 266 functional hospitals in the country (FMOH, 2018). However, it was understood that hospitals in Somali region of Ethiopia do not conduct pharmaceutical procurement instead the regional health bureau procures the drugs to hospitals and excluded from the study. Therefore, the total number of hospitals considered in the study is 258. This study takes 37% of hospitals to select a sample size of 95 hospitals of the study population (Mugenda & Mugenda, 2008). Some of the hospitals in SNNPR were not assessable during the study time due to conflicts and adjust was made to proportionally increase the number of hospitals to other regions. With adjustment of rounding up of the number of health facilities while taking proportionate number of health facilities throughout regions, the number of sample size became 95 hospitals.

3.6.2 Sampling method and procedures

To select the sample of public hospitals to be included in the study, stratified proportionate random sampling technique is used. According to Cooper and Schindler (2006), stratified proportionate random sampling technique produce estimates of overall population parameters with greater precision and ensures a more representative sample is derived from a relatively homogeneous

population. Stratification aims to reduce standard error by providing some control over variance. From each stratum the study used simple random sampling to select 95 respondents from the hospitals. According to Cooper and Schindler (2006), random sampling frequently minimizes the sampling error in the population. This in turn increases the precision of the estimation methods.

In this study, 258 public hospitals which were directly involved in the procurement of pharmaceuticals are listed to serve as a sampling frame. A stratified random sampling method is used to create 11 strata according to their regional states and federal hospitals. A separate sample unit is selected from each stratum using Proportional Allocate to their Size (PAS). Those regions with very few hospitals are represented at least by one hospital. Thus, 95 hospitals were the sample population. Individual units of the study are selected by Simple Random Sampling (SRS) method from the proportional allocates to size strata. The sampling procedure is indicated in Table 3.1.

Table 3.1: Sample size determination

Stratum Region/ Federal	Number of Hospitals	Formula	Sample Size	Adjusted Sample size	%
Federal	21	95/258(21)	8	10.0	10.53
Tigray	29	95/258(29)	11	12.0	12.63
Afar	06	95/258(06)	2	3.0	3.16
Amhara	64	95/258(64)	23	23.0	24.21
Oromia	67	95/258(67)	25	24.0	25.26
Benishnagul-	02	95/258(02)	1	2.0	2.11
SNNPR	57	95/258(57)	21	12.0	12.63
Gambella	03	95/258(03)	1	2.0	2.11
Hareri	01	95/258(01)	1	1.0	1.05
Addis Ababa	06	95/258(06)	1	4.0	4.21
Dire Dawa	02	95/258(02)	1	2.0	2.11
Total	**258**		**95**	**95**	**100%**

3.7. Data Collection Techniques and Procedure

Data collection procedure is the process of gathering pieces of information that are necessary for research process. The study collected primary data based on the objectives of the study. A structured questioner was developed to collect data. The questionnaires are prepared in English. The questionnaires are constructed with the Ethiopian context, adapted and customized from OECD/DAC methodology for assessment of national procurement systems (OECD/DAC 2006), the World Bank's country procurement assessment (World Bank 2003), USAID | DELIVER PROJECT logistics indicator assessment tool (LIAT) and logistics system assessment tool (LSAT) (USAID | DELIVER PROJECT, 2009 a &b) and literature reviews conducted on procurement performance measurements. The instrument comprised of dimensions indicated in at conceptual framework.

The self-administered questioners were administered by the data collectors to the hospitals with instructions on how to fill and the duration of time required. The professionals completed the questioners when they are presented at their institution as part of their routine work. The information that are collected include pharmaceutical availability, procurement efficiency and other relevant information as per the questioner. A covering letter accompanied each questionnaire and explaining the objectives of the study and assuring respondents confidentiality to get the data and information required. The answered questioners were collected after one to two weeks after the questioners were provided to the respondents. Secondary data were collected through evaluation of records and reports that are relevant and up to date.

Data collection facilitators who are pharmacists or pharmaceutical supply chain professionals based at the RHBs were used for administration of the questionnaires. Orientation were given for data collection facilitators by the principal investigator on the objectives of the study, the contents of the questionnaire, the process of data collection and critical ethical issues, issues related to the confidentiality of the responses and the rights of respondents.

3.8 Validity and Reliability of the data collection instrument

The questionnaire was pre-tested on a selected group of hospitals (5% of hospitals) and federal institutions to help to identification of errors in data collection instruments, to determine the degree

of clarity of questions, to assess the feasibility of the instrument and make necessary adjustment to ensure the reliability and validity of the questionnaire. The pre-test was conducted at the randomly selected hospitals, which did not form part of the sample to establish if the respondents could answer the questions without difficulty. Appropriate modifications were made accordingly to the findings of the pre-test. Continuous follow up were arranged to control the data collection procedures.

3.8.1 Validity

Validity refers to the extent to which an instrument measures what is supposed to measure. The validity the data collection instrument was conducted by factor analysis. The content of validity of the data collection instrument were determined through discussing the questioner with those who have experience in the country procurement practice. Experts were asked to review the scales of content validity. In addition, after pilot testing, the questionnaire was revised to incorporate the feedback that was provided. The valuable comments, corrections, suggestions given by the research experts assisted in the validation of the instrument. Accordingly, changes were made on the first draft in terms of eliminating, adding or rewording some of the items included in that draft.

3.8.2 Reliability

Reliability refers to the consistence, stability, or dependability of the data. Whenever an investigator measures a variable, he or she wants to be sure that the measurement provides dependable and consistent results (Cooper & Schindler, 2003). This means that if people answered the same question the same way on repeated occasions, then the instrument can be said to be reliable. To measure the reliability of the data collection instruments, an internal consistency technique using Cronbach's alpha will be applied. Cronbach's alpha is a coefficient of reliability that gives an unbiased estimate of data generalizability. An alpha coefficient of between 0.64–0.85 reported to be adequate and between 0.61–0.65 reported to be moderate indicated that the measurements are reliable as they have a relatively high internal consistency and can be generalized to reflect opinions of all respondents in the target population (Perry, 2004 and Taber, 2017). The results on reliability of the research instruments are presented in Table 3.2 below. All the study variables were found to have a Cronbach's alpha coefficient greater than 0.631 and thus

they were all retained for further analysis. Based on reliability test, it was supposed that the scales used in this study were reliable to capture the constructs.

Table 3.2: Reliability test results, September 2018 (n=95).

Variable	N items	Cronbach's Alpha
Public procurement regulations	5	0.695
Public procurement institutional organization	6	0.736
Procurement internal controls	6	0.683
Procurement staff competency	5	0.792
Nature of Pharmaceuticals	10	0.804
Public Pharmaceutical Procurement Practice	16	0.691

Source: Analysis of Survey data September 2018, using SPSS20.

3.9 Data Analysis Methods and Procedures

All the data were checked for completeness, clarity and consistency by the principal investigator. Data were intensively checked and cleaned by the principal investigator before entry into the statistical program and analysis. The data was entered in to statistical package for social sciences (SPSS) version 20 and analysis was done using same software.

Both descriptive and inferential statistics are used to analyze the data. Descriptive statistics of frequencies, standard deviation, percentages, and averages are calculated to describe the data and results are tabulated or presented in graph. Inferential statistics were applied through correlation analysis and the use of multiple regression analysis. The Pearson correlation analysis was used to establish with statistical significance, the nature of the existing relationship between the dependent variable and the independent variables. The regression analysis was used to determine with statistical significance, the influence or effect that the independent variables had in the dependent variable. Multiple regression and simple linear regression models were used to assess the nature of the existing relationship between the dependent variable and the independent variables. Multiple regression is used to study factors affecting the public pharmaceutical procurement practice (in this is a dependent variable). Public pharmaceutical procurement practice is a mediated variable. While simple linear regression model is used to determine the influence of pharmaceutical procurement practice on availability of pharmaceuticals.

The multiple regression model was used to analyze factors affecting the public procurement practice. The multiple regression model was of the form:

Where;

$Y=\alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \varepsilon$

Y = Represents the dependent variable, Pharmaceutical Procurement Practice

α= Constant

e. = error term

β1, β2, β3, β4, β5, = Partial regression coefficient for the independent variables X_i (for i = 1,2,3,4,5)

X1 = Procurement Regulation

X2 = Procurement institutional organization

X3 = Procurement staff competency

X4= Procurement internal controls

X5=Characteristics of Pharmaceuticals

The simple linear regression model was used to determine the influence of public procurement practice (the independent variable in this case) on the availability of pharmaceuticals (dependent variable). The simple linear regression model was of the form:

Where;

$Y=\alpha + \beta 1X1 + \varepsilon$

Y = Represents the dependent variable, availability of pharmaceuticals

α= Constant

e. = error term

$\beta 1$, = Partial regression coefficient for the independent variables X_i (for i = 1)

X1 = Pharmaceutical Procurement Practice

The regression analysis tested the variation of the dependent variable explained by the variation in the independent variables by calculation of the R^2 and adjusted R^2 statistics. P-value of 0.05 is used to decide whether the observed difference was statistically significant or not and to test the null hypotheses. Furthermore, correlation and regression analysis are carried out to determine the factors affecting availability of pharmaceuticals. The study having used the regression model tested for the violation of the assumptions of the linear regression model fitted and tested to confirm whether the model fitted followed/met the assumptions of; linearity, normality, homoscedasticity, and non- multicollinearity of the variables. The observed data are descriptively presented, and the results are displayed using graphs and tables.

ANOVA for regression was also used to determine the goodness of fit of the produced. A multiple regression model was fitted to determine the combined effect that the independent variables had on the dependent variable when acting jointly.

3.10. Operationalization / Measurement of Variables

Operationalization of study variables is important as it enables to measure variables quantitatively thus enabling testing of the formulated hypotheses. The study variables were operationalized based on the research objectives. To operationalize the research variables, the study first determined the indicators/parameters of each independent variable and then employed Nominal (yes or no questions) or ordinal/Likert scale to measure the independent variables. Likert scale is used to measure public procurement regulations, nature of pharmaceuticals and public pharmaceutical procurement practice. While nominal (yes or no questions) are used to measure public procurement institutional organization, procurement staff competency and procurement internal controls. The study operationalized the research variables as indicated in Annex 1.

Based on theories and models in the literature review (Norman, 2010; Sullivan & Artino Jr., 2013) the scale comprised an ordinal scale of 1-5 (1=Strongly Disagree, 2=Disagree, 3= Neutral/Undecided, 4= Agree and 5= strongly agree.). Data was presented in frequency, percentage, mean and standard deviation. A mean score 0-1.5 means the respondents are strongly

disagreed, a mean value 1.5-2.5 means respondents are disagreed, a mean score between 2.5-3.5 means the respondents are neutral to rate the practice and a mean value 3.5-4.5 represents the respondents are agree. Respondents are highly agreed if the mean value above 4.5. Mean of means or overall average of the various variables are then computed.

The availability of tracer pharmaceuticals within six months prior to study was determined by calculating the percentage of the continuous availability the basket of 20 tracer pharmaceuticals in a health facility within six months prior to study. The average availability of the 20 tracer products will indicate the availability rate for a specific facility. It is calculated using the following formula (Aronovich, 2010 and PFSA, 2017).

Formula

$$\frac{\text{\# of products continuously available during the period of interest}}{\text{Total \# of products reviewed}} \times 100$$

3.11. Ethical Considerations

Approval and permission were sought from ethical clearance committee of Addis University, School of commerce, the Hospitals' Research Ethics Committee. A letter of permission obtained from the university were given to all sampled hospitals. Due care was taken to ensure that all those who accept to participate in the study do so voluntarily and give their informed consent. The aim and objective of the study was explained to the study participants. Those who agreed to participate were given a chance to ask for any clarification about points on which they were not clear. They were informed that any information collected during the study are kept confidential and that no health facility or personal name appear on research documents, instead aggregate result of all institutions will be reported. Verbal consents were sought from the study participants. It was explained to the research participants, in this research project, there is no direct benefit but is likely to help the researcher in assessing the availability of pharmaceuticals and linked with challenges with respect to the public pharmaceutical procurement practice of the country. Besides, there is no risk in participating in this research project.

CHAPTER FOUR: RESULTS, DISCUSSION AND INTERPRETATION

This chapter presents the findings, results, analysis, interpretation and discusses the results against the literature reviewed and study objectives. The data is mainly presented in frequency tables, means and standard deviation.

4.1 Introduction

4.1.1 Response rate

The study population consisted of 95 institutions. Questionnaires were self-administered to pharmacy head or logistics officers in 95 public hospitals of Ethiopia. Hospital pharmacy head which were not available during the assessment period were replaced by other hospitals. All the 95 institutions were filled and returned with to a response rate of 100%. The high response rate was achieved due to a one-month data collection period, closer follow up by data collectors and replacing of non-willing respondents by other public hospitals. The high response rate of 100% facilitated gathering sufficient data for analysis and reporting. Thus, the gathered data could be generalized to represent the opinions of respondents about the study problem in the target population.

4.2 General information and demographic characteristics of the study participants

The general and demographic information of the respondents of the study included analysis of the type of hospitals and sex, levels of education, academic qualifications, position held, years of experience and involvement in procurement of pharmaceuticals of the respondents. This information is necessary to assess the respondent's competence to answer the questions and to make the analysis more meaningful and interesting for the reader. Accordingly, these variables are summarized and described in tables 4.1 shown below.

Among the 95 respondents, 10 (10.53%) were from federal hospitals, 24 (25.3%) were from Oromia regional state, 23 (24.8%) were from Amhara regional state, 12 (12.6%) were from Tigray and SNNP regional states respectively and the rest 14 (14.74%) were from the other six regional states. Among the 95 hospitals, 20 (21.1%) were referral hospitals, 47 (49.5%) were general hospitals and the rest 28 (29.5%) were primary hospitals.

Table 4.1: General information and demographic characteristics of the study participants in public hospitals of Ethiopia, 2018 (n=95).

Characteristics	Frequency	Percent
Region		
Tigray	12	12.6
Amhara	23	24.2
SNNP	12	12.6
Oromia	24	25.3
Harari	1	1.1
Dire Dawa	2	2.1
Benishangul-gumuz	2	2.1
Afar	3	3.2
Gambella	2	2.1
Addis Ababa	4	4.2
Federal	10	10.5
Type of hospital		
Referral Specialized	20	21.1
General	47	49.5
Primary	28	29.5
Sex		
Male	91	95.8
Female	4	4.2
Educational level		
Diploma	7	7.4
Degree	74	77.9
Post Graduate	14	14.7
Experience (years)		
Less than 5 years	63	66.3
5-10years	25	26.3
11-15years	5	5.3
16 years and above	2	2.1
Position Held		
Pharmacy Department Head	70	73.7
Supply Chain Officer	20	21.1
Supply chain case team leader	4	4.2
Procurement Officers	1	1.1
Manage procurement of pharmaceuticals		
Yes	91	95.8
No	4	4.2

Source: Analysis of Survey data September 2018, using SPSS20.

There were 91 (95.8%) male and 04 (4.2%) female participants indicating that the pharmaceutical procurement practice is highly dominated by male participants. The result on the highest level of education held by respondents revealed that majority of the respondents hold a bachelor's degree standing at 77.9% (74), diploma levels was 7.4% (7) and postgraduate level were 14.7% as shown in Table 4.1. The result on the work experience of the respondents revealed that respondents who

have worked for less than 5 years were 66.3%, between 5-10 years were 26.3%, between 11-15 years were 5.3% and those who have worked for 16 years and above were 2.1%. This clearly demonstrates that the public pharmaceutical procurement practice in majority of hospitals is managed by inadequately experienced employees.

The study sought to establish the positions held by respondents. The study results revealed that pharmacy department heads were 70 (73.7%), supply chain case team leaders were 4 (4.2%), supply chain officers were 20 (21.1%) and procurement officer was 01 (1.1%). About 95.8% of the respondents reported that they have direct involvement in procurement of pharmaceuticals at the hospitals while 4.2% of the respondents were indirectly involved in the procurement of pharmaceuticals. This clearly demonstrated that majority of the respondents had direct involvement in the procurement practice and had the required position that can help to assess of the effect of the public procurement practice on organizational performance of hospitals which is expressed as availability of pharmaceuticals.

4.3 Descriptive Statistics

Descriptive statistics are used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. The study used descriptive statistics to present the frequency and the percentages of the gathered data on factors affecting public procurement practices in public hospitals of Ethiopia and availability of pharmaceuticals.

4.3.1 Public procurement regulations for procurement of pharmaceuticals

The extent to which the respondents agreed with the given statement concerning public procurement regulations for procurement of pharmaceuticals was investigated. Data in Table 4.2 was analyzed using a Likert scale. Overall public procurement was computed by calculating the mean of means of the various variables.

To assess the public procurement proclamation No 649/2009 in public hospitals of Ethiopia, respondents were required to provide their opinions on five sets of questions related to procurement regulations. The opinion statements that states familiar with the procurement regulations, presence of loopholes in the regulations, and transparent procedures for

pharmaceuticals procurement had a mean score of greater than 3.79 indicating stronger level of agreement with the statements. Whereas the opinion statements that states comprehensiveness and flexibility of the regulation had a mean score of 3.14, and 2.79 respectively indicating their neutral position with the statement. The mean of means or the overall mean scores for the responses was computed as 3.524 with standard deviation of 0.657 for the five questions indicating their level of agreement on public procurement regulations.

Table 4.2: Level of agreement of the respondents on public procurement proclamation No 649/2009

Item	Mean	Std. Deviation
Transparent and explicit procedures for pharmaceuticals procurement	3.80	0.906
Comprehensive enough for the procurement of pharmaceutical	3.14	1.228
Flexible enough for pharmaceutical procurement	2.79	1.228
Parts of the Procurement regulations hinders pharmaceuticals procurement	3.79	0.933
Familiar with the procurement regulations	4.11	0.844

Source: Analysis of Survey data September 2018, using SPSS20.

These findings are in line with that of demonstrated that all Njeru (2015) where the procurement regulation factors affected procurement practices in tertiary public training institutions in Kenya to a large extent. The findings also corroborated with findings by Simpson and Power (2007) that low level of procurement regulations compliance in many public training institutions in developing nations hampers effective execution of procurement functions. It also notes that application of poor procurement policies hinders key impediments towards effective implementation of procurement practices in many government institutions in East Africa.

Respondents were asked on the part of the procurement regulations that affects or hinders public pharmaceuticals procurement. As indicated in Table 4.3, 93.7%, 46.3% and 28.4% of the respondents reported that the financial thresholds, the procurement methods, and product specifications preparation part of the procurement regulations most hinders the public pharmaceutical procurement practice. Only less than 10% of the respondents reported that the advertisement media, procurement planning, bid evaluation, bidding documents and procurement of goods. In addition, few respondents also reported that the procurement team composition, getting waiver or stock out certificate from PFSA to procure pharmaceuticals from private

suppliers and the bidding time are also reported to affect the public pharmaceutical procurement practice. From these results, it can be inferred that the financial thresholds, the procurement methods, the procurement team composition, getting waiver or stock out certificate from PFSA to procure pharmaceuticals and product specifications preparation part of the procurement regulations require revision.

These findings are in agreement with the findings of Haymero (2015) that concluded that low financial in procurement regulation affecting pharmaceuticals procurement efficiency at PFSA in Ethiopia.

Table 4.3: Parts of the public procurement proclamation No 649/2009 that affect public pharmaceuticals procurement practice

Characteristics	Frequency	Percent
Part of the procurement regulations that affect public pharmaceuticals procurement practice		
Procurement methods	44	46.3
Financial thresholds	89	93.7
Advertisement media	7	7.4
Procurement planning	9	9.5
Bid evaluation	9	9.5
Product specifications	27	28.4
Bidding documents	4	4.2
Procurement of goods	8	8.4

Source: Analysis of Survey data September 2018, using SPSS20.

4.3.2 Public procurement institutional organization for procurement of pharmaceuticals

The ability of the public procurement to achieve procurement goals is influenced by organizations in the government, and actors and organizations external to sub-agencies (Arney & Yadav 2014; Thai 2009). As indicated in Table 4.4, more than 90% of the hospitals has reported that specifications for procurement of pharmaceuticals are prepared by the pharmacy department and procurement is conducted after getting approval from the relevant committee/ management. About 68 (71.6%) of the hospitals have procurement unit that manages the procurement of pharmaceuticals. About 64% of the hospitals reported that the members of the tender committee are selected based on criteria as per the regulation and the procurement practice of the hospitals

are overseen by external/ internal office. In only 43.2% of the hospitals that the functions of the procurement office and the tender committee are separated. More than 70% of the hospitals reported that they have established functional tender, procurement, tender opening and disposal committee. Less than 50% of the hospitals have functional procurement planning, tender evaluation, tender endorsing, inspection and acceptance and complaints review committee. This may significantly affect the organizational performance of the hospitals. In general, the mean of means or the overall mean scores for the responses of the six-public procurement institutional organization for procurement of pharmaceuticals questions was computed at 71.42% with standard deviation of 0.246 indicating that there are better public procurement institutional organization for procurement of pharmaceuticals in public hospitals of Ethiopia.

Table 4.4: Public procurement institutional organization for procurement of pharmaceuticals

Item	Number	Percent
The organization have procurement unit	68	71.6
Functions of the procurement office and the tender committee are separated	41	43.2
The members of the tender committee are selected based on criteria as per the regulation	61	64.2
The procurement practice of the hospital is overseen by external/ internal office	60	63.2
Specifications are prepared by the pharmacy department	89	93.7
Procurement is conducted after getting approval from the relevant committee/ management	88	92.6
Formally established and functional committee at the hospital		
Procurement planning committee	42	44.2
Tender committee	76	80.0
Procurement committee	69	72.6
Tender opening committee	73	76.8
Tender evaluation committee	41	43.2
Tender endorsing committee	35	36.8
Inspection and acceptance committee	38	40.0
Disposal committee	69	72.6
Complaints review committee	29	30.5

Source: Analysis of Survey data September 2018, using SPSS20.

4.3.3 Public procurement internal controls in public hospitals of Ethiopia

Oversight and internal controls in procurement verify whether legal, administrative and financial procedures are followed and include financial controls, internal audit and management controls.

Moreover, harmonized internal control practices ensure consistency in the application of procurement rules and standards across the public sector (OECD, 2016). As indicated in Table 4.5, 69.5% and 60.0% of the respondents agreed with opinion statements that state on presence of internal controls tools, processes and controls and annual internal and external audits respectively. While 36.8%, 30.5% and 44.2% of the respondents disagreed with opinion statements that state on the presence of appeals process when bids are rejected, presence of post-tender suppliers' performance monitoring system and the presence of system to detect fraud respectively. The mean of means or the overall mean scores for the responses of the five internal control questions was computed at 48.21% with standard deviation 0.3162 indicating that there are weak public procurement internal controls in public hospitals of Ethiopia.

Table 4.5: Public procurement internal control for pharmaceutical procurement

Item	Frequency	Percentage
The hospital has internal controls tools, processes, and controls to ensure effective oversight over the procurement process	70	69.5
The hospital undergoes annual internal and external audits on procurement of pharmaceuticals	62	60.0
The hospital has a formal appeals process for applicants who have their bids rejected.	35	36.8
The hospital in places efficient post-tender system to monitor on suppliers' performance	29	30.5
The hospital in places efficient system to detect fraud	42	44.2

Source: Analysis of Survey data September 2018, using SPSS20.

4.3.4 Public procurement workforce proficiency and training in public hospitals of Ethiopia

A sound procurement system should have a competent professional workforce equipped with defined skills and knowledge for specified procurement jobs. As a measure of public procurement workforce proficiency and training in public pharmaceutical procurement, 5 questions with the dichotomous scale Yes or No answers were asked to the respondents. As indicated in Table 4.6, majority of the respondents confirmed the existence of weak public procurement workforce, proficiency and training programs in 04 of the 05 statements. In this regard, only 35.8% and 41.1% of the respondents believe that the hospital procurement team is well-staffed with the right number of employees and the right skills in pharmaceutical procurement respectively. About 20%

and 24.2% of the respondents replied the availability of training on public pharmaceutical procurement; and attended training on public procurement regulations in the last one year respectively. In general, the mean of means or the overall mean scores for the responses was computed as 36.42% with standard deviation of 0.309 indicating gaps in public procurement workforce, proficiency and training for pharmaceutical procurement in public hospitals of Ethiopia.

Table 4.6: Public procurement workforce, proficiency and training for pharmaceutical procurement

Item	Frequency	Percentage
The hospital procurement team is well-staffed with qualified staff to carry out procurement of pharmaceuticals	58	61.1
The hospital procurement team is well-staffed with the right number of staff to carry out the procurement of pharmaceuticals.	34	35.8
Procurement staff have the right skills in pharmaceutical procurement	39	41.1
Training on public pharmaceutical procurement regulation that contains knowledge to manage pharmaceutical is available	19	20.0
Procurement staff attended training on the public procurement regulation of the country/region in the past one year.	23	24.2

Source: Analysis of Survey data September 2018, using SPSS20.

4.3.5 Nature of pharmaceuticals in public pharmaceutical procurement

Pharmaceuticals significantly differ from other goods in terms of diversity, generic characteristics, stability, shelf-life limitations, special storage requirements, susceptibility to heat and light, quick obsolescence, and rigid quality control requirements (World Bank, 2000; Haymero, 2015). In line with this, how 10 selected characteristics of pharmaceuticals affects the pharmaceutical procurement process were tapped on a 5-points Likert scale where 1=Strongly Disagree, 2=Disagree, 3=Neutral/Undecided, 4=Agree and 5= strongly agree. Data was presented in frequency, percentage, mean and standard deviation. A mean score 0-1.5 means the respondents are strongly disagreed, a mean value 1.5-2.5 means respondents are disagreed, a mean score between 2.5-3.5 means the respondents are neutral, a mean value 3.5-4.5 represents the respondents are agree and respondents are highly agreed if the mean value is above 4.5.

Table 4.7: Level of agreement of the respondents on the characteristics of pharmaceuticals that affect the public pharmaceutical procurement practice

Item	Mean	Std. Deviation
Vital/lifesaving nature	4.38	0.913
High market value nature	4.06	1.009
Complex and diverse nature	3.66	1.058
Short shelf-life limitation nature	4.06	1.040
Susceptibility to heat, light, quick obsolescence	3.53	1.165
Special storage condition requirement	3.74	1.187
Special specification preparation requirement	3.67	1.134
Price differences among the same pharmaceutical	3.74	1.094
Perceived difference in the efficacy of pharmaceutical	3.67	1.046
Branded/ intellectual property rights of pharmaceuticals	3.68	1.104

Source: Analysis of Survey Data September 2018, using SPSS20.

From the results indicated in Table 4.7, the mean on the 5-point scale ranged from 3.53 to 4.38 for all 10 items, and this indicates that most of the respondents rate the effect of the characteristics of pharmaceuticals on the procurement process as agree. This means most of the respondents agree with the statements that Vital/lifesaving, high market value, complex and diverse, short shelf-life limitation, susceptibility to heat/light and obsolescence, special storage requirement, special specification preparation requirement and branded/ rights of pharmaceuticals affect the pharmaceutical procurement process. In general, the overall mean scores for the responses was computed as 3.82 with SD of 0.648 indicating that the characteristics of pharmaceuticals affects the public pharmaceutical procurement practice.

4.3.6 Public pharmaceutical procurement practice in public hospitals of Ethiopia

Table 4.8 below indicates summary measures on the level agreement of the respondents on 16 set of variables on the pharmaceutical procurement practice of the public hospitals. It was found that respondents agreed /strongly agreed with 11 (64.7%, N=16) of the statements out of the 16 statements. Most of the respondents strongly agreed with the statements that indicate preparing annual pharmaceutical procurement plans, keeping procurement records, utilizing allocated budget for procurement, applying appropriate procurement methods and transparent in procurement system with a mean score above 4.13 with a standard deviation more than 0.752. Some of the respondents availing allocated budget for procurement timely, conducting routine inspection of consignments, presence of lengthy processes for procurement, compliance with procurement

regulations and considering the decisions of the tender committee with a mean score between 3.0 to 4.0. They have also agreed with unethical behavior is a challenge for effective procurement and conflict exists between the procurement department and the pharmacy department a mean score between 3.0 to 4.0. However, the respondents were very much in disagreement with the statements regarding the practice of procurement reports preparation, supplier performance evaluation, practice of E-procurement, flexibility in the procurement to meet emergency needs of pharmaceuticals and ability of the procurement system to avail the required pharmaceuticals at the right time, right quality, and right quantity with a mean score blow 2.5 with a standard deviation of more than 0.988. In general, the mean of means or the overall mean scores for the responses for 16 items was computed as 3.51 with standard deviation of 0.378 indicating that the pubic pharmaceutical procurement practice is executed as per the standard.

Table 4.8: Level of agreement of respondents on public pharmaceutical procurement practice

Item	Mean	Std. Deviation
The hospital prepares annual pharmaceutical procurement plans	4.34	0.752
The hospital keeps accurate and reliable procurement records.	4.33	0.831
The hospital prepares pharmaceutical procurement progress reports	2.44	1.099
The hospital available allocated budget for procurement of pharmaceuticals timely.	3.79	1.157
The hospital effectively utilizes the allocated budget for procurement of pharmaceuticals	4.18	1.031
The hospital conducts routine inspection of consignments	3.43	1.098
The hospital conducts supplier performance evaluation	2.35	1.156
There is high bureaucracy to initiate procurement of pharmaceuticals	3.84	0.949
The hospital complies with most of the provisions of the procurement regulations	3.76	0.844
The hospital applies appropriate procurement methods	4.13	0.718
Decisions of the Tender Committee are always considered in the procurement process	3.88	0.999
"The procurement system in the hospitals is operating in a totally transparent manner"	4.15	0.838
Unethical behavior is a challenge for effective procurement	3.40	1.402
The hospital procurement system provides the required pharmaceuticals at the right time, right quality, and right quantity.	2.36	0.988
The hospital procurement system is flexible to meet emergency needs of pharmaceuticals	2.36	1.129
Conflict exists between the procurement department and the pharmacy department	3.38	1.196

Source: Analysis of Survey data September 2018, using SPSS20.

In Ethiopia, PFSA procures pharmaceuticals from local and international manufacturers and distributes it to health facilities as per the mandate given by proclamation No 553/2007. The proclamation dictates that all public health facilities should procure pharmaceuticals directly from

Table 4.9: Percentage of total procurements, frequency of procurement, lead time and supplier fill rate of PFSA and private suppliers for public hospitals of Ethiopia

Characteristics	Public		Private	
	Number	Percent	Number	Percent
% of pharmaceuticals procured in the last six months				
80% to 100%	30	31.6	0	0
60% to 79%	50	52.6	3	3.2
40% to 59%	12	12.6	21	22.1
30 % to 39%	3	3.2	57	60.0
0 to 19%	0	0	14	14.7
Frequency of procurement in the last six months				
0 to 2	15	15.8	44	46.3
3 to 4	44	46.3	33	34.7
5 to 6	25	26.3	15	15.8
7 to 10	11	11.6	3	3.2
Mean(SD)	4.23(1.882)		2.94(1.725)	
Minimum	1		1	
Maximum	10		10	
Supplier fill rate of pharmaceuticals in the last six months				
>94.5%	0	0	6	6.4
85% to 94%	1	1.1	6	6.4
75% to 84%	8	8.4	11	11.7
65% to 74%	12	12.6	11	11.7
55 to 64%	24	25.3	14	14.9
45 to 54%	26	27.4	13	13.8
35 to 44	14	14.7	21	22.3
<35	10	10.5	12	12.8
Average lead time to procure pharmaceuticals from suppliers (days)				
1 to 2 days	19	20.0	13	13.8
3 to 4 days	39	41.1	18	19.1
5 to 6 days	22	23.2	18	19.1
7 to 10 days	15	15.8	11	11.7
11 to 15 days	0	0	7	7.4
16 to 30days	0	0	19	20.2
>30days	0	0	8	8.5
Mean(SD)	4.25(1.934)		10.38(11.24)	
Minimum	1		2	
Maximum	10		>60	

Source: Analysis of Survey data September 2018, using SPSS20.

PFSA (FDRE, 2007). As indicated in this thesis, hospitals have reported to conduct procurements from 1 to 10 times, average being 4.23 (1.882) times from PFSA during the previous six months. About 84.2% of the hospitals reported to procure more than 60% of their pharmaceuticals requirements from PFSA. Only 47.4% of the hospitals reported that the supplier fallrate of pharmaceuticals from PFSA in the last six months is more than 55% while the rest 52.6% of the hospitals reported that the supplier fill rate of PFSA to be less than 54% of their request. The hospitals reported a lead time ranging from 1 to 10 days, average being 4.25 (1.934) days, to procure pharmaceuticals from PFSA. About 61.1% of the hospitals reported that they require an average lead time from 1 to 4 days while the rest 39% of the hospitals reported to require lead time ranging from 5 to 10 days to finalize procurements of pharmaceuticals from PFSA.

Public health facilities can also procure pharmaceuticals from private suppliers after getting approval from PFSA whenever pharmaceuticals are not available at PFSA (PFSA, 2016). In line with this, the hospitals reported to conduct procurements ranging from 0 to 8 times, average being 2.94 (1.725), from private suppliers during the previous six months using open tender (75%), direct procurement (30.5%) and restricted tender (30.5%) procurement methods as indicated in figure 2.

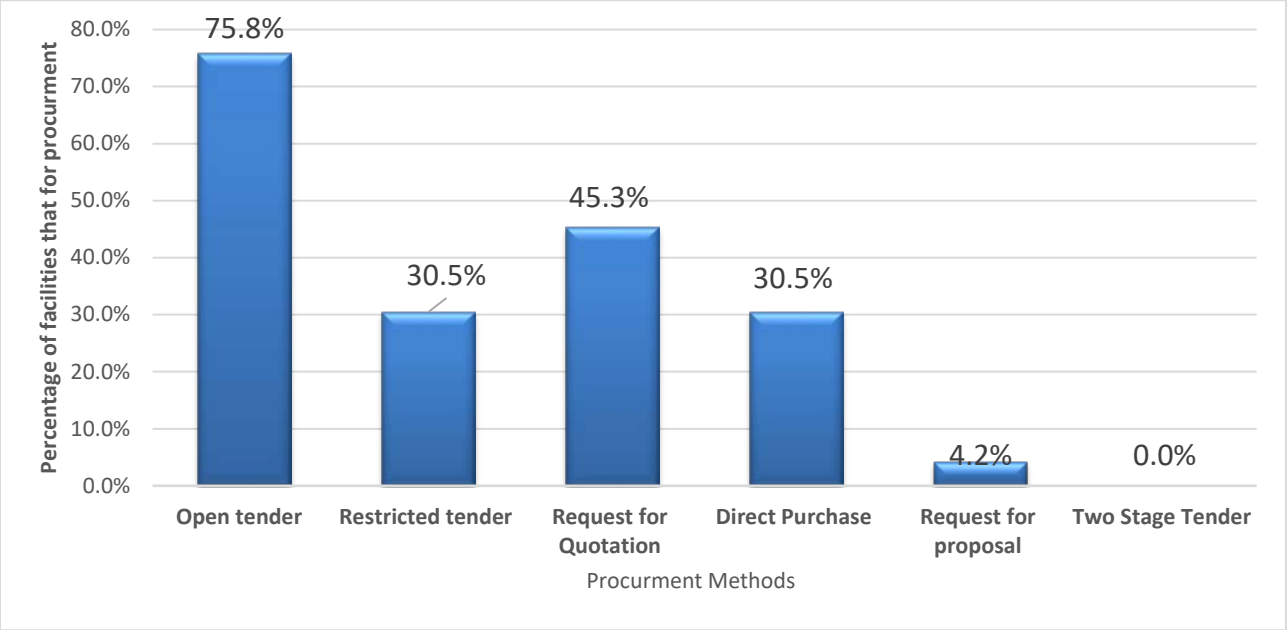


Figure 2: Procurement methods used for procurement of pharmaceuticals from private suppliers for public hospitals of Ethiopia, September 2018 (n=95).
Source: Analysis of Survey data September 2018, using SPSS20.

About 74.7% of the hospitals reported to procure up to 40% of their pharmaceuticals requirements from private suppliers. While only 25.3% of the hospitals reported to procure from 40% to 79% their pharmaceutical requirements form private suppliers. Only 51.1% of the hospitals reported that the supplier fill rate of private suppliers in the last six months is more than 55%. The hospitals reported a lead time ranging from 2 to 60 days, average being 10.38 (11.236) days, to procure from private suppliers depending on the method of the procurement. About 33.0% of the hospitals reported that they require an average lead time from 1 to 4 days, 30.8% of the hospitals reported from 5 to 10 days and while the rest 36.8% of the hospitals reported to require lead time ranging from 11 to more than 60 days to finalize procurements from private suppliers.

4.3.7 Availability of pharmaceuticals in public hospitals

The most important output of a public pharmaceutical procurement system is continuous availability pharmaceuticals at health facilities. Anything less than a customer service level of 100% is unacceptable because of the direct impact on health and safety of patients (Mesay, 2016). Unavailability in any health system is considered a critical system failure since stock-outs can result in patients going without life-saving pharmaceuticals. An additional effect is the reduced confidence in the health system (Shewarega *et al*., 2015). In this study, the dependent variable, organizational procurement performance of public hospitals, is measured by continuous availability of pharmaceuticals. The availability of a basket of 20 tracer pharmaceuticals on the day of visit and within six months prior to the study time were measured and analyzed as a continuous variable. The means of the overall availability rate were used as the measure of central tendency and standard deviation as the measure of dispersion for the variables.

The overall average availability of a basket of 20 tracer pharmaceuticals is 90% (0.105) and 76.16% (0.1342) on the day of data collection and within six months prior to the study time respectively. Average stock availability in the past 6 months is down by 13.84 % when compared with that of the result on the day of data collection. The availability of tracer products ranged from 40% to 100% in both cases of the study. As shown in Table 4.10, only 28.4% and 4.2% of the hospitals able to achieve 100% stock availability for the 20 tracer pharmaceuticals on the day of data collection and within six months prior to the study time respectively. In addition, 81.0% and 32.6% of the hospitals were able to achieve 85% and more stock availability for the 20 tracer pharmaceuticals on the day of data collection and within six months prior to the study time

respectively. Generally, the results show performance gaps in product availability. Hospitals are expected to maintain a100% availability of products to the public (PFSA, 2015). Unavailability of such vital products is therefore a critical issue to be considered.

Table 4.10: Availability of a basket of 20 tracer pharmaceuticals on the day of data collection and within six months prior to the study time in public hospitals of Ethiopia

Variables	Number	Percent
Availability of 20 tracer pharmaceuticals on the day of data collection		
100	27	28.4
85-99	50	52.6
60-84	14	14.7
45-59	3	3.2
30 -44	1	1.1
Mean(SD)	90(0.105)	
Minimum	40	
Maximum	100	
Availability of 20 tracer pharmaceuticals within six months prior to the study		
100	4	4.2
85-99	27	28.4
60-84	41	43.2
45-59	18	18.9
30 -44	5	5.3
Mean(SD)	76.16(0.1342)	
Minimum	40	
Maximum	100	
Optimum Availability of 20 tracer pharmaceuticals on the day of data collection		
≥85% availability	77	81.0
< 85% availability	18	19.0
Optimum Availability of 20 tracer pharmaceuticals within six months prior to the study		
≥85% availability	31	32.6
< 85% availability	64	67.4

Source: Analysis of Survey Data September 2018, using SPSS20.

In general, stock out of Ciprofloxacin 500mg Tablet, Cotrimoxazole Suspension 240mg/5ml, Surgical gloves No. 7.5, Gauze Surgical 90cmx100 m, Insulin zinc suspension 100IU/ml, Tetracycline eye ointment, Hydralazine Injection, Ferrous sulphate + folic acid, Glibenclamide tablet, Enalapril tablet, Oxytocin injection, and Gentamycin Sulphate injection were reported.

In relation with the stock availability, the lead time and suppliers fill rate of the 20 tracer pharmaceuticals are assessed as indicated in Table 4.11. In average, suppliers fill rate of the 20 tracer drugs were 68.07 (12.15) and 73.38 (4.47) for PFSA and private suppliers respectively. While 87.4% and 99% of the hospitals reported that suppliers fill rate of the 20 tracer products is more than 55% within six months of the survey time for PFSA and private suppliers respectively. Most of the hospitals, 53.7% and 74.7% of them reported that suppliers fill rate of the 20 tracer products is between 65% to 74% for PFSA and private suppliers respectively within six months of the survey time. The hospitals reported a lead time ranging from 1 to 12 days, average being 5.53(2.049) days, to procure pharmaceuticals from PFSA. About 72.6% of the hospitals reported that they require an average lead time from 1 to 6 days while the rest 27.4% of the hospitals

Table 4.11: Suppliers performance on lead time and supplier fill rate on a basket of 20 tracer pharmaceuticals in public hospitals of Ethiopia

Characteristics	Public		Private	
	Number	Percent	Number	Percent
Supplier fill rate of pharmaceuticals in the last six months				
>94.5%				
85% to 94%	9	9.5		
75% to 84%	11	11.6	20	21.1
65% to 74%	51	53.7	71	74.7
55 to 64%	12	12.6	3	3.2
45 to 54%	8	8.4	1	1.1
35 to 44	4	4.2	0	0
<35	1	1.05	0	0
Mean(SD)	68.073(12.153)		73.38(4.467)	
Minimum	28.76		47.64	
Maximum	93.25		82.83	
Average lead time to procure pharmaceuticals from suppliers (days)				
1 to 2 days	2	2.1	0	0
3 to 4 days	23	24.2	0	0
5 to 6 days	44	46.3	0	0
7 to 10 days	22	23.2	84	88.4
11 to 15 days	4	4.2	9	9.5
16 to 30 days	0	0	2	2.1
>30days	0	0	0	0
Mean(SD)	5.53(2.049)		9.78(1.88)	
Minimum	1.62		6.00	
Maximum	12.06		23.19	

Source: Analysis of Survey Data September 2018, using SPSS20.

reported to require lead time ranging from 7 to 12 days to finalize procurements of pharmaceuticals from PFSA. About 88.4% of the hospitals reported that they require an average lead time from 7 to 10 days while the rest 11.6% of the hospitals reported to require lead time ranging from 11 to 30 days to finalize procurements of pharmaceuticals from private suppliers.

4.3.8. Pharmaceutical supply chain and procurement performance of PFSA

In Ethiopia, PFSA procures pharmaceuticals from local and international manufacturers and distributes it to health facilities as per the mandate given by proclamation No 553/2007. The proclamation dictates that all public health facilities should procure pharmaceuticals directly from PFSA (FDRE, 2007). The availability of pharmaceuticals at health facilities are directly dependent on the supply chain performance of PFSA. Therefore, assessing the pharmaceutical supply chain and procurement performance of PFSA, which is the main role player in the public health supply chain of Ethiopia, will greatly complement the findings of the study. Even though the main target of this study was to assess the pharmaceutical procurement performance of public hospitals, having insight about the supply chain performance of PFSA will complement the findings on the supply chain performance of hospitals.

To assess stock availability at PFSA, six-month stock availability monitoring and stock on hand data on 557 revolving drug fund (RDF) pharmaceuticals (categorized as essential and 192 vital pharmaceuticals) across 18 branches and central warehouses of PFSA from February to July 2018 was obtained from the forecasting and capacity building department of PFSA. The time range matches with the six months of time assessment period prior to the data collection conducted at hospitals. The data is a reconciled from Health Commodity Management and paper bin-card and approved by the relevant managers of each branch. In addition, the annual report of the forecasting and capacity building department and central PFSA was also reviewed. In line with this, the average stock availability of the 557-essential revolving drug fund (RDF) pharmaceuticals and 192 vital pharmaceuticals in the past 6 months is 42.0% and 62% respectively. While the average stock availability of the basket of 18 tracer pharmaceuticals across 18 branches and central warehouses of PFSA from February to July 2018 was found to be 45%, the minimum being 28% and the maximum being 72% indicating the high variation in availability of the tracer drugs across the PFSA branches and the center. Only 39% of the tracer drugs were continuously available for the six-month period at central PFSA warehouse which is the national warehouse which refills the

other 18 warehouses. This means 61% of the tracer products had experienced stock out of a product for at least once in the last six months. This finding also complements the findings of this thesis where hospitals reported that the average supplier fill rate of PFSA for the 20 tracer drugs was 68.07% (12.15).

In general, the service level agreement of the focal company, PFSA, is to avail a 100% availability of products to the public (PFSA, 2015). Unavailability of such vital products from any of the focal company PFSA branch is therefore critical issue to be considered and directly impacts the availability and its fill rate for hospitals which frequently procure pharmaceuticals from PFSA. The results show performance gaps in product availability.

PFSA has procured 1,957,242,808.00-birr RDF pharmaceuticals and 8,148,800,943.00 health program pharmaceuticals accounting for a total of 10,106,043,75.00 Birr in 2017/2018 fiscal year. The Agency has placed 114 international tenders where 70 of them were international open tenders, 6 of them are emergency tenders and the rest 38 of them are direct procurement from international sole suppliers. In 2017/2018, the agency advertised for procurement of 546 products in its website where only 481 (89.1%) of the products got bidders/suppliers to provide the products. The bidding process took four months starting from the advertisement until its completion and import permit was requested from FMHACA.

As per the agency annual 2017/2018 report, the agency reported that only 65% of the hard currency requested from the national bank was allowed for internationally procurement of pharmaceuticals. With local manufacturer/suppliers, the agency managed to utilize 59.85% of the allocated budget i.e. the agency had a contractual agreement for 821,759,504.48-birr worth pharmaceuticals with local suppliers. However, the local suppliers were able to provide 491,784,799.65-birr worth pharmaceuticals making the suppliers fill rate of local manufacturers 59.85%. The performance of the local suppliers ranged from 26.9% to 78.9% indicating the capacity limitation of local suppliers of PFSA affecting its performance.

To assess the procurement performance of PFSA, the lead time of suppliers (suppliers, freight, custom clearance and total lead time) of purchase orders received via Air and Ship from April to August 30, 2018 were assessed. The average lead time for sea and air shipments were found to be 166.67 (N=49) days and 90.76 (N=203) days respectively. A review of 203 Purchase Orders (POs)

received via air indicated that the overall lead time (from LC opening date/ CAD reservation date to warehouse arrival date) is 90.76 days. Further analysis of the lead time for air shipments indicted that the average suppliers lead time (LC opening/ CAD reservation date to shipping issue date), the freight lead time (from shipping/issue date to airport arrival date) and custom clearance cycle time (from port/airport arrival date to warehouse arrival date) were found to be 74.4, 5.99 and 10.36 days respectively.

A review of 49 Purchase Orders (POs) received via sea indicated that overall lead time for sea shipments which starts from LC opening date/ CAD reservation date to warehouse arrival date is 166.67 days. Further analysis of the lead time for shipments indicted that the average suppliers lead time (LC opening reservation date to shipping issue date), the freight lead time (from shipping/issue date to seaport arrival date) and custom clearance cycle time (from port/airport arrival date to warehouse arrival date) were found to be 86.71, 33.66 and 426.3 days respectively.

Table 4.12: Lead time of international suppliers of PFSA for purchase orders received via air and ship from April to August 30, 2018

Characteristics	Sea (N=49)	Air (N=203 POs)
	Leadtime	Leadtime
Supplier Lead Time (days)	86.71	74.4
Freight Lead Time (days)	33.66	5.99
Custom Clearance Cycle Time (days)	46.3	10.36
Total Lead Time (days)	166.67	90.76

A review of 41 internationally placed Purchase Orders (POs) which are received from April to July 30, 2018 or selected tracer products indicated that the suppliers fill rate is close to 100% in terms of quantity of the items, minimum being 97% and maximum being 100%. In 2017/2018 fiscal year, six local suppliers were managed to deliver 59.8% of the total annual tender award value (ETB), the minimum being 26.9% while the maximum being 78.9%. In addition, a review of 10 specific orders for tracer products from local suppliers indicated that they were able to fill 73% of the tracer dugs. The suppliers fill rate ranged from minimum 0% to 100% fill rate.

The results indicate that local suppliers of PFSA have a critical capacity limitation, around 60% performance, which greatly affected its performance. In contrary, international suppliers were managed to refill almost 100% of the products requested as per their contract agreement. Another challenge indicated in the report is that, 10.9% of pharmaceuticals could not find suppliers from

either local or international market. The lead time for international procurements is 5.6 months for sea shipments and 2.9 months for air shipments which is far more than the target. PFSA has reported that it got a permit for 65% of the hard currency that it requested from the national bank.

4.4 Inferential Statistics of Variables

The dependent variables, public pharmaceutical procurement practice of public hospitals and availability of life saving pharmaceuticals, were compared with key independent variables of the study. The independent variables of the study include public procurement regulations, procurement institutional organization, procurement internal controls, procurement staff competency and nature/characteristics of pharmaceuticals. Pearson correlation analysis were undertaken to explore relationship between the dependent and independent variables.

The study used simple and multiple linear regression analysis to establish and estimate the statistical significance relationship between the dependent and independent variables. Multiple regression is used to study factors affecting the public pharmaceutical procurement practice (in this case, it is a dependent variable). Public pharmaceutical procurement practice is a mediated variable. While simple linear regression model was used to determine the influence of pharmaceutical procurement practice on availability of pharmaceuticals. The regression analysis results were presented using a regression model summary tables, Analysis of Variance (ANOVA) table and beta coefficients tables.

4.4.1 Factors affecting public pharmaceutical procurement practice of public hospitals

Pearson correlation analysis were undertaken to explore relationship between the public pharmaceutical procurement practice with the independent variables which includes public procurement regulations, procurement institutional organization, procurement internal controls, procurement staff competency and nature/characteristics of pharmaceuticals. Pearson correlation coefficient is a measure of linear association between two variables. Values of the correlation coefficient are always between -1 and +1. A correlation coefficient of +1 indicates that two variables are perfectly related in a positive linear sense; a correlation coefficient of -1 indicates that two variables are perfectly related in a negative linear sense and a correlation coefficient of 0 indicates that there is no linear relationship between the two variables (Pallant, 2005).

In line with this, Pearson's correlation analysis indicated that relationship exists between the public pharmaceutical procurement practice with that of procurement institutional organization (r=0.322, p=0.000), procurement internal controls (r=0.329, p=0.00), characteristics of pharmaceuticals (r=0.254, p=0.008), public procurement regulations (r=0.353, p=0.006) and procurement staff competency (r=0.156, p=0.045). The values of the Pearson correlation coefficient (r) for procurement institutional organization, public procurement regulations and procurement internal controls are positive and fall between 0.30 to 0.55 indicating a moderate relation with pharmaceutical procurement practice. While the value of Pearson correlation coefficient (r) for procurement staff competency and characteristics of pharmaceuticals are positive and fall in the range between 0.01 to 0.29 indicating that there exists a very weak relationship with public pharmaceutical procurement practice both variables move in the same direction (If one is going up, the other will go up too or if one is going down, the other will go down too). In line with this, linear logistic relation was carried out for all the independent variables which showed relationship with the dependent variable.

To run for multiple regression, multicollinearity, normality, linearity, homoscedasticity, and independence of residuals assumptions were checked is by inspecting the residuals scatterplot and the normal probability plot of the regression standardized residuals that were requested as part of the analysis. In line with this, all the points lied in a reasonably straight diagonal line from bottom left to top right in the normal probability plot as depicted in Annex 2. This suggested no major deviations from normality. In the Scatterplot of the standardized residuals the residuals roughly rectangularly distributed, with most of the scores concentrated in the center.

Multicollinearity was checked by referring the VIF (Variance inflation factor), which is just the inverse of the Tolerance value (1 divided by Tolerance). VIF values above 10 or tolerance value of less than 0.10 indicate the presence of multicollinearity (Pallant, 2005). In this study, all the five independent variables have VIF value less than 10. i.e. procurement institutional organization (VIF=1.241), procurement internal controls (VIF=1.451), characteristics of pharmaceuticals (VIF=1.411), public procurement regulations (VIF=1.342) and procurement staff competency (VIF=1.314) indicating absence of multicollinearity. In addition, the zero-order coefficient of correlation coefficient shows positive relationship between procurement institutional organization (r=0.49), procurement internal controls (r=0.477), characteristics of pharmaceuticals (r=0.421),

public procurement regulations (r=2.365) and procurement staff competency (r=0.237) with the dependent variable public pharmaceutical procurement practice which is congruent with the pearsons correlation findings.

4.4.1.1 Multiple regression model analysis for hypothesis testing of factors affecting public pharmaceutical procurement practice

Variables that show relationship or correlation with public pharmaceutical procurement practice in Pearson's correlation analysis were fitted by controlling for the effect of confounders in the multivariate regression analysis. This subsection examines whether the multiple regression equation can be used to explain the nature of the relationship that exists between the independent variables and the dependent variable.

As can be observed in Table 4.13, the p value of the t statics for the independent variable, characteristics of pharmaceuticals (t=-1.21, p=0.568) and public procurement regulations (t=3.441, p=0.001) are greater than 0.05 which implies that the coefficient of the independent variable is insignificant. However, the p value of the t statics for the independent variables, procurement staff competency (t=3.55, p=0.001), procurement institutional organization (t=-0.395, p=0.000) and procurement internal controls (t=3.441, p=0.001) is less than 0.05 which implies that the coefficient of the independent variables are significant. Therefore, procurement staff competency, procurement institutional organization and procurement internal controls have showed significant influence on public pharmaceutical procurement practice in the multiple regression analysis. While characteristics of pharmaceuticals do not have influence on public pharmaceutical procurement practice.

The model summary table of the multiple regression analysis (Table 4.13) indicates an overall P-value of 0.000 which is less than 0.05 (5%). This shows that the overall regression model is significant at the calculated 95% level of significance. It further implies that the studied independent variables, namely procurement staff competency, procurement institutional organization and procurement internal controls have significant effect and a positive linear relationship on pharmaceutical procurement practice of public hospitals. The coefficient of determination R square as 0.336 and R is 0.579. This means that 33.6% of the relationship or the variation on public procurement practice is explained by the variation identified three independent

factors. The rest 52.4% is explained by other factors not studied in this research. The Adjusted R square is 0.384 which is greater than the R square, 0.336. Other factors could be influencing public procurement practice of public hospitals other than the two factors.

Table 4.13 Multiple regression of independent variables with pharmaceutical procurement practice of public hospitals

Model Summary, Multiple regression

R	R Square	Adjusted R Square	Std. Error of the Estimate	F Change	Sig. F Change
0.579a	0.336	0.384	0.313	15	0.000

ANOVA, Multiple Regressions

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	4.496	3	1.499	15.328	.000b
Residual	8.898	91	.098		
Total	13.394	94			

Coefficients of Overall Regression Model

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
Constant (β0)	2.925	0.100		29.27	0.000	2.726	3.123
Public procurement regulations (β1)	0.128	0.210	0.131	1.21	0.568	0.075	0.382
Procurement institutional organization (β2)	0.554	0.144	0.372	3.95	0.000	0.268	0.840
Procurement staff competency (β3)	0.352	0.114	0.342	3.55	0.000	0.288	0.560
procurement internal controls (β4)	0.416	0.121	0.348	3.441	0.001	2.726	3.523
Characteristics of pharmaceuticals (β5)	-0.038	0.119	-0.031	-0.32	0.748	-0.275	0.198

Source: Analysis of Survey data September 2018, using SPSS20.

The regression equation is established that taking all significantly related factors into account (public procurement practice as the result of procurement institutional organization and procurement internal controls) constant at zero public procurement practice among public hospitals will be 2.925. The findings presented also shows that taking all other independent variables at zero, a unit increase in procurement institutional organization will lead to a 0.554 increase in the scores of public procurements practice; a unit increase in procurement internal controls will lead to a 0.416 increase in procurement practice among public hospitals in Ethiopia. The regression equation will be:

$Y=2.925 + 0.372X2 + 0.342X4+0.348X3$

Y = Pharmaceutical procurement practice

α= Constant

X2 = Procurement institutional organization

X4= Procurement internal controls

X3=Procurement staff competency

The study used ANOVA to establish the significance of the regression model. In testing the significance level, the statistical significance was considered significant if the p-value was less or equal to 0.05. The significance of the regression model is as per Table 4.13 above with P-value of 0.00 which is less than 0.05. This indicates that the regression model is statistically significant in predicting procurement practice in public hospitals. Basing the confidence level at 95% the analysis indicates high reliability of the results obtained. The overall ANOVA results indicates that the model was significant at $F = 15.328$, $p = 0.000$.

In summary, out of the five factors studied, three of the factors namely, procurement staff competency, procurement institutional organization and procurement internal controls have a positive relationship with public procurement practice. In hypothesis testing of the variables,

Hypothesis 1

As per explained in this part of the thesis, public procurement regulations are found to has insignificant influence on public procurement practice. It is not statistically significant predictor of public pharmaceutical procurement practice. Therefore, the study accepts the null hypotheses for H_{01}.

- H_{01}: There is no significant effect between public procurement regulations and pharmaceutical procurement practice in public hospitals of Ethiopia, $\beta 1=0$.
- H_{A1}: There is significant effect between public procurement regulations and pharmaceutical procurement practice in public hospitals of Ethiopia, $\beta 1\neq 0$.

These findings are in contrary with Njogu and Gichinga (2016) who argue that procurement regulations affect the procurement performance. The findings are also in contrary to the findings concluded by the Silas Eliphas Njeru (2015) where employed procurement policies hampered effective implementation of procurement practices in over 80% of tertiary public training institutions in Kenya. Wasike and Mugambib (2015) indicated that skills and training had a strong relationship between skills and training and the performance of public health facilities in Mombasa County, Kenya. Therefore, further study is required to analyze the influence of public procurement regulations with more sample size, better depth, diversified experts and better duration of study.

Hypothesis 2

- H_{02}: There is no significant effect between procurement institutional organization and pharmaceutical procurement practice in public hospitals of Ethiopia, $\beta 2=0$.
- H_{A2}: There is significant effect between procurement institutional organizational structure and pharmaceutical procurement practice in public hospitals of Ethiopia, $\beta\ 2\neq 0$.

The results in Table 4.13 above indicate that procurement institutional organization has a significant influence on public procurement practice. This is supported by regression analysis t-value of 3.85 which is greater than the critical value 2.0 and a p-value of 0.01 at 95% level of significance which is less than 0.05. After testing the hypothesis by comparing the scores of calculated t-value and critical t; Calculated t-values was, 3.85 for procurement institutional organization, which is greater than the critical t_{36-1} (0.05) = 2.0, the study rejected the null and

accepts the alternative hypothesis. Therefore, the study accepted the alternative hypothesis that there is significant effect between procurement institutional organizational and pharmaceutical procurement practice in public hospitals of Ethiopia.

The findings are incongruent with the findings concluded by Pamela, (2015) whose findings indicated a significant effect of the public procurement organizational framework implementation on organizational performance in Kenya. Hence, hospitals need to be equipped with adequate organizational structure to implement effective public procurement practice.

Hypothesis 03

- H_{03}: There is no significant effect between procurement staff competency and pharmaceutical procurement practice in public hospitals of Ethiopia $\beta\ 3=0$,
- H_{A3}: There is significant effect between procurement staff competency and pharmaceutical procurement practice in public hospitals of Ethiopia. $\beta\ 3\neq0$,

The results in Table 4.13 above indicate that procurement staff competency has a significant influence on public procurement practice. This is supported by regression analysis t-value of 3.55 which is greater than the critical value 2.0 and a p-value of 0.000 at 95% level of significance which is less than 0.05. After testing the hypothesis by comparing the scores of calculated t-value and critical t; Calculated t-values was, 3.55 for procurement staff competency, which is greater than the critical t_{36-1} (0.05) = 2.0, the study rejected the null and accepts the alternative hypothesis. Therefore, the study accepted the alternative hypothesis that there is significant effect between procurement staff competency and pharmaceutical procurement practice in public hospitals of Ethiopia.

The findings are incongruent with Njogu and Gichinga (2016) who argue that procurement staff competency affect the procurement performance. The findings are also aligned with the findings concluded by the Silas Eliphas Njeru (2015) where lack of professional training hampered effective implementation of procurement practices in over 80% of tertiary public training institutions in Kenya. Wasike and Mugambib (2015) indicated that skills and training had a strong relationship between skills and training and the performance of public health facilities in Mombasa County, Kenya. Hence, hospitals need to be equipped with adequate procurement staff competency to implement effective public procurement practice.

Hypothesis 4

As per explained in this part of the thesis, nature/characteristics of pharmaceuticals are found to have insignificant influence on public pharmaceutical procurement practice. It is not statistically significant predictor of public pharmaceutical procurement practice. Therefore, the study accepts the null hypotheses for H_{04}.

- H_{04}: There is no significant effect between the characteristics of pharmaceuticals and pharmaceutical procurement practice in public hospitals of Ethiopia
- H_{A4}: There is significant effect between the characteristics of pharmaceuticals and pharmaceutical procurement practice in public hospitals of Ethiopia

The finding is in disagreement with that of Haymero (2015) who concluded that lack of considerations for pharmaceuticals nature in public procurement affected pharmaceuticals procurement efficiency at PFSA in Ethiopia. Therefore, this study proposes to study the influence of nature/characteristics of pharmaceuticals with more sample size and better length of assessment.

Hypothesis 5

- H_{05}: There is no significant effect of procurement internal controls on pharmaceutical procurement practice in public hospitals of Ethiopia, $\beta 5=0$,
- H_{A5}: There is a significant effect of procurement internal controls on pharmaceutical procurement practice in public hospitals of Ethiopia, $\beta 5=0$,

The results in Table 4.13 above indicated that procurement internal controls have a significant influence on procurement practice in public hospitals of Ethiopia. This is supported by regression analysis t-value of 3.44 which is greater than the critical value 2.0 and a p-value of 0.001 at 95% level of significance which is less than 0.05. After testing the hypothesis by comparing the scores of calculated t-value and critical t; Calculated t-values was, 3.441 for procurement internal controls, which is greater than the critical $t_{36\text{-}1}$ (0.05) = 2.0, the study rejected the null hypothesis. Therefore, the study accepted the alternative hypothesis that there is a significant effect of procurement internal controls on pharmaceutical procurement practice in public hospitals.

One of the main purpose of this study was to evaluate factors affecting public pharmaceutical procurement practice in the case of public hospitals of Ethiopia. The regression results in this

study revealed that procurement staff competency, procurement institutional organization and procurement internal controls had a positive and a significant association with effective public pharmaceutical procurement practice. Previous findings also support that procurement staff competency, procurement institutional organization and procurement internal controls are the important factors that affect public procurement practices. Procurement institutional organization whether centralized or decentralized, procurement staff competency, and internal control policies influence the performance of the procurement function (Arrowsmith, Treumer, Fejø & Jiang, 2011; Arrowsmith, 2010). This shows that strengthening procurement staff competency, procurement institutional organization and procurement internal controls is a very important factor in the extent or degree to which better public procurement practice can be achieved in public hospitals. Therefore, success or failure of public pharmaceutical procurement practices in public hospitals of Ethiopia depends partly on the strength of the procurement staff competency, procurement institutional organization and how internal controls are strong in the procurement activity. However, this study proposes to further study the influence of public procurement regulations and nature/characteristics of pharmaceuticals with more sample size, better depth, involving diversified experts and better duration of the study.

4.4.2 The influence of pharmaceutical procurement practice on availability of life saving pharmaceuticals

Simple linear regression model was used to determine the influence of pharmaceutical procurement practice on availability of pharmaceuticals.

Pearson's correlation analysis indicated that relationship exists between the dependent variable availability of life saving pharmaceuticals with that of pharmaceutical procurement practice ($r=0.277$, $p=0.006$). The values of the Pearson correlation coefficient (r) is positive and falls in the range between 0.01 to 0.29 indicating that there exists a very weak relationship between the independent and dependent variable both variables move in the same direction. In line with this, simple linear logistic relation was carried out with the dependent variable.

To conduct the regression analysis, tests for normality, linearity, homoscedasticity, and independence of residuals assumptions were checked. Linearity of data means that the values of the outcome variable for each increment of a predictor lie along a straight line. Homoscedastic

means the values have a constant variance. Regression analysis assumes that the data is normally distributed. Non-normally distributed data can distort relationship and significance tests hence statistical inference.

In this study, linearity was tested using the scatter plot in Annex 3 which showed that the residuals were equally distributed about zero all through as the regression standardized predictors increased. This showed no violation of linearity which a requirement for regression analysis. To test for homoscedasticity, a scatter plot of the standardized residuals was used to test the violation of homoscedasticity. The curve in Annex 3 was not skewed to either side of the plot implying a normal distribution. The plot also showed no clear indication or pattern of increasing or decreasing plots with increase in the regression predictor values. This implied no signs of heteroscedasticity which means that the residual from the regression were homoscedastic.

Test for normality was conducted using Kolmogorov- Smirnov normality test. Table 4.14 presents key statistics for the normality test. The skewness of the standardized residuals was 0.587. The Kolmogorov- Smirnov normality test for the standardized residuals was significant with a significance of 0.001 which was less than 0.05. This implied that the residuals follow a normal distribution as required for a linear regression.

Table 4.14: Normality test

Item		Skewness	Krtosis	Kolmogorov-Smirnova		
				Statistic	df	Sig.
Public Procurement Practice	Standardized residual	-0.285	1.591	0.104	95	.014
Availability of pharmaceuticals	Standardized Residual	-0.587	0.392	0.129	95	.001

Source: Analysis of Survey data September 2018, using SPSS20.

Regression analysis was carried out to establish the significance of the relationship between pharmaceutical procurement practice and availability of life saving pharmaceuticals in public hospitals of Ethiopia. The regression analysis result indicates that there exist significance and a positive linear relationship between the dependent and independent variable. The result on regression model on the coefficient of determination indicate that R square is 0.077 and R is 0.277. The coefficient of determination R square indicates that 7.7% of the variation on availability of life saving pharmaceuticals is explained by the variation in pharmaceutical procurement practice.

The R square is low which implies that the model does not have a good fit. This can be corrected by adding more variables to the model. The Adjusted R square is 0.067 which is less than R square. The R square is low implying that the model was not well fitted with this independent variable. Other factors could be influencing availability of life saving pharmaceuticals other than pharmaceutical procurement practice.

The study further used Analysis of Variance (ANOVA) to test the significance of pharmaceutical procurement practice on availability of life saving pharmaceuticals in public hospitals of Ethiopia. The ANOVA results for regression indicate that the significance of the F is 0.006 which is less than 0.05 hence implying that the predictor coefficient is at least not equal to zero. This also implies a good fit for the model.

Table 4.15 Regression analysis of pharmaceutical procurement practice with availability of life saving pharmaceuticals

Regression Model Summary, pharmaceutical procurement practice

R	R Square	Adjusted R Square	Std. Error of the Estimate	F Change	Sig. F Change
0.277	0.077	0.067	1.296	7.756	0.006

ANOVA, pharmaceutical procurement practice

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	1302.600	1	1302.600	7.756	.006
Residual	15620.031	93	167.957		
Total	16922.632	94			

Coefficients, pharmaceutical procurement practice

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
Constant (β0)	41.578	12.488		3.329	0.001	16.779	66.377
pharmaceutical procurement practice (β1)	9.862	3.541	0.277	2.785	0.006	2.830	16.893

Source: Analysis of Survey data September 2018, using SPSS20.

Further analysis was carried out to determine the beta coefficients of pharmaceutical procurement practice on availability of tracer pharmaceuticals. Table 4.15 also presents that the beta coefficient of pharmaceutical procurement practice is 9.862. The t statics is for this coefficient is 2.785 with a p-value of 0.006 which is less than 0.05. This p value confirms the significance of the coefficient of pharmaceutical procurement practice at 95% confidence. We can thus conclude that pharmaceutical procurement practice significantly influences availability of tracer pharmaceuticals and thus has a significant positive relationship with availability of tracer pharmaceuticals.

Hypothesis Testing 6

- H_{06}: There is no significant effect of pharmaceutical procurement practice on availability of life saving pharmaceuticals in public hospitals of Ethiopia. B6=0,
- H_{A6}: There is a significant effect of pharmaceutical procurement practice on availability of life saving pharmaceuticals in public hospitals of Ethiopia, $\beta 6 \neq 0$,

The results in Table 4.15 above indicated that pharmaceutical procurement practice have a significant influence on availability of life saving pharmaceuticals in public hospitals of Ethiopia. This is supported by regression analysis t-value of 2.785 which is greater than the critical value 2.0 and a p-value of 0.006 at 95% level of significance which is less than 0.05. After testing the hypothesis by comparing the scores of calculated t-value and critical t; Calculated t-values was, 2.785 for pharmaceutical procurement practice, which is greater than the critical t_{36-1} (0.05) = 2.0, the study rejected the null hypothesis. Therefore, the study accepted the alternative hypothesis that there is a significant effect of a significant effect of pharmaceutical procurement practice on availability of life saving pharmaceuticals in public hospitals of Ethiopia.

The findings are incongruent with the findings concluded by Pamela (2015) whose findings indicated a significant effect of the public procurement legal framework implementation on organizational performance in Kenya. It is also congruent with a study conducted in Kenya where inconsistency in supply of pharmaceuticals was widely experienced culminating from bureaucratic procurement procedures and legal requirements whereby 90.5% indicated that the legal requirements lengthened the procurement process (Muia, 2013). Muia (2013) also indicated that tendering procedures used in pharmaceutical procurement processes showed a strong relationship

as a factor influencing performance of public health facilities in a study conducted in Maragua District Hospitals of Kenya. Hence, hospitals need to be equipped with adequate organizational structure to implement effective public procurement practice.

This study concludes that there exists a significant effect of pharmaceutical procurement practice on availability of life saving pharmaceuticals in public hospitals of Ethiopia. The finding of the study is congruent with a survey conducted by Cameron, Ewen, Auton, and Abegunde (2011) on availability of essential medicines indicated medicine procurement has been reported as one of the barriers. In addition, the finding is incongruent with a report that states availability of affordable and evidence-based high-quality medicines depends on the procurement procedure of medicines (Baghdadi-Sabeti, Cohen-Kohler & Wondemagegnehu, 2009).

4.5 The Optimal Model

Based on the outcomes of the requisite and inferential analysis, the following figure is the optimal model for the study. The multiple regression analysis revealed that there is a positive association and a significant effect of procurement institutional organization and procurement internal controls on pharmaceutical procurement practice. The analysis also concludes public procurement regulations, procurement staff competency and nature of pharmaceuticals are found to have no correlation and insignificant influence on public procurement practice. The simple linear regression model concludes that pharmaceutical procurement practice has a significant effect and a positive linear relationship with availability of pharmaceuticals in public hospitals of Ethiopia. There was a need for revision as hypotheses were tested and some of the variables statistically established to be not relevant. The Optimal model is presented in the figure below

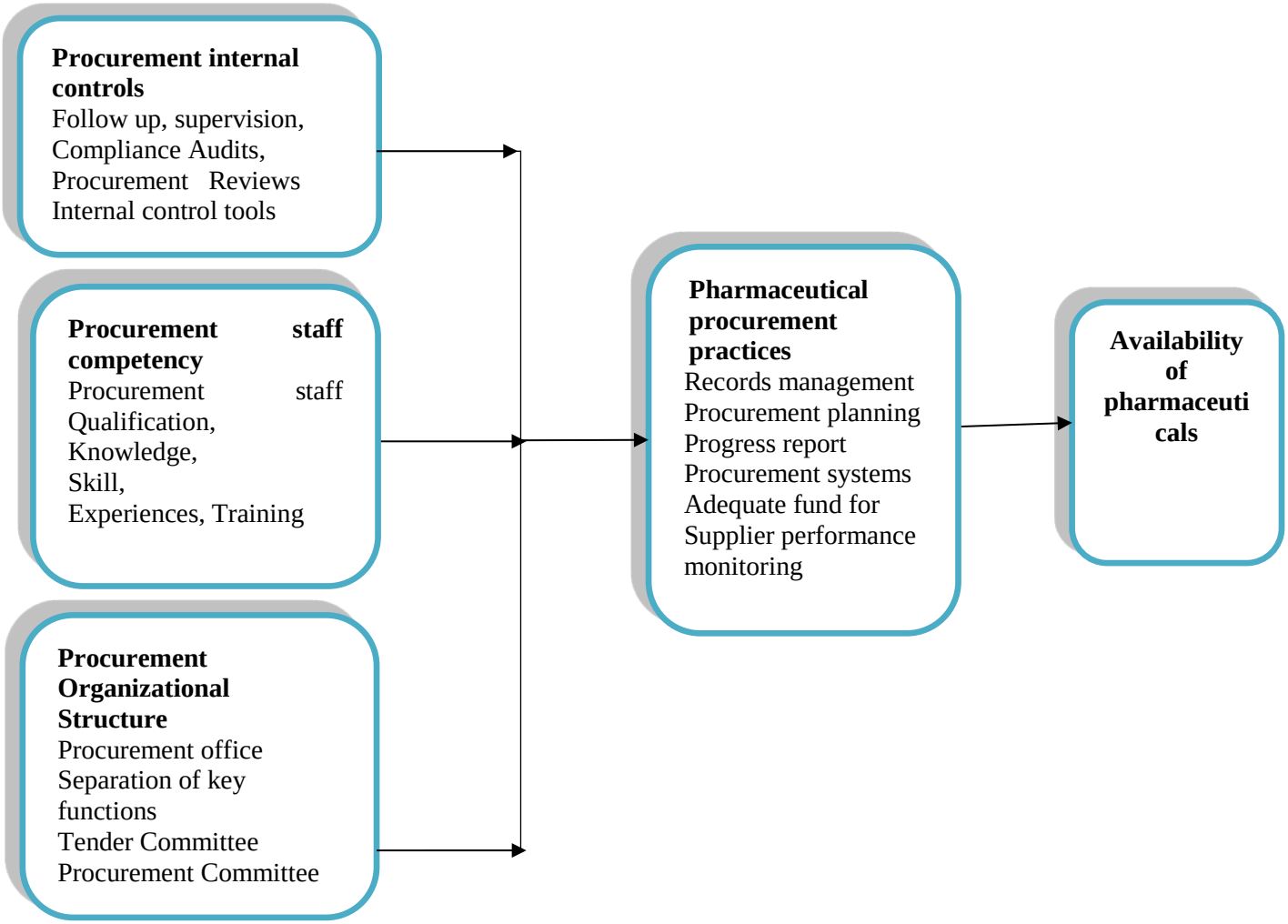


Figure 3: Revised conceptual framework model for factors affecting public procurement practice and availability of pharmaceuticals in public hospital of Ethiopia

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the summary of the study, pinpoint the major findings, discuss the conclusions, indicate the recommendations and the suggested areas of further research based on the analyzed data related to the general and specific objectives of the study.

5.1 Summary of Major Findings

The study was set out to assess the factors affecting the public pharmaceutical procurement practice and availability of life saving pharmaceuticals of public hospitals in Ethiopia. The major findings of the study are summarized as follows:

- Pearson's correlation analysis indicated that relationship exists between the public pharmaceutical procurement practice with that of procurement institutional organization (r=0.322, p=0.000), procurement internal controls (r=0.329, p=0.00), characteristics of pharmaceuticals (r=0.254, p=0.008), public procurement regulations (r=0.353, p=0.006) and procurement staff competency (r=0.156, p=0.045).
- The multiple regression results of the study indicated that procurement internal controls have a significant influence on procurement practice in public hospitals of Ethiopia. This is supported by regression analysis t-value of 3.441 with p-value of 0.00. Increasing levels of procurement internal controls by a unit would increase the levels of public procurement practices by 0.416. In addition, the overall mean scores for the responses of the five procurement internal control questions was computed at 48.21% indicating that there are weak public procurement internal controls in public hospitals of Ethiopia.
- The multiple regression results indicated that there is significant effect between procurement institutional organization and pharmaceutical procurement practice in public hospitals of Ethiopia with t-value of 3.8 and a p-value of 0.01 at 95% level of significance. Increasing levels of procurement institutional organization by a unit would increase the levels of pharmaceutical procurement practice by 0.554. The study further revealed that the mean of means for six-public institutional organization statements was computed at 71.42% indicating the existence of better public procurement institutional organization in

public hospitals of Ethiopia. Most of the respondents agree with the statements that specifications for are prepared by the pharmacy department, procurement unit manages procurement and procurement is conducted after getting approval from the relevant committee/ management. More than 70% of the respondents reported that they have procurement unit, functional tender, procurement, tender opening and disposal committee.

- The multiple regression results indicated that there is significant effect between procurement staff competency and pharmaceutical procurement practice in public hospitals of Ethiopia with t-value of 3.55 and a p-value of 0.000 at 95% level of significance. Increasing levels of procurement staff competency by a unit would increase the levels of pharmaceutical procurement practice by 0.352. The mean of means for the responses of statements with respect to public procurement workforce proficiency and training was computed as 36.42% indicating weak public procurement workforce capacity with respect to availability of right number of employees, right skills and availability of training programs in public procurement regulations.
- The multiple regression results also indicated that public procurement regulations and nature/characteristics of pharmaceuticals are found to have no correlation or have insignificant influence on public pharmaceutical procurement practice. They are not statistically significant predictor of public pharmaceutical procurement practice. Therefore, the study accepts the three null hypotheses for H_{01} and H_{04}. Increasing levels of these factors would have no significance effect on public pharmaceutical procurement practices in public hospitals of Ethiopia. However, these findings are in contrary with other published articles who argue that procurement regulations and considerations for pharmaceuticals nature affect the procurement performance.
- Pearson's correlation analysis indicated that relationship exists between the dependent variable availability of life saving pharmaceuticals with that of the independent variable pharmaceutical procurement practice ($r=0.277$, $p=0.006$). The simple linear regression analysis result indicated that the mediating dependent variable, pharmaceutical procurement practice, have a significant influence on availability of life saving pharmaceuticals in public hospitals of Ethiopia. This is supported by regression analysis t-value of 2.785 which is greater than the critical value 2.0 and a p-value of 0.006 at 95% level of significance which is less than 0.05. Increasing the levels of pharmaceutical

procurement practice by a unit would increase the levels of availability of life saving pharmaceuticals by 9.862. This finding is incongruent with and complemented with most of the published articles as indicated in the result part of the study.

- The respondents agree with the five sets of statements that public procurement regulations affect public procurement practice of pharmaceuticals with overall mean scores of 3.524. The respondents agree with the statements that the procurement regulation is comprehensiveness, flexibility, transparent procedures for pharmaceuticals and parts of the regulation loopholes for procurement pharmaceutical with a mean score of 2.16±0.993, 2.32±0.948 and 2.21±0.933 respectively. Financial thresholds, procurement methods, and product specifications preparation part of the procurement regulations are reported to hinders pharmaceutical procurement by 93.7%, 46.3% and 28.4% of the respondents respectively.
- The mean of means for six-public institutional organization statements was computed at 71.42% indicating the existence of better public procurement institutional organization in public hospitals of Ethiopia. Most of the respondents agree with the statements that specifications for are prepared by the pharmacy department, procurement unit manages procurement and procurement is conducted after getting approval from the relevant committee/ management. More than 70% of the respondents reported that they have procurement unit, functional tender, procurement, tender opening and disposal committee.
- The respondents agree that the pubic pharmaceutical procurement practice is executed as per the standard with overall mean scores of 16 items computed as 3.51. Most of the respondents reported to prepare annual pharmaceutical procurement plans, keep procurement records, utilize allocated budget, apply appropriate procurement methods and uses transparent procedures with a mean score above 4.13.
- The respondents agree that the characteristics of pharmaceuticals affect the procurement process with overall mean scores 3.82 for responses of 10 items. The respondents agreed with the statements that vital/lifesaving, high market value, complex, short shelf-life, susceptibility to heat/light and obsolescence, special storage requirement, special specification preparation requirement and branded/ rights of pharmaceuticals affect the pharmaceutical procurement practice with a mean scale ranged from 3.53 to 4.38 on the 5-point Likert's scale.

- In average, hospitals reported to conduct procurements 4.23 (1.882) and 2.94 (1.725) times from PFSA and private suppliers during six months prior to the data collection period respectively. The hospitals reported to procure more than 60% of their pharmaceuticals requirements from PFSA.
- The average availability of a basket of 20 tracer pharmaceuticals is 90% (0.105) and 76.16% (0.1342) on the day of data collection and within six months prior to the study time respectively. Only 28.4% and 4.2% of the hospitals able to achieve 100% stock availability for on the day of data collection and within six months prior to the study time respectively. Generally, the results show performance gaps in product availability as hospitals were expected to maintain 100% availability of these lifesaving pharmaceuticals.
- In average, suppliers fill rate of the 20 tracer drugs were 68.07% (12.15) and 73.38% (4.47) for PFSA and private suppliers respectively. The hospitals reported a lead time ranging from 1 to 12 days, average being 5.53 (2.049) days, to procure pharmaceuticals from PFSA. While about 72.6% of the hospitals reported that they require an average lead time from 1 to 6 days to procure from PFSA. About 88.4% of the hospitals reported that they require an average lead time from 7 to 10 days to finalize procurements from private suppliers.
- The supply chain and procurement performance of PFSA, which is the key suppliers of hospitals, indicate that the average stock availability of the basket of 20 tracer pharmaceuticals across 18 branches and central warehouses from February to July 2018 was found to be 45%, the minimum being 28% and the maximum being 72%. This indicates high variation in availability of the tracer drugs across PFSA branches and the center which directly impacts the supplier fill rate of PFSA and the availability at hospital level. The major reasons reported for the performance gaps were non-availability of hard currency for international procurement (65% availability) and poor capacity of local suppliers where only 59.85% of the contact agreement were supplied by local manufacturer. The average lead time for sea and air shipments for internationally procured commodities were found to be 166.67 (N=49) days and 90.76 (N=203) days respectively.

5.2 Conclusions

The study determined factors affecting pharmaceutical procurement practice and availability of life saving pharmaceuticals in the case of public hospitals of Ethiopia. Descriptive statistics and multiple regression analyses were used to study factors affecting the public pharmaceutical procurement practice while simple linear regression model is used to determine the influence of pharmaceutical procurement practice on availability of pharmaceuticals.

The multiple regression analysis revealed that there is a positive association and a significant effect of procurement institutional organization, procurement staff competency and procurement internal controls on pharmaceutical procurement practice in public hospitals of Ethiopia. The model explained only 57.9% of the variation in public pharmaceutical procurement practice implying other factors that explain 42.1% of the variation were not accounted in the model. The analysis also concludes public procurement regulations and nature of pharmaceuticals are found to have no correlation and insignificant influence on public procurement practice. They are not statistically significant predictor of public pharmaceutical procurement practice proposing further detail study with more sample size, better design and duration of study.

The simple linear regression model analysis concludes that pharmaceutical procurement practice has a significant effect and a positive linear relationship with availability of pharmaceuticals in public hospitals of Ethiopia. The coefficient of determination R square indicates that 7.7% of the variation on availability is explained by the variation in pharmaceutical procurement practice.

In this study, the average availability of a basket of 20 tracer pharmaceuticals is found to be 90% and 76.16% on the day of data collection and within six months prior to the study time. Pharmaceutical supplier fill rate of both public and private suppliers were near to 50%, contributing for the non-availability of pharmaceuticals in public hospitals of Ethiopia. The study also revealed that public procurement regulations suits for pharmaceuticals with certain level, better institutional organization exists for procurement of pharmaceuticals, characteristics of pharmaceuticals influence the procurement practices, weak public procurement workforce capacity exists, and weak public procurement internal controls exits in public hospitals of Ethiopia.

All in all, it is necessary to focus on improving the availability of pharmaceuticals through strengthening the pharmaceutical procurement practice at public hospitals of Ethiopia.

5.3 Recommendation

The following specific recommendation can be made based on the finding of the study. This will help to give a clue about the possible direction to follow and to alleviate the existing problems of in public pharmaceutical procurement practice of public hospitals in availing lifesaving pharmaceuticals.

- To strengthen the public pharmaceutical procurement practice of hospitals with respect to organizational structure, procurement staff competency and internal control to improve availability of life saving pharmaceuticals to expected level.
- To advocate for the revision of public procurement regulation to accommodate the special characteristics of pharmaceuticals and other short comings that the regulation has with respect to financial thresholds, the procurement methods, product specifications preparation and flexibility nature of pharmaceuticals.
- To strengthen the procurement units of public hospitals and functionality of procurement committees as stipulated in the procurement regulation to improve the procurement practice and availability of life saving pharmaceuticals.
- To strengthen internal controls system including internal and external audits, appeal reviewing process, and implementing system to detect fraud at the hospitals to fully implement and comply with procurement rules and regulations.
- To capacitate the public procurement workforce competency with the necessary knowledge, skill and competencies through training on public procurement regulations, processes and on emerging issues of public procurement practices.
- To strengthen the procurement practice of public hospitals through complying with the procurement regulation, the preparation of annual pharmaceutical procurement plans, keeping accurate procurement records, supplier performance evaluation, conduct routine inspection of consignments, utilizing allocated budget, appropriate procurement methods and building transparency in procurement practice.
- To capacitate public and private pharmaceutical suppliers to improve their pharmaceutical fill rate capacity to meet the demands of public hospitals and to improve the availability of life saving pharmaceuticals at public hospitals.

5.4 Areas for Further Research

The study is a milestone for further research in the field of public pharmaceutical procurement practices in Ethiopia. The findings demonstrated different factors affecting the public pharmaceutical procurement practice and availability of life saving pharmaceuticals in public hospitals of Ethiopia. The following are suggested potentials areas for further research:

- The multiple regression model explained only 57.9% of the variation in public pharmaceutical procurement practice implying other factors that explain 42.1% of the variation were not accounted in the model. Therefore, further research should be conducted to account for other factors as well that lead to better public procurement practice with specific focus on government institutions.
- The analysis also concludes public procurement regulations and nature of pharmaceuticals are found to have insignificant influence on public procurement practice. They are not statistically significant predictor of public pharmaceutical procurement practice unlike other similar published studies proposing further detail study with more sample size, better design and duration on the influence of these factors on procurement practice.
- The study looked the influence of public procurement practice on availability of pharmaceutical form procurement practice perspective only. Therefore, similar studies can be carried out to assess the effect of public procurement practice, processes, challenges and systems on availability of pharmaceuticals; and on the efficiency and effectiveness, transparency, accountability, financial, supply chain performance, customer satisfaction and other measures of organizational performance.
- A more elaborated study such as longitudinal studies can be undertaken cutting across different public pharmaceutical procurement entities (private public, hospitals, health centers, importers, wholesalers, manufacturers and others) with variety of assessment methods to compare the level of procurement practice with progress on availability of pharmaceuticals over time and to provide stronger evidence on the effect of pharmaceutical procurement practice in availability of lifesaving pharmaceuticals. This will also be used to ascertain whether there is consistency on factors influencing public procurement practice in the sector.

- The study looked only selected independent variables that affect the pharmaceutical procurement practice. The study therefore proposes further studies to be undertaken to explore the effect of other procurement related independent variables on public pharmaceutical procurement practice and availability of pharmaceuticals in public hospitals of Ethiopia to cover a wider scope and to enhance generalization.
- Similar studies can be expanded to explore related factors on procurement practice that affect the availability of pharmaceuticals in public, private and other related sectors of the country.
- The study relied on pharmacy heads and supply chain officers of hospitals who routinely practice procurement of pharmaceuticals. Future studies could analyze the effect of the public procurement practice on availability of pharmaceuticals from the perspective of both the users of pharmaceuticals and all those involved in the procurement process including other procurement practitioners, purchasers, the management, committee members and accounting officers.
- The measurement of the dependent variable, availability of life saving pharmaceuticals, was conducted based on selected 20 tracer pharmaceuticals. Future studies can include the measurement of other more number of essential drugs and other supply chain indicators to get comprehensive picture on pharmaceutical procurement performance of public hospitals.

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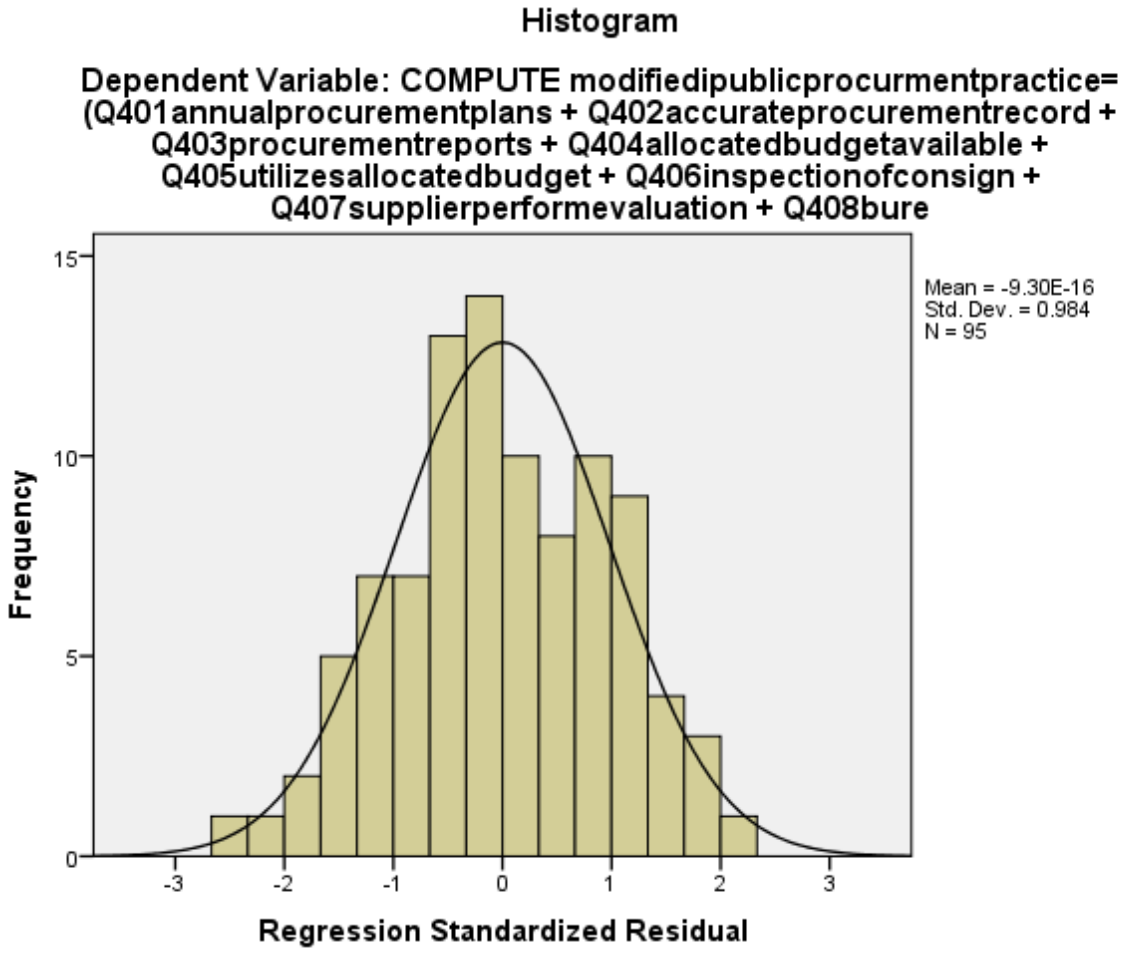
Annex

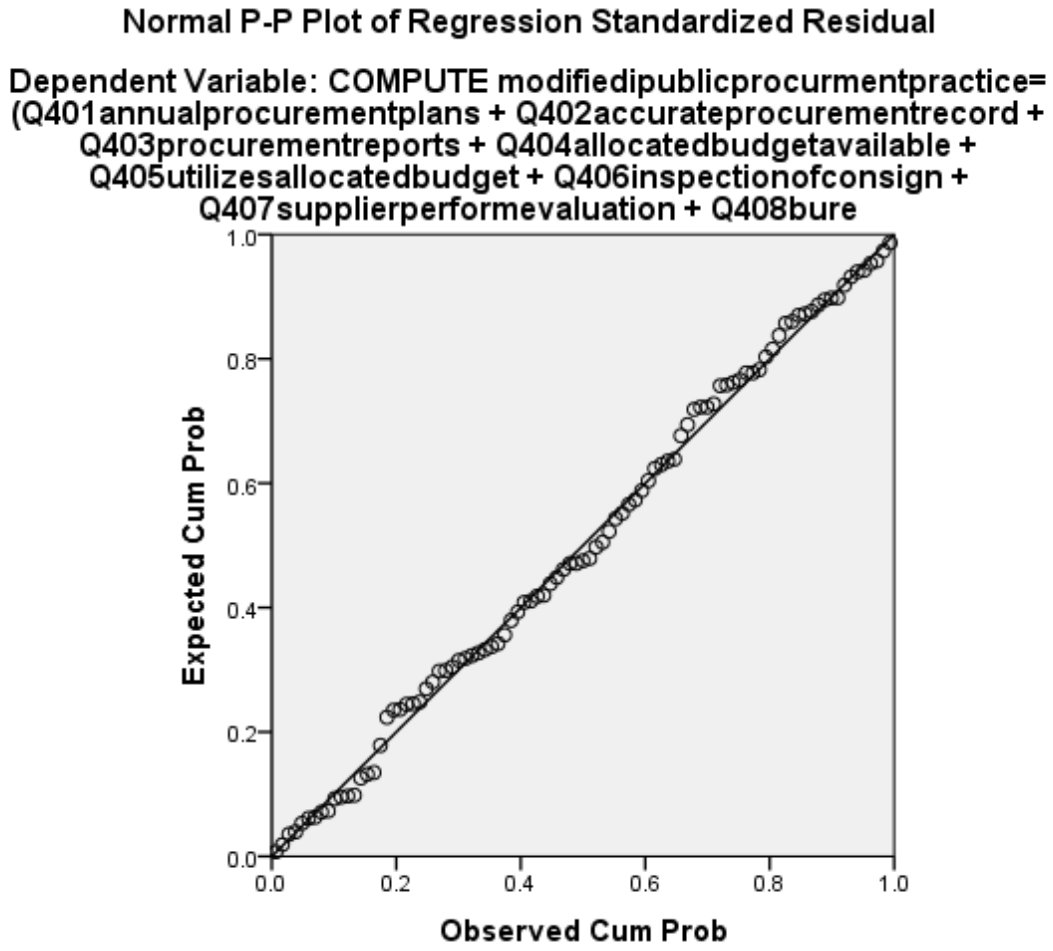
Annex 1: Operationalization of the research variables

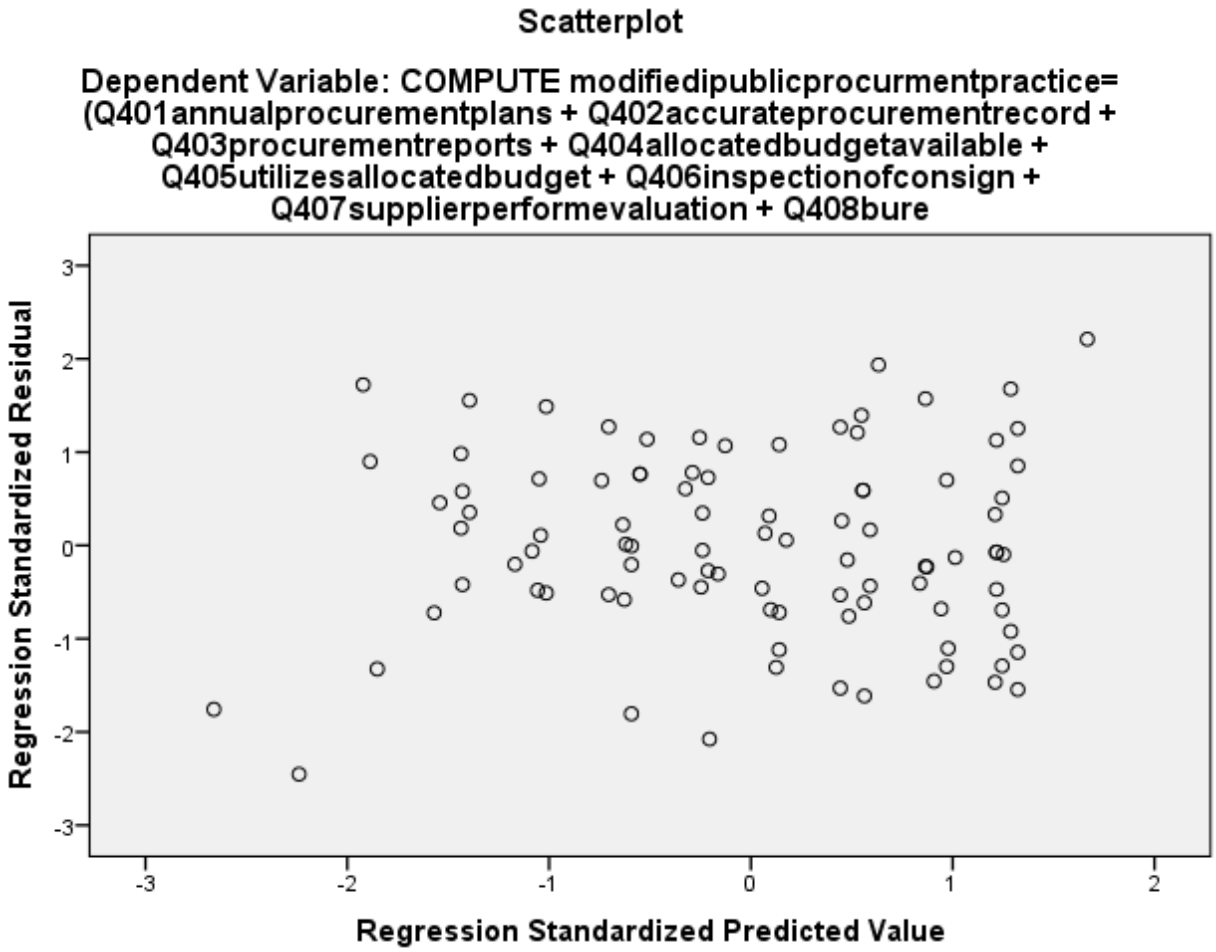
Variable	Indicator	Values	Measure
Public procurement regulations	Transparent and explicit procedures Comprehensive for pharmaceutical Flexibility for pharmaceutical procurement Facilitates pharmaceuticals procurement	5 Point Likert	Ordinal Scale
Public procurement institutional organization	Availability of procurement unit Separate functions of the procurement office and the tender committee Tender committee selected as per the regulation The procurement practice is overseen by external/ internal office Specifications are prepared by the user Procurement is conducted after getting approval from the relevant committee/ management	Yes/No	Nominal
Procurement internal controls	Internal controls tools, processes, and controls to ensure effective Annual internal and external audits on procurement Formal appeals process for applicants who have their bids rejected. Efficient post-tender system emplaced to monitor on suppliers' performance efficient system in placed to detect fraud	Yes/No	Nominal
Procurement staff competency	well-staffed with qualified procurement staff Well-staffed with the right number of staff Procurement staff have the right skills in pharmaceutical procurement Training on public pharmaceutical procurement regulation is available Procurement staff attended training on the public procurement regulation in the past one year.	Yes/No	Nominal
Nature of Pharmaceuticals	Vital/lifesaving nature High market value nature Complex and diverse nature Short shelf-life limitation nature Susceptibility to heat, light, quick obsolescence Special storage condition requirement Special specification preparation requirement Price differences among the same pharmaceutical Perceived difference in the efficacy of pharmaceutical Branded/ intellectual property rights of pharmaceuticals	5 Point Likert	Ordinal Scale
Public Pharmaceutical Procurement Practice	The hospital prepares annual pharmaceut. procurement plans The hospital keeps accurate and reliable procurement records. The hospital prepares pharmaceut. procurement progress reports	5 Point Likert	Ordinal Scale

	The hospital available allocated budget for procurement of pharmaceuticals timely. The hospital effectively utilizes the allocated budget for procurement of pharmaceuticals The hospital conducts routine inspection of consignments The hospital conducts supplier performance evaluation There is high bureaucracy to initiate procurement of pharmaceuticals The hospital complies with most of the provisions of the procurement regulations The hospital applies appropriate procurement methods Decisions of the Tender Committee are always considered in the procurement process "The procurement system in the hospitals is operating in a totally transparent manner" Unethical behavior is a challenge for effective procurement The hospital procurement system provides the required pharmaceuticals at the right time, right quality, and right quantity. The hospital procurement system is flexible to meet emergency needs of pharmaceuticals Conflict exists between the procurement department and the pharmacy department		

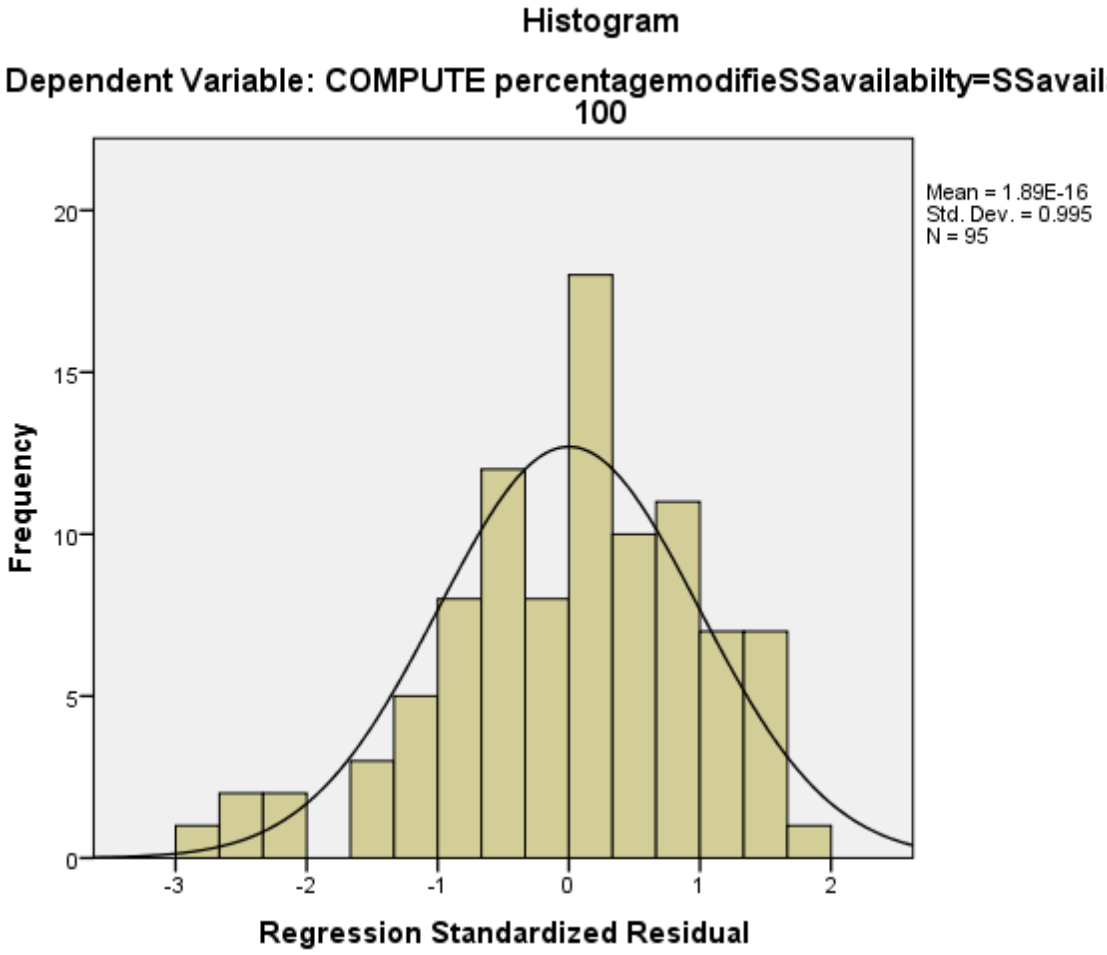
Annex 2: Normal P-P plot of Regression Standard Residual and scatter plot for multiple regression analysis

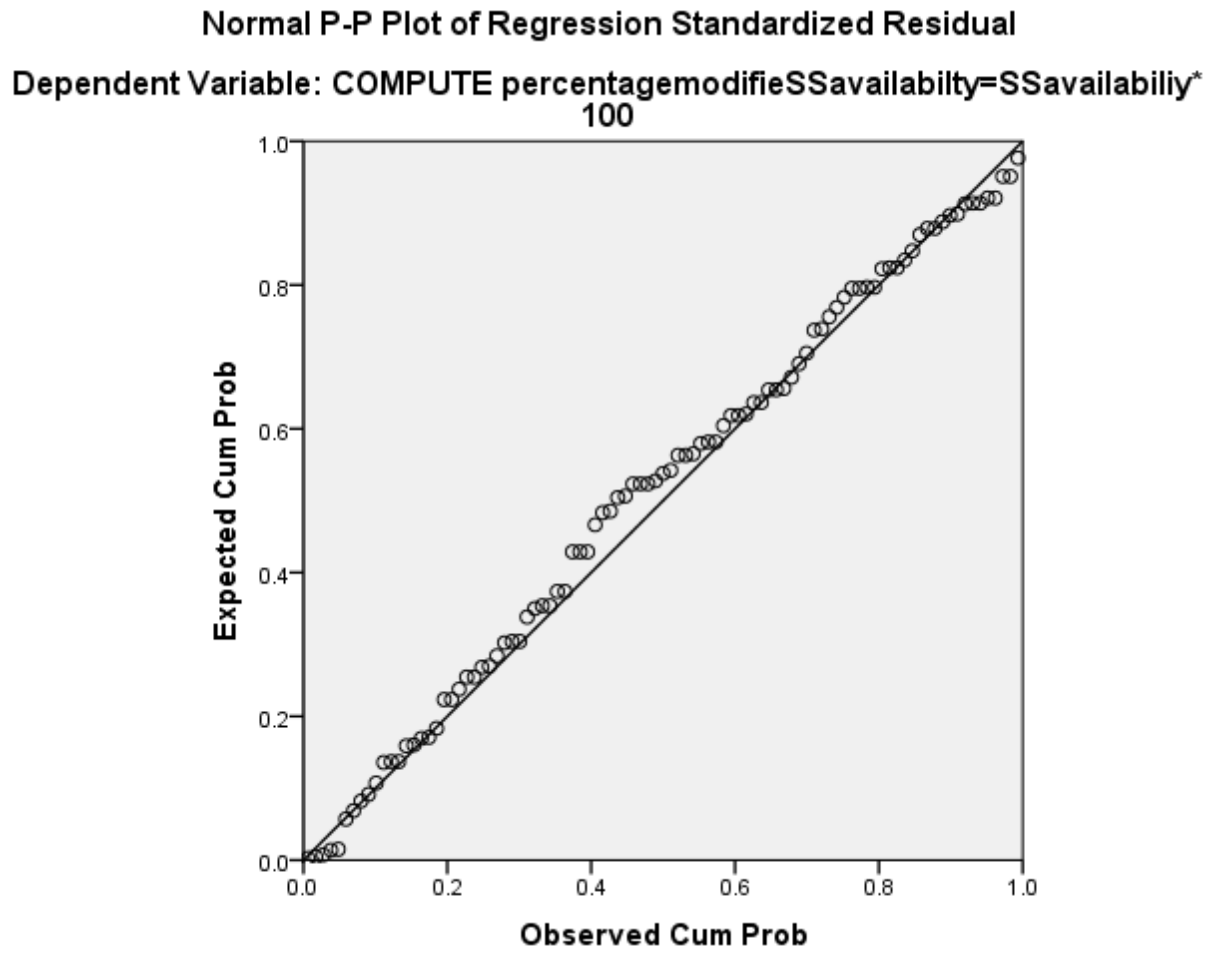


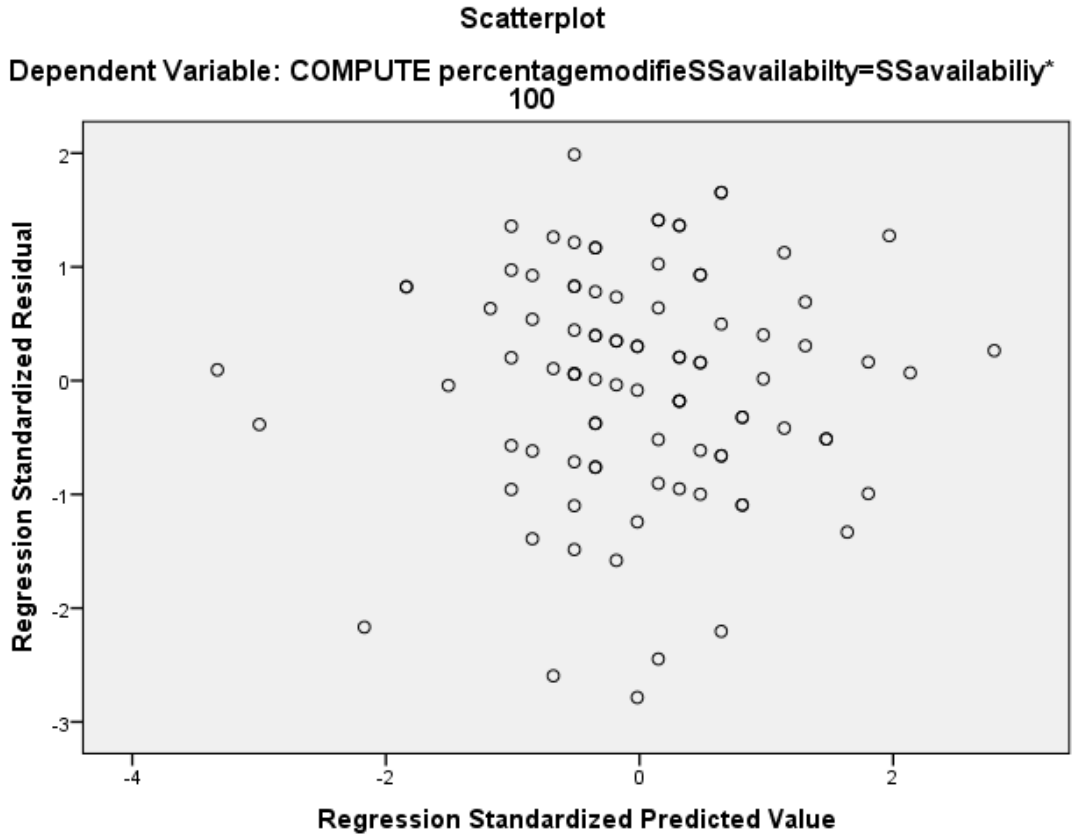

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: COMPUTE modifiedipublicprocurmentpractice=
(Q401annualprocurementplans + Q402accurateprocurementrecord +
Q403procurementreports + Q404allocatedbudgetavailable +
Q405utilizesallocatedbudget + Q406inspectionofconsign +
Q407supplierperformevaluation + Q408bure
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Scatterplot
Dependent Variable: COMPUTE modifiedipublicprocurmentpractice= (Q401annualprocurementplans + Q402accurateprocurementrecord + Q403procurementreports + Q404allocatedbudgetavailable + Q405utilizesallocatedbudget + Q406inspectionofconsign + Q407supplierperformevaluation + Q408bure
Regression Standardized Residual
Regression Standardized Predicted Value
3
2
1
0
-1
-2
-3
-3
-2
-1
0
1
2

Annex 3: Normal P-P plot of Regression Standard Residual and scatter plot for simple linear regression analysis




Normal P-P Plot of Regression Standardized Residual
Dependent Variable: COMPUTE percentagemodifieSSavailabilty=SSavailabiliy* 100
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Scatterplot
Dependent Variable: COMPUTE percentagemodifieSSavailabilty=SSavailabiliy* 100
Regression Standardized Residual
Regression Standardized Predicted Value
2
1
0
-1
-2
-3
-4
-2
0
2

Annex 4: Information Sheet and Informed Consent Form (English)

Addis Ababa University, School of Commerce
Logistics and Supply Chain Management
Supported Distance Learning Program

Name of the Principal Investigator: Fikreslassie Alemu

Name of the organization: Addis Ababa University, School of Commerce Logistics and Supply Chain Management Supported Distance Learning Program
Name of the Sponsor: Self

Information Sheet and Consent Form prepared for participants from Public Institutions of Ethiopia that studies Public Pharmaceutical Procurement Practice in Ethiopia: Legal frame work, challenges, performance and its impact on availability of life saving pharmaceuticals.

Introduction

This information sheet and consent form is prepared by the investigator whose main aim is to study factors affecting public pharmaceutical procurement practice and availability of pharmaceuticals in public hospitals of Ethiopia: The investigator is MA student from Addis Ababa University, School of Commerce, Logistics and Supply Chain Management Supported Distance Learning Program.

Purpose: The general objective of the study is to assess factors affecting pharmaceutical procurement practice and availability of life saving pharmaceuticals in the case of public Hospitals of Ethiopia.

Procedure: Dear/sir, you are invited to take part in the study. If you are willing to participate in study, you need to understand and to give verbal consent or to give your agreement in words or to sign the consent form. Then, you will be asked to give your response by the data collectors. For this questionnaire based study, participants are procurement and health professionals who have at least one year of experience preceding the survey time. All the responses given by the participants

and the results obtained will be kept anonymous and confidential using coding system whereby no one will have access to your responses.

Risk and/or Discomfort: By participating in this research project, you may feel that it has some discomfort specially on wasting your time (**about 30-40 minutes**) but this may not be too much comparing against its potential benefits. It contributes to the overall improvement of the health status of the community and improve of procurement practice. There is no risk in participating in this research project.

Benefits: If you participate in this research project, you may not get direct benefit but your participation is likely to help us in assessing the public pharmaceutical procurement practice. Therefore, the findings of the study will contribute to the understanding, monitoring and evaluating the Public Pharmaceutical Procurement Practice, the legal frame work, challenges and its impact on availability of life saving pharmaceuticals. It will also be useful to develop culturally sound and better directed interventions that consider the challenges and obstacles associated with public pharmaceutical procurement practice.

Incentives: You will not be provided any incentives to take part in this project.

Confidentiality and Anonymity: The information that we will collect from this research project will be kept confidential. Information about you that will be collected from the study will be stored in a file, which will not have your name on it, but a code number assigned to it. Which number belongs to which name will be kept under lock and key, and it will not be revealed to anyone except the principal investigator.

Right to Refuse or Withdraw: You have the full right to refuse from participating in this research (you can choose not to respond some or all the questions) if you do not wish to participate; and this will not affect your health services you get at from any health facilities. You have also the full right to withdraw from this study at any time you wish to, without losing any of your rights as a resident of this site.

Persons to contact: If you have any question you can contact any of the following individuals and you may ask at any time you want.

Name: Fikreslassie Alemu, Addis Ababa University, School of Commerce Logistics and Supply Chain Management Supported Distance Learning Program
Tel: +25111142762
Mob: +251911157949
E-mail: falemu2@gmail.com

You are now being asked if you are interested and if you are willing to participate in the study. We would greatly appreciate your truthful and keen participation in responding to this questionnaire.

Yes I agree _____ No, I don't agree_____

Participants Signature_____

Thank you!

Annex 5: Questionnaire

Addis Ababa University
School of Commerce
MA Program in Logistics and Supply Chain Management

Dear Sir/ madam;

My name is Fikreslassie Alemu conducting a study on "the role of public pharmaceutical procurement practice on availability of life saving pharmaceuticals in public hospitals of Ethiopia." The study is believed to contribute for understanding, developing interventions and improving the public pharmaceutical procurement practice, the legal frame work, challenges and its impact on availability of life saving pharmaceuticals.

I'm therefore, seeking your assistance to fill the questionnaires. The questionnaire will take about twenty to thirty minutes to complete. Participation in this study is voluntary, and all who participate will remain anonymous. Your name is not needed. All information offered will be treated confidentially, and the results will be presented in such a way that no individuals may be recognized.

Thank you in advance for the available information you are sharing and the precious time you are going to spend for this purpose

If you have any enquiry, please don't hesitate to contact the researcher on:

- Email –falemu2@gmail.com
- Phone: 09 11157949 (Fikreslassie Alemu)

Questionnaire

SECTION I: GENERAL INFORMATION				
QID	Question	Response options/codes	Coded Response	Skip Pattern
	Organization Name			
101	Region	_____		
102	Sex of respondent	Male 01 Female 02	[__|__]	
103	How long have you worked in your current position?	Less than 5 years 01 5-10years 02 11-15years 03 16 years and above 04	[__|__]	
104	What is your highest educational level?	Certificate 01 Diploma 02 Degree 03 Post Graduate 04 Others 05	[__|__]	
105	Position/responsibility:	_____		
106	What is your job role/title position?	Pharmacy Department Head 01 Supply Chain Officer 02 Case Team leader 03 Procurement Officer 04 High level manger 06 Others 07 Specify_____	[__|__]	
107	Are you responsible or directly related for managing procurement of pharmaceuticals at the facility?	Yes 01 No 02	[__|__]	

II. PUBLIC PROCUREMENT LEGAL FRAMEWORK

Section II: Applicability of public procurement proclamation/directives/manuals for pharmaceuticals						
Please feel free to tell us what you think. How strongly do you agree or disagree with the following statements?						
No	**Questions**	**Strongly disagree= 01**	**Disagree =02**	**Undecided =03**	**Agree =04**	**Strongly agree** =5
201	You are familiar with the procurement rules and regulations of the country/region					

202	The procurement regulations have transparent and explicit procedures for procurement of pharmaceuticals?					
No	**Questions**	**Strongly disagree= 01**	**Disagree =02**	**Undecided =03**	**Agree =04**	**Strongly agree** =5
203	The procurement regulations are comprehensive enough for the procurement of pharmaceutical					
204	The procurement regulations flexible enough for the procurement of pharmaceuticals					
205	There are parts/loopholes of the procurement regulations that affect/hinders the pharmaceuticals procurement process					
206	The hospital complies with all parts of the procurement regulations during procurement					

QID	Question	Response options/codes	Coded Response
207	Which part of the procurement regulations are hindering the pharmaceuticals public procurement practice?	Procurement Methods 01 Financial thresholds 02 Advertisement media 03 Procurement planning 04 Bid evaluation 05 Product Specifications 06 Bidding documents 07 Procurement of goods 08 Others 09 Specify_____	

SECTION III: Public Procurement Institutional Organization

Please write “01” if the answer is” yes” and “02” if the answer is” No”

No	Questions	Yes 01	NO 02
301	The organization have procurement department		
302	Which of the following committees are formally established and functional at the hospital?		
	procurement planning committee		
	Tender committee		
	Procurement committee		

	Tender opening committee		
	Tender Evaluation committee		
	Tender endorsing committee		
	Inspection and Acceptance Committee		
	Disposal committee		
	Complaints Review Committee		
303	Key functions of the procurement office and the tender committee are clearly separated?		
304	The members of the tender committee are systematically selected based on specific criteria as per the regulation		
305	There is an organization/office which oversees the procurement practice of the hospital.		
306	Decisions of the Tender Committee are always considered in the procurement process."		
307	Specifications are prepared by the pharmacy department		
308	Procurement of pharmaceuticals are done after getting approval from the relevant committee and management		

SECTION IV: Public Pharmaceutical Procurement Practice

Please feel free to tell us what you think. How strongly do you agree or disagree with the following statements?

No	Questions	Strongly disagree= 01	Disagree =02	Undecided =03	Agree =04	Strongly agree =5
401	The hospital prepares annual pharmaceutical procurement plans					
402	The hospital keeps accurate and reliable pharmaceutical procurement records.					
403	The hospital prepares pharmaceutical procurement progress reports.					
404	The hospital makes allocated budget available for procurement of pharmaceuticals timely.					
405	The hospital effectively utilizes the allocated budget for procurement of pharmaceuticals					
406	The hospital conducts routine inspection of consignments after procurement					
407	The hospital conducts supplier performance evaluation					
408	There is high bureaucracy to initiate procurement of pharmaceuticals					
409	The hospital practice E-procurement					

410	The hospital complies with most of the provisions of the procurement regulations					
411	The hospital applies appropriate procurement methods during procurement					
412	Decisions of the Tender Committee are always considered in the procurement process."					
No	**Questions**	**Strongly disagree= 01**	**Disagree =02**	**Undecided =03**	**Agree =04**	**Strongly agree** =5
413	"The procurement system in the hospitals is operating in a totally transparent manner"					
414	Unethical behavior is a challenge for effective procurement					
415	The hospital procurement system provides the required pharmaceuticals at the right time, right quality, and right quantity.					
416	The hospital procurement system is flexible to meet any emergency needs of pharmaceuticals					
417	There is conflict between the procurement department and the pharmacy department on the pharmaceutical procurement activities					

QID	Question	Response options/codes	Coded Response
418	Which methods of procurement are most commonly used during procurement of pharmaceuticals from private suppliers? (More than one answer is possible)	Open tender 01 Restricted tender 02 Request for Question 03 Two Stage Tender 04 Direct Purchase 05 Request for proposal 06	
419	How many times did you procure pharmaceuticals in the last six months?	A) Form PFSA _____ B) From Private Suppliers _____	
420	What percent of RDF drugs are procured form PFSA in the last six months?	A) Form PFSA _____ B) From Private Suppliers _____	
421	What is the estimated supplier fill rate of pharmaceuticals (What percentage of pharmaceuticals does the hospital gets at the right time, right quality, and right quantity from required quantity)?	A) Form PFSA _____ B) From Private Suppliers _____	

422	On average, how long does it take to handle and finalize procurement activities?	A) Form PFSA _____ B) From Private Suppliers _____	

SECTION V: Public Procurement Enforcement and Internal Controls
Please write "01" if the answer is" yes" and "02" if the answer is" No"

No	Questions	Yes 01	NO 02
501	The hospital has appropriate and sufficient internal controls (tools, processes, and controls) in place to ensure effective oversight over the public procurement process		
502	The hospital undergoes annual internal and external audits on procurement of pharmaceuticals		
503	The hospital has a formal appeals process for applicants who have their bids rejected.		
504	The hospital in places efficient post-tender system to monitor and report on suppliers' performance?		
505	The hospital in places efficient system to detect fraud?		
506	The top management provide support for procurement of pharmaceuticals		

SECTION VI: Public Procurement Workforce, Proficiency and Training
Please write "01" if the answer is" yes" and "02" if the answer is" No"

No	Questions	Yes 01	NO 02
601	The hospital procurement team is well-staffed with **qualified and experienced staff** who can carry out procurement of pharmaceuticals?		
602	The hospital procurement team is well-staffed with the right number of staff who can carry out the procurement of pharmaceuticals?		
603	Procurement staff have the right skills in pharmaceutical procurement		
604	There is comprehensive training program on public pharmaceutical procurement regulation that contains specialized knowledge and skills to manage pharmaceutical procurement?		
605	Does any of your procurement staff attended training on the public procurement regulation of the country/region in the past one year?		

SECTION VII: Nature of Pharmaceuticals						
Please feel free to tell us what you think. How strongly do you agree or disagree with the following statements?						
No	**Questions**	**Strongly disagree= 01**	**Disagree =02**	**Undecided =03**	**Agree =04**	**Strongly agree** =5
	The following characteristics of pharmaceuticals greatly affects the pharmaceutical procurement process					
701	Vital/lifesaving nature of pharmaceuticals					
702	High market value nature of pharmaceutical					
703	Comple x and diverse nature of the pharmaceuticals					
704	Short shelf-life limitation nature of most pharmaceuticals					
705	Susceptibility to heat, light, quick obsolescence of pharmaceuticals					
706	Special storage condition requirement of pharmaceuticals					
707	Special specification preparation requirement of the pharmaceuticals					
708	Price differences on the same pharmaceutical					
709	Perceived difference in the efficacy of the pharmaceutical					
710	Branded/ Intellectual property rights of pharmaceuticals					

SECTION VIII: Supplier pharmaceutical procurement performance						
Please feel free to tell us what you think. How strongly do you agree or disagree with the following statements?						
No	**Questions**	**Strongly disagree= 01**	**Disagree =02**	**Undecided =03**	**Agree =04**	**Strongly agree** =5
801	Public supplier delivers pharmaceuticals as expected date					
802	Private supplier delivers pharmaceuticals as expected date					
803	Shortage/stock out of pharmaceuticals at suppliers is common					
804	There is mismatch of supply and demand for pharmaceuticals at the suppliers					
805	There is high bureaucracy at suppliers					

806	Stock out/shortage at the suppliers affected the provision of health services					
SECTION IX: Challenges the pharmaceutical procurement practice						
Please feel free to tell us what you think. How strongly do you agree or disagree with the following statements?						
No	**Questions**	**Strongly disagree= 01**	**Disagree =02**	**Undecided =03**	**Agree =04**	**Strongly agree** =5
	The following challenges affect the pharmaceutical procurement practice and availability of pharmaceuticals at the hospital					
901	Unethical behavior (bribery, material gifts, favoritism, conflict of interest etc.) practices					
902	Poor stock and inventory management at hospitals					
903	Urgent/unplanned procurements					
904	Length/extended procurement process					
905	Work load on the procurement staff					
906	Specification related problem					
907	Poor competency of procurement personnel					
908	Poor knowledge on the procurement regulations and procedures					
909	Interference by the management					
910	Interference by suppliers					
911	Delays in passing the budget					
912	G17aps at the primary supplier of PFSA					
913	Financial problem at the health facility					
914	Special nature of pharmaceuticals in the regulation					
915	Lack of enforcement from top management					
916	Excessive bureaucracy and documentation					
917	Non-availability at suppliers					
918	Lengthy of procurement process					
920	Any other challenges. Specify _____ _____ _____					

Availability of tracer drugs in the day of visit and in the last six months for RDF Drugs

S.No	Tracer drug	Available on the day of visit	Have you Experienced Stocked Out in the last six months
		(Yes, No)	(Yes, No)
1	Gentamycin Sulphate injection		
2	Magnesium Sulphate injection		
3	Oxytocin injection		
4	Enalapril tablet		
5	Glibenclamide tablet		
6	Adrenaline injection		
7	Glucose 40%		
8	Dextrose in normal saline		
9	Ferrous sulphate + folic acid		
10	Ceftriaxone injection		
11	Hydralazine injection		
12	Tetracycline eye ointment		
13	Insulin zinc suspension 100IU/ml injection		
14	Gauze Surgical 90cmx100 m mesh size 19x15		
15	Surgical gloves sterile latex No. 7.5		
16	Tetanus Anti toxin (TAT) 1500IU/ml injection		
17	Cimetidine 200mg/ml, 2ml injection - CSPC Ouyi Phar.		
18	Cotrimoxazol (Sulphamethoxazole + Trimethoprim) Suspension 240mg/5ml		
19	Amoxicillin 250mg,500mg tablet		
20	Ciprofloxacin 500mg Tablet		

Lead time and Supplier Fill Rate for Tracer Drugs in the last six months

S. no.	Tracer drug	Supplier (PFSA or Private)	Order Date	Order received date	Number Requested	Number Received
1	Gentamycin Sulphate inj					
2	Magnesium Sulphate inj.					
3	Oxytocin injection					
4	Enalapril tablet					
5	Glibenclamide tablet					
6	Adrenaline injection					
7	Glucose 40%					
8	Dextrose in normal saline					
9	Ferrous sulphate + folic acid					
10	Ceftriaxone injection					

11	Hydralazine injection					

S. no.	Tracer drug	Supplier (PFSA or Private)	Order Date	Order received date	**Number** Requested	**Number** Received
12	Tetracycline eye ointment					
13	Insulin zinc suspension 100IU/ml injection					
14	Gauze Surgical 90cmx100 m mesh size 19x15					
15	Surgical gloves sterile latex No. 7.5					
16	Tetanus Anti toxin (TAT) 1500IU/ml injection					
17	Cimetidine 200mg/ml, 2ml injection - CSPC Ouyi Phar.					
18	Cotrimoxazole Suspension 240mg/5ml					
19	Amoxicillin 250mg/500mg tablet/cap					
20	Ciprofloxacin 500mg Tablet					
