ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

AN ASSESSMENT ON ESSENTIAL DRUGS SUPPLY INSUFFICIENCY IN THE CASE OF ST.PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE, ADDIS ABABA, ETHIOPIA: EXTENTS, CAUSES AND OUTCOMES

THESIS SUBMITTED TO THE UNIT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR MASTER OF ART (MA) DEGREE

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Statement of Declaration

I,Gutema Misgana, declare that this Master's research **"An Assessment on essential drugs supply insufficiency in the case of st.paul's hospital Millennium Medical college, Addis Ababa, Ethiopia: extents, Causes and Outcomes**" is submitted in partial fulfillment of the requirements for the degree of Master's of Arts in Logistics and Supply Chain Management at the School of Commerce, Addis Ababa University. The thesis is my original work and has not been presented for a degree in any other university and all sources of materials used for the thesis have been duly acknowledged.

Declared by:

Gutema Misgana

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Date & Signature

Statement of Certification

This is to certify that Gutema Misgana has carried out his research work on the topic entitled: "**An Assessment on essential drugs supply insufficiency in the case of st.paul's hospital Millennium Medical college, Addis Ababa, Ethiopia: extents, Causes and Outcomes**" is his original work and is suitable for submission for the award of Masters of Art Degree in Logistics & Supply Chain Management.

Advisor: Tariku Jebena (PhD*)*

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Date & Signature

Thesis approval sheet

This is to certify that the thesis prepared by Gutema Misgana, entitled: "**An Assessment on essential drugs supply insufficiency in the case of st.paul's hospital Millennium Medical college, Addis Ababa, Ethiopia: extents, Causes and Outcomes**" and submitted in partial fulfillment of the requirements for the Degree of Masters of logistics and supply chain management complies with the regulations of the university and meets the accepted standard with respect to originality and quality.

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List of Abbreviations and Acronyms

SPHMMC	St. Paul's Hospital Millennium Medical College
WHO	World health organization
VEN	Vital, Essential, Non essential
PFSA	Ethiopian pharmaceutical fund and supply agency.
APTS	Auditable pharmaceutical transaction and services
SCM	Supply chain management
EML	Essential medicine list
DTC	Drug therapeutic committee
LMICs	low and middle-income countries
FMAHACA	Food, Medicine and Healthcare Administration and Control Authority of Ethiopia
API	Active pharmaceutical ingredient
DSM	Drug supply management
SPSS	Statically packaged for social science

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Abstract

Essential drugs concept was defined in 1975 by the World Health Organization (WHO), and is based on the premise that a limited list of carefully selected medicines will improve quality of health care and provide cost-effective health care and better management of medicines. The effectiveness of these drugs supply system in achieving a reliable supply of essential drugs must be continually and objectively assessed. Accordingly, this study has the objective of examining essential drugs supply insufficiency in st.paul;s hospital MMC with extents, causes and outcomes. The study was methodologically conducted using descriptive survey method. The sample size was 56 health professionals particularly pharmacists those knowledgeable in area of drugs supply management in the hospital. Out of 56 questionnaires distributed 51 usable questionnaires were collected and statically packaged for social science (spss16) were used for interpretation. The study shows there are significant problems regarding drugs supply insufficiency in the case hospital. Finally the study provides valuable conclusion and recommendation based on the analysis result.

Chapter one

Introduction

1.1 Background of the study

The availability of drug supplies is an essential element in the delivery of quality, integrated health services. Essential drugs satisfy the priority health care needs of a population in any country and their availability and affordability at all times is crucial for the provision of complete health service. One third of the world's population does not have a regular access to full and effective treatments with the medicine they need. Lack of access or insufficiency to essential drugs is still a serious global public problem, despite considerable progress made since introduction of essential drug concept (Nditunzel et al., 2015).

Drug supply insufficiencies pose a serious challenge for health care institutions, often interfering with patient care (Zaidi, 2015). A common practice during a drug shortage is to select an alternate therapeutic; however, these agents often present challenges and may create safety concerns. Patient harms including adverse events and medication errors may occur. Patients may also file complaints because of drug shortages (McLaughlin, 2013). Drug supply problems are an increasing and worldwide problem. Different definitions are used to define drug supply problems, also referred to as drug or medicine shortages. From an economic point of view, a drug supply insufficiency is defined as: "when the supply does not meet the demand" (Mamun Habib, 2009). However the demand side can be considered at pharmacy level or at patient level. Diverse organizations adapted this general definition according to the interests of the organization (Elfi et al, 2017).). In this paper, drug supply insufficiencies refer to supply disruptions when the supply of drugs does not meet the demand at the level of pharmacies and when the supply of drugs does not meet the demand at consumers/patients level.

Causes of drug supply problems are complex and multi factorial. Quality and manufacturing problems, shortages of the active pharmaceutical ingredient (API) and an unforeseen demand

have a large share in the known causes for supply problems. However, the real causes for supply disruptions and drug shortages remain often unknown (AnnaGu, 2011).

Governments world over, in a bid to have a healthy population and wealthy nations, have continued to strive to ensure that supply chains of essential drugs are effective and efficient for improved health care. This is after the realization that the supply, availability and accessibility of these drugs can improve the quality of lives of the nation since a drug can take up more than half of the actual cost of a treatment at a time, increasing the chance of incurring, catastrophic health expenditures and the associated risks of falling into poverty (Carasso et.al., 2009).

A national survey of Ethiopia estimated that only 70% of key essential medicines were available in the public sector (FMoH, 2013). Eventhough, the number of drugs in amount and variety required is different for a referral hospital, district hospital, health center, and dispensary. The number of drugs should definitely depend on the level and size of the health facility (Admassu et al, 2014). A referral hospital should have more drugs than a district hospital; a district hospital should have more than a health center; health centers more than a dispensary; and so on (Mulugeta, 2011).

In Ethiopia, since its establishment in 2007, Pharmaceutical Fund and Supply Agency (PFSA), the lead organization managing the health care supply chain of the country, has been working to ensure the availability, accessibility, and affordability of essential medicines with appropriate quality, safety, and efficacy (USAID 2010). But still there is drug supply interruption at each health facilities (Anteneh, 2013). In case of the second largest hospital in Ethiopia, St. paul's hospital MMC, repeated stock outs of drugs, particularly of drugs considered as essential are a common phenomenon . This hospital is relatively with wider specialty, hosting large number of clients or patients and complicates drug supply management (Yeshwondm, 2016). Consequence, the problem relating to drug supply is also wider even if there is no documented or evidences in essential drugs availability and usages, basic causes of these drugs shortage and supply chain hindrances of these drugs(Habib, 2009)

In spite government commitments to improve access and availability of the essential drugs, actual realization remains low (Sisay et al., 2017) and structural bottlenecks at each stage of the supply chain have not been systematically identified and documented (Chandani et al., 2014)

Generally, as stated by Ally et al. (2014), the availability of essential drugs and supplies in developing countries hospitals is a continuing problem due to a combination of problems that includes: lack of an agreed procurement policy, lack of an integrated procurement approach**,** lack of credible data and information for procurement planning, poor forecasting. Stoermer, (2009) added, funding structures and arrangements not always able to support procurement and ineffective procurement arrangements with suppliers, interrupted, discontinues and insufficient supply of these drugs by supplying agencies, inappropriate stock management, bad prescribing habit, fraud etc.

1.2 Statement of the problem

Drug supply shortages are recognized as global problem by WHO (Bansal & Purohit, 2016) and drug supply insufficiency affects all stakeholders, patients, pharmacists, clinicians and pharmaceutical industries in the health care system (Alshehir, 2016). Access to drugs is critical to the provision of equitable and affordable health care in low and middle-income countries (LMICs) (Balogun et al, 2012). Majority of the developing countries, mostly in sub Saharan Africa, lack consistent availability and access to essential health products. Availability, access and affordability of safe drug products must be addressed to facilitate high quality healthcare but this is challenging in resource poor settings. Despite increased affordability of drugs, most countries in sub Saharan Africa struggle with drugs supply chain management (Sekabembe, 2009). Specific challenges include high and increasing patient attendance, geographical distance from central stores to local pharmacies, challenges in importing drugs from outside countries, and lack of competitive suppliers (Nditunze, 2015).

According to WHO, the mean availability of essential drugs in LMICs is 35% in public sector facilities. Limited studies are available from these LMICs, which demonstrate significant

variations in essential drugs availability, affordability stock out status (Gov. of India 2014). Many studies recognize that an effective supply chain management (SCM) is a powerful tool to achieve cost advantage and a more profitable outcome for all parties within and beyond any organization (Mungu, 2013). In the health sector an effective SCM management will contribute considerably to constant availability of medical supplies, more so medicines in particular, which are important items in health service delivery (Alshehir, 2016).

In Ethiopia, several initiatives have been taken up by FMoH to insure the availability of essential drugs, such as increased budget allocation for procurement of drugs, centralized drug procurement system through PFSA, online drug inventory management IPLS, and give high attention to strength drug supply management etc. at government health facilities. The primary objective behind all these initiatives is to ensure that essential drugs are available at government health facilities, in required quantities, and that all patients can access prescribed drugs at the point of treatment (FMoH, 2013**).** The study done by FMoH in 2013 to assess pharmaceutical sectors in Ethiopia health facilities identified availability and stock out rates of essential drugs and it recommended further in depth study on areas where shortcomings were noted in order to explore underlying causes and design specific interventions**.** In addition it recommended that in depth assessment needed at health facilities depending on their own unique characters in terms of patient flow, size of health facility, staff quality and quantity, location from capital and PFSA, administration support etc(FMoH, 2013).

St.paul's hospital MMC health facility, like all other public health facilities in Ethiopia is ideally supposed to be getting all the medicines requirement from the Pharmaceutical fund and supply agency (PFSA). PFSA is a specialized government medical logistics provider for ministry of health supported health facilities and programmers in Ethiopia. It plays the role of procuring, storing and distributing health commodities for the public health sector. But the supplies from PFSA are always short of the requirements of the facility.

In St.paul's hospital MMC a number of studies have been carried out in the field of heath targeting different medical issues but no studies have focused on the extents, causes and outcomes of drugs supply insufficiency which influences daily activity of the hospital to serve under privileged population, providing services free of charge for majority of patients and

offering services for large numbers of patients. Therefore this study is intended to assess different issues relating to essential drugs supply insufficiency in st paul's hospital MMC in depth and to explore the extent of drugs supply insufficiency with its cause and effect.

In view of the above, to make medicines available and affordable to consumers, to improve access to essential drugs, reliable information is needed. Thus this study assessment provide important inputs to the hospital drug supply management and designing a system for availing drugs sufficiently in st.paul's hospital MMC.

1.3 Research Questions

The following is the main research questions of the study:

1. What are the causes of drugs supply insufficiency in st.paul's HMMC?

And sub problems questions are: -

1. What extent the drugs supply insufficiency is in st.paul's hospital?
2. What is the role PFSA in causing drugs supply insufficiency in st.paul's HMMC?
3. What are the causes for drugs supply insufficiency in st.paul's HMMC by the organization itself?
4. What are the causes for drugs supply insufficiency in St.pauls HMMC by human resources?
5. What are the outcomes of drugs supply insufficiency in st.paul's HMMC?

1.4 Objective of the study

1.4.1 General Objective

The overall objective of this study is to explore the extent, cause and outcomes of essential drugs supply insufficiency in St. Paul's HMMC.

1.4.2 Specific objectives of the study

The specific objectives of the studies are:

1. To analysis organizational or institutional causes for drugs supply insufficiency in st.Paul,s HMMC.
2. To analysis human causes for drugs supply insufficiency in st.paul's HMMC.
3. To analysis patients satisfaction regarding drugs supply status in st.Paul's HMMC.
4. To assess drugs manufacturers role in causing drugs supply insufficiency in St.paul's HMMC
5. To assess the extent of drugs supply insufficiency in st.paul's HMMC.

1.5 Significance of the study

Insufficiency of essential drugs in st.paul's hospitals MMC is a result of problem related to supply chain management. Insufficiency of these drugs leads the patients to expenditure extra cost for drugs, treatment failure due to the patient miss the prescribed drugs if not avail in hospital, reduces patient confidence on treatment and treatment satisfaction etc.

Essential drugs insufficiencies in hospital exposes patient to extra cost because they forced to buy these drugs from private pharmacies where the drug cost is increases in many folds from governments hospitals.

Thus the findings of this research have the follow practical benefits

- St.Pauls's hospital MMC identify the main causes for drugs supply hindrances
- The stakeholders use the finding to improve the management of the drugs supply chain.
- The patients get better satisfaction after the gap for drugs supply is identified**.**
- The hospital take necessary measures to overcome drugs supply insufficiency after the gap is identified.
- It serve as a trigger for researchers to conduct further study in this area

Due to these reasons it is envisaged that the study make a contribution to the body of knowledge related to the drugs supply management and increasing patient satisfaction and enhance confidence on treatment by indicating reliable data regarding these drugs supply. Thus the significance of the study is that it should provide the richness of a cross sectional study scenario to underpin the causes of essential drugs insufficiency with outcomes on patients in St.paul's Hospital MMC since there is no previous study in this area. Therefore, this study is timely, important and provide information on public health, SCM and will benefit the st.paul's hospital MMC, FMOH, PFSA, etc in boosting the sufficiency of essential drugs in hospital.

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1.6 Scope of the study

The scope of the study is limited on st.paul's hospital MMC and on a portion of employees within the organization. There are around 50 pharmacy staffs plus a limited numbers of other stakeholders in drugs supply management in st.paul's hospital. All pharmacy professionals and limited numbers of administrative staffs (those participate in drug procurement process) were engage in the study of essential drugs supply insufficiency in st.paul's hospital. Newly employed (within six months) pharmacy professional were not include in the study.

1.7 Limitation of the study

Almost every research work inevitably faces some basic limitations and this study is not exception. The study was conducted in one organization and it is difficult to generalize based on the results as drug supply problem vast throughout the country. On other hand to conduct this study, there were limitation encountered during the study. To mention some of these draw back, lack of time became the main factor in collecting data and referring many relevant documents in-depth for analysis. Lack of cooperation from employees, respondents were not dedicated enough to respond the questionnaires, some of the employees were busy of their daily routine tasks to fill the questionnaire and they leave the question not answered. In addition, some respondent were reluctant and reserved to convey their idea freely, on what they really believe in, some respondents were not punctual in returning the questionnaire; these are the limitation of the study. The limitations were overcomed by introducing the importance of the research to respondents and by giving some extra time to fill the questionnaires.

1.8 Operational definition of terms and concepts.

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Operational definition among the independent variables, concepts and terms are defined below.

Supply Chain: - It is a system of organizations, people, activities, information, and resources involved in moving a product or service from supplier to customer. Supply chain activities involve the transformation of natural resources, raw materials, and components into a finished product that is delivered to the end customer.

Supply chain management: - Managing supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, and delivery to the customer.

Insufficiency: State of being insufficient, inadequate supply, deficiency in amount.

Drug supply insufficiency: Drug supplies to heath facilities below actual demand of the facilities. It is a change in the drug supply that has the potential to compromise patient care and

healthcare team is also perplexed under the stress of insufficient supplies, is a problem that entangles health systems preventing them from achieving their goals.

Essential drugs: Are the medications that satisfy the priority health care needs of the population, the medications to which people should have access at all times in sufficient amounts. Those drugs ideally available in st.paul's hospital with enough quantity and affordability at all time.

Organizational causes for drugs supply insufficiency: Drugs supply under demand of the organization(st.paul's hospital MMC) because of facilities, human resources and systems of working an organization has. It is a causes for drugs supply insufficiency by and within institution itself.

Human Resources causes for drugs supply insufficiency: It is factors directly attributable to the drugs supply shortage by operator, worker or personnel (pharmacists and administrative of st.paul's hospital MM) involved. A number of st,paul's hospital employees behavioral like attention, competence, skills, attitudes etc. contribute to the drugs supply insufficiency.

Suppliers performance in supplying essential drugs: The process of measuring, analyzing, and managing supplier performance in supplying essential drugs for the purpose of reducing cost, mitigating risk, and driving continues improvements in value and operations. The activity of PFSA which is almost the sole suppliers of essential drugs for government hospital in Ethiopia .

Manufacturers factore in producing essential drug: Drugs manufacturer performance especially local manufacturers availablity and capacity which includes technological capacity, company's resources, level of production, skill of personnel, level of products formulation and production capabilities those affects product availability and direct effects on essential drugs supply insufficiency in st.paul's hospital MMC.

1.9 Organization of the study

The study is organized under five chapters: Chapter one deals with background of the study, statement of the problem, objectives, and research questions, scope of the study, significance of the study, limitation of the study and Operational definition of terms and concepts. Chapter two is mainly concerned with review of literatures. It comprises theoretical and empirical literatures and conceptual framework. Chapter three focuses on research methodology which comprises rationale for the selection of research area, study design and sampling techniques, data collection methods and analysis. Chapter four presents results and discussion of data. Finally chapter five presents summary of the research finding, concluding remarks and recommendations for future action.

Chapter two

Literature Review

2.1 The concepts of essential medicine

The concept of essential medicines was pioneered by the World Health Organization in 1977 with the introduction of the first essential medicines list (EML). The list has been revised every two years since then (WHO, 2003). Essential Medicine Concept, a major breakthrough in health care, started in 1977 when World Health Organization (WHO) published its first list. Appropriate use of essential medicines is one of the most cost-effective components of modern health care (Bansal & Purohit, 2013). Essential drugs comprise one of the tools needed to fight ill health. By increasing access to essential drugs and their rational use, we could improve health status and secure development gains. “Essential drugs are those that satisfy the health care needs of the majority of the population; they should therefore be available at all times, in adequate amounts and in the appropriate dosage forms” (Assefa, 2013, p.13). This concept was introduced to accelerate the positive impacts of drugs on health status, particularly for developing countries. The availability of essential drug is found to significantly reduce morbidity and mortality; and impact of procurement system on price and availability of these drugs is heavy and wider, therefore it needs to be addressed (WHO, 2004; DACA, 2004).

2.2 Need of Essential Medicines

Essential medicines are those that satisfy the priority health care needs of the population (Jha, 2006). They are selected with due regard to public health relevance, evidence on efficacy and safety, and comparative cost-effectiveness. Essential medicines are intended to be available within the context of functioning health systems at all times in adequate amounts, in the appropriate dosage forms, with assured quality and adequate information, and at a price the

individual and the community can afford. The implementation of the concept of essential medicines is intended to be flexible and adaptable to many different situations. Careful selection of a limited range of essential medicines results in a higher quality of care, better management of medicines (including improved quality of prescribed medicines) and more cost-effective use of health resources.

Forty million deaths have been reported in year alone in developing countries, one-third among children under age, yet most leading causes of death and disability can be prevented or treated with cost-effective essential drugs. Ten million die due to acute respiratory infections, diarrheal diseases, tuberculosis, and malaria; for all these conditions safe, inexpensive, essential drugs can be lifesaving (Bansal and Purohit, 2013). The economic impact of pharmaceuticals is substantial especially in developing countries. While spending on pharmaceuticals represents less than one-fifth of the total public and private health spending in most developed countries, it represents up to 66% in developing countries. In most low income countries pharmaceuticals are the largest public expenditure on health after personnel costs and the largest household health expenditure. Despite this substantial spending on drugs, lack of access to essential drugs, irrational use of drugs and poor drug quality remain serious global public health problems. Essential medicines are believed to be one of the most cost effective elements in modern healthcare and their potential health impact is remarkable (Bhatia et al., 2015).

2.3 Criteria of Selection of Essential Medicine

The Essential Medicines List aims to identify cost-effective medicines for priority conditions, together with the reasons for their inclusion, linked to evidence-based clinical guidelines and with special emphasis on public health aspects and considerations of value of money. The core list presents a list of minimum medicine needs for a basic health care system, listing the most efficacious, safe and cost-effective medicines for priority conditions. Priority conditions are selected on the basis of current and estimated future public health relevance, and potential for safe and cost-effective treatment (Balogun et al., 2013).

The complementary list presents essential medicines for priority diseases, for which specialized diagnostic or monitoring facilities, and/or specialist medical care, and/or specialist training are needed. In case of doubt medicines may also be listed as complementary on the basis of consistent higher costs or less attractive cost-effectiveness in a variety of settings (Balogun et al., 2013). The choice of essential medicines depends on several factors, including the public health relevance and sound and adequate data on the efficacy, safety and comparative cost effectiveness of available treatments. Stability in various conditions, the need for special diagnostic or treatment facilities and pharmacokinetic properties are also considered if appropriate. When adequate scientific evidence is not available on current treatment of a priority disease, the Expert Committee may either defer the issue until more evidence becomes available, or choose to make recommendations based on expert opinion and experience (Carasso, 2009).

Essential medicines are selected based on disease prevalence, evidence on efficacy and safety, and comparative cost-effectiveness. According to WHO (2003), the number of drugs required is different for a referral hospital, district hospital, health center, and dispensary. The number of drugs should definitely depend on the level and size of the health facility. A referral hospital should have more drugs than a district hospital; a district hospital should have more than a health center; health centers more than a dispensary; and so on.

2.4 Availability and accessibility of essential medicines

Availability of quality essential drugs in the public health facilities is very important for the effective implementation of health care policy. To make it happen, procurement of these drugs and its supply management system could be considered as one of the most important factors. It was argued that the essential drugs procurement mechanism is not appropriate in essential drugs. Moreover, it should be proper mechanism of procurement and distribution of quality essential drugs at different levels (Oluka et al., 2012).

The availability of medicines in the world is still a big issue. For example, It has been estimated by different sources that 50-80% of the Indian population are not able to access all the medicines

they need (Bhatia et al, 2015). Despite having lower prices of medicines in India as compared to the international prices, the availability and affordability is poor (Bhatia et al., 2015).

2.5 Causes of essential drugs supply insufficiency

Any country's national drug policy is aimed at ensuring that essential, safe, efficacious and cost-effective drugs are made available to the entire population of its citizen. Despite this, problems of access to quality essential drugs are persistent. This is complicated by availability of few hard data regarding bottlenecks, especially in the poorest parts of Africa and Asia where more than half the population still lacks access to essential drugs (WHO, 1998). The Global Fund to fight AIDS, Tuberculosis and malaria asserts that availability of essential drugs and supplies in the public health sector is a continuing problem due to a combination of problems. Lack of an agreed procurement policy; lack of a single, Ministry of Health (MOH) led procurement strategy; lack of an integrated procurement approach (MOH + donors, NGOs, vertical programmers); lack of credible data and information for procurement planning; poor forecasting; funding structures and arrangements not always able to support procurement and ineffective procurement arrangements with suppliers. Poor fund management and use at MOH; non- compliance to basic procurement rules and regulations; weak regulatory infrastructure / underpinnings; poor use of advisory services from cooperating partners. These problems result in regular emergency procurement activities with high costs (Oluka et al., 2012).

Reasons for drugs supply insufficiency is result from one or more causes , including manufacturing issues, acute healthcare needs, external political and economic factors, or marketing, procurement, and supply chain management practices. Examples of manufacturing issues resulting in shortages include a lack of raw materials, limited manufacturing capacity, or product quality problems resulting in more stringent inspections and plant closures. Health emergencies, such as disasters and disease outbreaks, can also trigger shortages due to unexpected and large surges in demand (Iyengar 2016). The causes of drug supply insufficiency are complicated and rooted in every phase of a drug's life cycle. Yet to be systematically studied, many trends contribute to the shortage, comprising shortage of raw materials, issues related to

manufacturers (pharmaceutical mergers and acquisitions, decisions based on projected profit), supply chain members performance, regulatory and legislative factors, and labor disruption. It is worth noting that approximately 27% of the shortages are unexplained (AnnaGu, 2011). Ventola (2011), added there are a variety of reasons for drug shortages, manufacturing problems (23%) and supply/demand issues (13%) were the most common known causes of drugs insufficiency in health care. However, a far greater percentage of drug shortages (55%) were classified as being due to "unknown" causes.

Once a drug is manufactured, the drug supply chain is composed mostly of wholesalers or distributors, prime vendors, group-purchasing organizations (GPOs), and end-user hospitals and health care systems. Business decisions made by these components of the supply chain can also contribute to drug product shortages (Whitney, 2014). Most hospitals and health systems obtain most of their drug products through wholesale distributors. Distribution methods that are restrictive or that deviate from the usual supply chain can create supply insufficiency. Market approval requirements or post marketing surveillance might cause manufacturers to limit drug product availability to only selected suppliers and health systems that comply with manufacturer agreements. Health systems may also be required to order a drug directly from a manufacturer or through one specialty distributor; this practice may also restrict supplies (Weerdt, et al, 2017).

Ammar et al, (2016) stated that, transportation and communication efficiencies have allowed "on-hand" inventories to be reduced throughout the supply chain. Consequently, most manufacturers, distribution centers, and health systems now use "just-in-time" inventory management to optimize cash flow and reduce the cost of inventory stock. Although this practice is widespread and is considered to be sound, it increases the vulnerability of health care systems to unexpected drug shortages.

Adzimah et al. (2014) , stated that, Poor ordering practices, drug stockpiling in advance of price increases, hoarding in response to rumors of an impending supply insufficiency, and delivery delays may also affect drug stock inventories in health care facilities. Drug shortages may also occur when too many health care facilities in a geographic area are using the same wholesaler, particularly since some shortages are wholesaler-dependent and may occur only because of delays in supplier contracts.

2.6 Consequence of essential drugs supply insufficiency

In developing countries medicines account for 25-70% of overall health care expenditure, compared to less than 10% in high income countries. Moreover, up to 90% of the population in low and middle income countries pay for medicines out of pocket. Therefore, medicines are unaffordable for large sectors of the global population and major burden of government. In addition, supply systems in developing countries frequently face problems regarding efficiency and reliability. The situation is even worse in Africa and Asia where as much as 50% of the population lack access (WHO, 2004). A study conducted by WHO in 36 developing and middle-income countries shows that, average public sector availability of generic medicines ranges from 29.4% to 54.4% (Abiye, 2013).

The inability to benefit from proper medications and supplies puts patients at substantial risk of medical complications and deterioration in health status. The shortages force patients to cope by trying to procure medications from other health providers or from the local market at greater cost, using inappropriate substitute medications, and by seeking treatment abroad. Cancer patients requiring on-going chemotherapy have also been referred outside for treatment. Patients with kidney diseases, transplants, hypertension, blood conditions and chronic illnesses who require a regular regime of medications, some of which are unavailable, are exposed to special risk. (WHO 2011). Due to the need for vital drugs and supplies that are out-of-stock, surgeries in all major specialties have been either curtailed or stopped altogether.

2.7 Essential drugs supply status in Ethiopia.

The population of Ethiopia was estimated to be 100 million in 2016 G.C of which 85% live in rural area (FMoH, WHO 2016). To fulfill drug demand of these populations the Federal Ministry of Health (FMOH) has been working to ensure an efficient and high performing healthcare supply chain that will ensure equitable access to affordable medicines for all Ethiopians. In past

years, significant progress has been made, although various challenges remain an inadequate supply of quality and affordable essential pharmaceuticals, poor storage conditions, and weak stock management resulted in high levels of waste and stock outs. To address these challenges, the FMOH initiated a comprehensive supply chain strategic planning process, which led to the Pharmaceuticals Fund and Supply Agency (PFSA) being established in 2007. In 2009, as part of a major intervention to improve the supply chain situation in the country, PFSA, in partnership with its support partners the USAID | DELIVER PROJECT, Supply Chain Management Systems (SCMS), and others in the sector developed and began implementing the Integrated Pharmaceuticals Logistics System (IPLS). To help health facilities effectively implement IPLS, PFSA and partners designed various interventions, including designing and implementing electronic and paper based logistics management information systems (LMISs), building the logistics capacity of FMOH and PFSA staff at all levels, supporting facilities and warehouses through improved infrastructure, monitoring, and evaluation and supportive supervision for facilities (USAID | DELIVER PROJECT, 2015).

Before PFSA established an organization called Pharmid operated in the country for over fifty years, until 2007. Pharmid was only responsible for non program drugs, and coexisted with the private sector in supplying some of the pharmaceuticals needed throughout the country. In mid 2007, the Pharmaceutical Fund Supply Agency (PFSA) was created with a larger mandate: to supply the entire country with both Program and Essential drugs, as well as serve as the distribution entity for vaccines, other health facility supplies, and laboratory equipment. The end goal is for PFSA to be the sole distributor of health related materials to all public facilities within the country. PFSA's current supply chain starts with the import of most drugs via the port of Djibouti. These products are then trucked into Addis Ababa, before being distributed to the various distribution centers (Hubs) and on to the hospitals, clinics, and health centers (world Bank, 2009).

According to FMHACA 2010, Ethiopian essential drugs are selected with due regards to public health relevance, evidence on safety, efficacy, quality and comparative cost effectiveness. They are intended to be available within the context of functioning health systems at all times in adequate amount, appropriate dosage forms with assured quality.

Essential Medicines List is meant to guide the selection, procurement, production, distribution and storage of medicines. It can also serve as an informational and educational tool for health care professionals involved in diagnosis and treatment of diseases as well as dispensing of medicines. Furthermore, it can improve availability and promote rational use of medicines. The Government of Ethiopia, through its drug policy, has reaffirmed its commitment to provide or else systematize the supply of medicines that adequately meet the common contemporary health needs of the general population of the country.

As Wondwossen (2015), stated global expenditure on health service is about $ 5.5 Trillion, of which 25% is on pharmaceuticals ($1.2 Trillion), 3-6% per year. Africa shares 10% of global Pharmaceutical share, the share is expected to increase in the coming years. By 2016 pharmaceutical spending on the continent is expected to reach $30 billion, driven by a 10.6% annual growth rate . Ethiopian market will reach about USD 800 Million ($600 in public + $ 200 Private) , with annual growth rate of 25-35%, will reach $ one Billion by 2018.

According to MSH (Management Sciences for Health, 2012), In Ethiopia, despite a high burden of disease, utilization of health services remains very low, with people visiting a health facility less than once every two years. Even though per capita spending on health has increased over the past years to $7.14 in 2004⁄2005, it heavily relies on household contributions with out of pocket expenditure accounting for 30% of total health expenditure. At the same time, the government drug budget remains well below the WHO recommendation of US$ 1 per person. There are frequent drug shortages in public health facilities. (FMoH 2003). Unavailability of medicines in the public sector compels patients to revert to the private sector. Consequently drugs can take up more than half of the actual cost of a visit, increasing the chance of incurring catastrophic health expenditures and the associated risks of falling into poverty. To address issues of drug availability and affordability, the government of Ethiopia supported the creation of revolving drug funds (RDF) as part of the new Health Care Financing Strategy. These funds aim to increase resources at facility level through the sale of medicines with a mark up, thereby generating additional funds for the procurement of new drugs and quality improvements. The strategy aims to enhance affordable and sustainable supply of medicines to the public, improve

overall quality of services provided, and promote sustainability of health services (Carasso et al., 2009).

The availability of medicines in hospitals is expected to be 100%. This is especially true if the medicines are essential and lifesaving. This is not the reality in Ethiopian hospitals and an urgent response is needed. Health care facilities in Ethiopia, purchase drugs directly from PFSA and make little effort to obtain these drugs from other sources or suppliers if fail to receive from PFSA through direct procurement. It is expected that hospitals use all types of procurement methods to ensure the availability of medicines from various sources in situations where products are not supplied through the PFSA. But hospitals are challenged by the legal requirements governing the procurement process. The major reasons for insufficiency of essential medicines in Ethiopian hospitals are, the supplier (PFSA) cannot respond effectively to ever increasing need for medicines and information for decision making in procuring medicines is not properly generated by the hospital and when information is available, it is not used to guide the selection and procurement of pharmaceuticals (APTS, 2014).

2.8 Conceptual Framework

According to Grant (2014), a conceptual framework represents the researcher's synthesis of literature on how to explain a phenomenon. It maps out the actions required in the course of the study given his previous knowledge of other researchers' point of view and his observations on the subject of research. In other words, the conceptual framework is the researcher's understanding of how the particular variables in his study connect with each other. Thus, it identifies the variables required in the research investigation. It is the researcher's "map" in pursuing the investigation.

Depending on this the figure below shows the relationship between Variables in the study of Essential drugs supply insufficiencyin st.paul's HMMC: prevalence, cause, outcomes

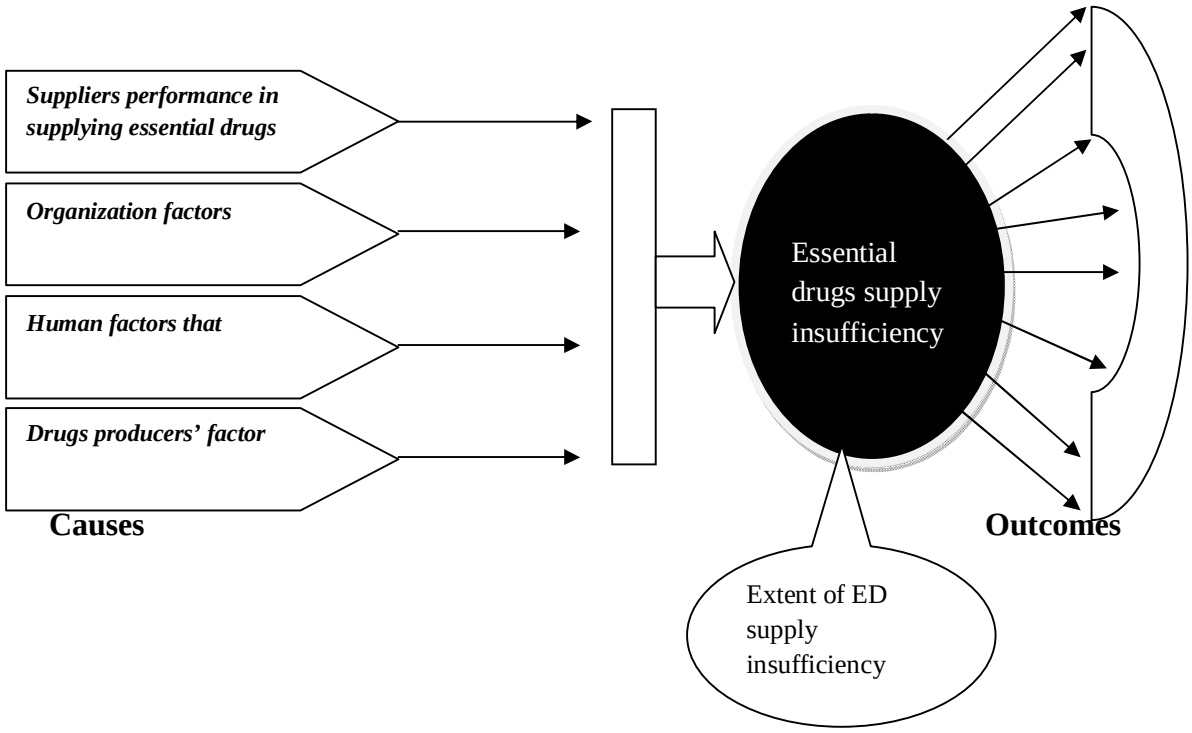

Fig1. Conceptual framework (own source)

Suppliers factors in supplying essential drugs, Organization factors, human factors and drugs producers factors are identified as the main causes for the drugs supply insufficiency in st.paul's hospital MMC. The extent and outcomes of these drugs supply insufficiency are identified.

Chapter three
Research Methodology

3.1 Description of study area

The study is conducted at st. paul's hospital MMC which is located in Gulale sub city, Addis Ababa. St.paul's hospital MMC is the 2nd largest government hospital in Ethiopia.

St. Paul's Hospital Millennium Medical College is a referral hospital in Addis Ababa under the Ethiopian Federal Ministry of Health (FMOH). It is built by the Emperor Haile Selassie in 1961 with the help of the German Evangelical Church. The hospital was established to serve the economically under privileged population, providing services free of charge to about 75% of its patients. In 2007 it became a medical college and its core services include the provision of medical care, teaching and research.

This hospital currently has more than 400 beds, with an annual average of 200,000 patients and a catchment population of more than 5 million. Approximately 75% of the patients receive medical services free of charge. There are over 2000 clinical and non-clinical staff in over 25 departments.

3.2 Research approach

3.2.1 Qualitative versus quantitative research approach

The decision to choose a specific methodology should be based on its suitability to answer the research questions (Guba, & Lincoln, 1994). They asserted that qualitative research emphasises the process of discovering how the social meaning is constructed and stresses the relationship between the investigator and the topic studied. Conversely, quantitative research is based on the measurement and the analysis of causal relationships between variables.

Saunders, Lewis &Thornhill (2008), discriminated between qualitative and quantitative research arguing that qualitative research referred to the meanings, concepts, definitions, characteristics,

metaphors, symbols and descriptions of things, while quantitative research referred to the measures and counts of things. Qualitative and quantitative research approaches differ basically in some major areas, including: their analytical objectives; types of questions posed; types of data collection methods used; types of data produced; degree of flexibility in study design.

Accordingly, I used both qualitative and quantitative approach to accomplish the overall aim of the study as most of the business and environment literature has largely focused on quantitative studies that lack deeper theoretical analyses (Guba & Lincoln 1994).

3.2.2 Inductive versus deductive research approach

It is important also to classify the research approach in terms of whether it is inductive or deductive. Saunders, Lewis &Thornhill (2008), differentiated between these two types of the research design.

- **Deductive approach** – known as testing a theory, in which the researcher develops a theory or hypotheses and designs a research strategy to test the formulated theory.
  Deduction is the technique by which knowledge develops in more mature fields of enquiry. It involves a sort of logical leap. Going a stage further than the theory, data is then collected to test it.
- **Inductive approach** – known as building a theory, in which the researcher starts with collecting data in an attempt to develop a theory.
  When researchers first begin to open up any new line of enquiry there will be no useful theories available from which to deduce propositions for testing. Knowledge has to begin with collecting facts and then trying to find some order in them. This is known as induction.

The current study used inductive research design. I started the research process by exploring and collecting the data from different sources and by using multiple sources of evidence: by questionnaires, direct observation and document analysis in an attempt to develop a best practice model for drug supply insufficiency in st,paul's hospital.

3.3 Research Design

The study was done as a cross sectional descriptive study based on historical data, interviews, direct observation of current practice. The study was therefore both quantitative and qualitative. For the quantitative aspect, the data was collected by questionnaires. This data collection tool was structured questionnaires for pharmacy professionals.

The qualitative part of the study used in-depth interviews with key players in the drug supply management system. These key informants were drug purchasers and hospital administrative. The key informants were interviewed on how they perceived essential drug management and also on problems relating to these drugs supply in the st,paul's hospital MMC. The observational part of the study was also part of the qualitative aspect of the study.

3.4 Unit of Analysis

The unit of analysis is the major entity that is being analyzed in a study. It is the 'what' or 'who' that is being studied. In social science research, typical units of analysis include individuals (most common), groups, social organizations and social artifacts (Waning et al., 2010).

The unit of analysis in this study is a st.paul's hospital MMC as drugs supply insufficiency in st.paul's hospital permits understanding of collective action and permits understanding of drugs supply insufficiency and impacts.

3.5 Study Population

The study populations were comprised of st.paul's hospital MMC staffs of more than 2000 people. To study the extent, causes and outcomes of drugs supply insufficiency in the hospital, all pharmacists or experts in four case team were engaged in the study. The case teams are drugs supply management case team, dispensing unit case team, clinical unit case team and pharmacy administration case team. The qualitative part of the study used in-depth interviews with key players in the drug supply management system. These key informants were drug purchasers and hospital administrative.

3.6 Sampling techniques and Sample Size

The researcher used non-probability sampling technique which is purposive or judgment sampling technique since the study was intended explore the judgment of the expertise in this case pharmacists and procurement experts in st.paul's hospital MMC were involved. As a result there were 51 participants in this case. The study targeted these personnel because of they are directly involved in drugs supply management, inventory management, dispensing drugs, counseling patient. Thus they are better to answer questions related to drugs supply insufficiency in the hospital.

3.7 Data Types, Sources and Collection Procedure

The sources of data for the study were primary data by using structured questionnaires and secondary data to assess document review and observation of the drug supply insufficiency of selected essential drugs.

Both quantitative and qualitative data type were applied in this research and the data were collected from employees of st.paul's hospital particularly those directly participate in drugs supply management.

To collect data permission was requested from the hospital research and development administration of the academic bureau. The questionnaire was left with the respondents through well prepared questionnaire with preamble letter. Consent was made with employees to facilitate good response rate and the collection of the data taken a week.

3.8 Variables of the study

Scientists design experiments to search for cause and effect relationships. In other words, they design an experiment so that changes to one item cause something else to vary in a predictable way. These changing quantities are called variables. A variable is any factor, trait, or condition that can exist in differing amounts or types. An experiment usually has three kinds of variables: independent, dependent, and controlled (Helmenstine , 2017).

This study has two variables independent variables (Factors) and dependent variable (outcomes)

3.8.1 Dependent Variable

- Drugs supply insufficiency

3.8.2 Independent variables

- Suppliers performance in supplying essential drugs
- Organizational or institutional causes
- Human cause
- drugs manufacturers causes

3.9 Quality of data (Validity and reliability of the questionnaires)

Validity and reliability are two fundamental elements in the evaluation of a measurement instrument. Instruments can be conventional knowledge, skill or attitude tests, clinical simulations or survey questionnaires. Instruments can measure concepts, psychomotor skills or affective values.

Validity is concerned with the extent to which an instrument measures what it is intended to measure. Reliability is concerned with the ability of an instrument to measure consistently. It should be noted that the reliability of an instrument is closely associated with its validity. An instrument cannot be valid unless it is reliable. However, the reliability of an instrument does not depend on its validity.

3.9.1 Validity

Kaur SP (2013), asserted that "an account is valid or true if it represents accurately those features of the phenomena, that it is intended to describe, explain or theorise". Insofar, validity is concerned with two main issues: whether the instruments used for measurement are accurate and whether they are actually measuring what they want to measure. In addition, the use of multi-methods for examining one issue corroborates the findings of the research and increases the validity of the data.

In terms of the current research, validity is achieved by undertaking multiple methods to investigate the problem from different angles to strengthen the validity of the findings. I also considered selecting multiple/representative case studies to cover the entire issues related to the study and increase the probability of generalization. Moreover, all the questions posed in the questionnaires are directly linked to the research's aim and objectives and covered all aspects of the topic.

The prepared questionnaire to assess drug supply insufficiency with independent variables were intended to be measured by Likert scale of five point with 1= strongly disagree, 2= disagree, 3=

neutral, 4= agree, and 5 = strongly agree. Response category: strongly disagree (1.50 or less), disagree (1.51 – 2.50), neutral (2.51 – 3.49), agree (3.50 – 4.49) and strongly agree (4.5 or greater)

Finally, all secondary sources of data were initially assessed to determine the validity of the information given.

3.9.2 Reliability

Reliability is known as to what extent the research findings can be replicated, if another study is undertaken using the same research methods (*Tavakol & Dennick 2011)*. They asserted that the reliability of the findings depends on the likely recurrence of the original data and the way they are interpreted.

Alpha was developed by Lee Cronbach in 1951 to provide a measure of the internal consistency of a test or scale; it is expressed as a number between 0 and 1. Internal consistency describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the interrelatedness of the items within the test. Internal consistency should be determined before a test can be employed for research or examination purposes to ensure validity. In addition, reliability estimates show the amount of measurement error in a test. Put simply, this interpretation of reliability is the correlation of test with itself.

The number of test items, item interrelatedness and dimensionality affect the value of alpha. There are different reports about the acceptable values of alpha, ranging from 0.70 to 0.95. A low value of alpha could be due to a low number of questions, poor interrelatedness between items or heterogeneous constructs. For example if a low alpha is due to poor correlation between items then some should be revised or discarded. The easiest method to find them is to compute the correlation of each test item with the total score test; items with low correlations (approaching zero) are deleted. If alpha is too high it may suggest that some items are redundant as they are testing the same question but in a different guise. A maximum alpha value of 0.90 has been recommended. According to Tavakol & Dennick (2011), scales with coefficient alpha between

0.8 and 0.95 are considered to have very good quality, scales with coefficient alpha between 0.7 and 0.8 are considered to have good reliability. (Zikmund ,et.al, 2010), added that coefficient alpha between 0.6 and 0.7 indicates fair reliability.

Table 1: Reliability of variables depending on Cromboch's alpha level

Summary of Measures

SN	Variables	No of items in the scale	Cronbach"s alpha result
1	Suppliers performance in supplying essential drugs	13	0.62
2	Organizational or institutional causes for drugs supply insufficiency	21	0.78
3	Human cause for drugs supply insufficiency	11	0.675
4	Drugs manufacturers factors in causing essential drugs supply insufficiency	9	0.65

Source: own survey, 2017

The above table evidenced that in this study reliability tested, the alpha value for four variables were measured ,tested and number of question in the instrument identified , finally alpha result was determined this increase confidence that the instrument would yield acceptable results and it proved that scales with coefficient alpha acceptable and fair for further analysis (Tavakol & Dennick, 2011).

3.10 Ethical consideration

All social research involves consent, access and associated ethical issues, since it is based on data from people about people. Interviews of participants was meet the general protocols and procedures for interviewing and oral history. The study was ensure that informed consent was obtained from participants. They needed full information about the research including the reasons they have been chosen to participate. Participants' privacy, confidentiality and anonymity was guaranteed. Consent forms and a covering letter was provided.

Similarly, the organizational used for the case study, st.paul's Hospital MMC was gave permission for access to archival material and documents useful to the study. The hospital was assured that findings used appropriately, as their reporting and dissemination.

CHAPTER FOUR
Data Analysis AND DISCUSSION

4.1 Introduction

The main objective of this study is to examine the extent, causes and outcomes of essential drugs supply insufficiency in st.paul's hospital MMC. In this chapter, the data obtained in the study are analyzed, presented, interpreted and discussed. The chapter starts by providing the demographic and personal information of the respondents. The descriptive statistics is presented thereafter. Quantitative and qualitative data analysis tools were used to analyze the collected data. Descriptive statistics used to describe and interpret the result of the study by Social Package for Social Sciences (SPSS) software was used to analyze the data from the questionnaire.

Out off 56 questionnaires distributed to the respondents 51 (91%) questionnaires were collected. Accordingly, the analysis of this study is based on the responses obtained from these questionnaires filled by respondents.

4.2 Demographic information of Respondents

The first section of the questionnaire demanded personal information from respondents. These questions include: gender, age, work experience in the hospital, Professional title and education status.

Table.2 Gender Composition of Respondent

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	32	62.7	62.7	62.7
Female	19	37.3	37.3	100
Total	51	100	100	

Source: own survey, 2017

Table.2 above presents the gender distribution of the sample. The sample was representative of a larger number of male respondents to that of female respondents. Male respondents comprised of 62.7(n = 32) compared to 37.3(n = 19) female respondents.

Table.3 Age distribution of the Respondent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	below 20	1	2	2	2
	21-30	25	49	49	51
	31-40	25	49	49	100
	Total	51	100	100	

Source: own survey, 2017

The tabular presentation of the age distribution of the sample is presented in table 4.3. Almost all respondents age category fall within 20-40 (no=49 or 98%). The age category of respondents within 21-30 (no=25 or 49%) and 31-40(no=25 or 49%) are equal. The age category below 20 constitute (no=1 or 2%). There is no respondents' age category above 40.

From the table the majority of the respondents' age category belongs to in range of 21-30 and 31- 40 that mean in range of 20-40 (no=49 or 98%).

Table.4 Respondents years of service in st.paul's hospital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-3yrs	20	39.2	39.2	39.2
	4-7yrs	20	39.2	39.2	78.4
	8-11yrs	9	17.6	17.6	96.1
	above 12yrs	2	3.9	3.9	100
	Total	51	100	100	

Source: own survey, 2017

With regard to years of work experience in hospital 20(39.2%) have 1-3 years experience, 39.2% (20) of them have 4-7 year experience, 17.5 (9) employees have an experience of 8-11 years. The remaining of them 2(3.9%) have above 12years of experience.

From the table above majority of the staffs have below seven years of experience. There are only 21.4% (11) of employees have above 8 years of experience.

Table.5 professional title of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Senior pharmacist	29	56.9	56.9	56.9
	Pharmacist	12	23.5	23.5	80.4
	Clinical pharmacy	6	11.8	11.8	92.2
	Druggist	2	3.9	3.9	96.1
	others	2	3.9	3.9	100
	Total	51	100	100	

Source: own survey, 2017

From table. 5 most of the respondents professional title is senior pharmacist 29(56.9%) and pharmacist 12(23.5%) .

Table.6 Education Back Ground of Respondent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Master degree	5	9.8	9.8	9.8
	First degree	44	86.3	86.3	96.1
	Diploma	2	3.9	3.9	100
	Total	51	100	100	

Source: own survey, 2017

From the table, it is evidenced that the respondents from the case institution hold a range of educational qualification from diploma to Masters' degree level. The majority of the respondents which represents 44 (86.3%) are first degree holders and 5 (9.8%) are master's degree holders and 2(3.9%) of them are diploma holder.

4.3 The extents of essential drugs supply insufficiency in st.paul'S hospital MMC

To study the extent of essential drugs supply insufficiency in st.paul's hospital MMC, the respondents asked to express the estimation of these drugs availability and the following result was gained.

Table .7 Experts estimation on the extent of essential drugs supply in St.PHMMC

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	below 50%	13	25.5	25.5	25.5
	50-70%	28	54.9	54.9	80.4
	70-85%	8	15.7	15.7	96.1
	85-95%	2	3.9	3.9	100
	Total	51	100	100	

From the table above, the majorities of respondents (N=28, 54.5%) estimate the availability of essential drugs in st.paul's hospital MMC in between 50-70%.

13(25.5%), 8(15.7%) and 2(3.9%) of the respondents were estimate the availability of these drugs below 50%, 70-85%, 85-95% respectively.

4.4 Causes of essential drugs supply insufficiency in st.paul's hospital MMC.

The data collected from Employees of st.paul's hospital MMC through structured questionnaire are analyzed and presented in this section below with the help of tables. The descriptive statistics analyzes the data based on research questions to asses drugs supply insufficiency in st.paul's hospital MMC with prevalence, causes and outcomes.

Descriptive statistics in the form of arithmetical means and standard deviation for the respondents were computed for the multiple dimension of drugs supply insufficiency that have been examined through the questionnaires collected from employees st.pauls's hospital MMC.

1. *Suppliers factors*

Table.8 Summary of responses to Suppliers performance in supplying essential drugs

	Table 4.2.1 Summary of responses to Suppliers performance in supplying essential drugs								
	Statements		Str. Disagree	Disagree	Neutral	Agree	str. Agree	Mean	Std. Deviation
1	PFSA service is not satisfactory to the facility	Count		4	11	16	20	4.2	0.969
		%		7.8	21.6	31.4	39.2		
2	Local suppliers services are not satisfactory to the facility	count		6	9	28	8	3.74	0.868
		%		11.8	17.6	54.9	17.4		
3	Buying drugs from PFSA is less cost effective	Count	4	9	10	16	12	3.45	1.254
		%	7.8	17.6	19.6	31.4	23.5		
4	Having a poor working relations with suppliers results in untimely delivery of drugs	Count		6	15	19	11	2.27	1.282
		%		11.8	29.4	37.3	21.6		
5	Poor quality of drugs supplied by PFSA result in drugs shortage	Count	2	17	10	9	13	3.27	1.282
		%	3.9	33.3	19.6	17.6	25.5		
6	There are a recall or reverse logistics due to drugs quality defect by suppliers	Count	2	21	14	13	1	2.8	0.939
		%	3.9	41.2	27.5	25.5	2		

7	Inadequate information flows to and from suppliers significantly lead to drugs supply insufficiency	Count		1	9	26	15	3.49	0.744
		%		2	17.6	51	29		
8	A gap of order fill rate of drugs from the suppliers is visible	Count		1	13	32	5	3.49	1.206
		%		2	25.5	62.7	9.8		
9	Transporting drugs between PFSA and SPHMMC is difficult	Count	4	6	14	15	12	3.49	1.206
		%	7.8	11.8	27.5	29	23.5		
10	PFSA deliver drugs by own fleets to reduce drug supply insufficiency	Count	2	20	19	7	3	2.78	0.945
		%	3.9	39.2	37.3	13.7	5.9		
11	The location of the PFSA is not convenient to supply drugs for st.paul's hospital	Count	7	12	9	13	10	3.14	1.357
		%	13.7	23.5	17.6	25.5	19.6		
12	PFSA is the sole supplier for the hospital result in drugs supply insufficiency	Count	3	3	14	14	17	3.76	1.159
		%	5.9	5.9	27.5	27.5	33.3		
13	The time spent during procuring drugs from PFSA is large	Count	1	11	12	18	9	3.45	1.083
		%	2	21.6	23.5	35.3	17.6		

Source: own survey, 2017

From the table above there is respondents agreement level on each variable regarding drugs supply insufficiency in st,paul;s hospital. Accordingly, Most of the respondents were not strongly disagree for most variables. For example no respondents strongly disagree with the statement of "PFSA service is not satisfactory to the facility, Having a poor working relations with suppliers results in untimely delivery of drugs, inadequate information flows to and from suppliers significantly lead to drugs supply insufficiency. Having a poor working relations with suppliers results in untimely delivery of drugs" in causing drugs supply insufficiency by suppliers side.

Most respondents are agreed on statements "A gap of order fill rate of drugs from the suppliers is visible (n=32 62.7%), local suppliers services are not satisfactory to the facility (n=28,54.9%), inadequate information flows to and from suppliers significantly lead to drugs supply insufficiency (no= 26, 51%)"

From the table we understand that most respondents were agreed, strongly disagreed and neutral on the statements listed in this category.

A little number of respondents disagree and strongly disagree with the statements listed as a problem for drugs supply insufficiency in st,paul,s hospital.

On other hand majorities of the respondents agreed that "PFSA service is not satisfactory to the facility" (4.2 mean score) and "PFSA is the sole supplier for the hospital result in drugs supply insufficiency" (3.76 mean score) in causing drugs supply insufficiency in st.paul's hospital by suppliers side.

2. Organization factors

Table.9 Summary of responses to organization causes that lead to drug supply insufficiency

	Table 4.2.2 Summary of responses to Organization causes that lead to drug supply insufficiency								
SN	Statements		Str. Disagree	Disagree	Neutral	Agree	str. Aagree	Mean	Std. Deviation
14	Lack of computerized alert system for low of stock drugs	Count	2	1	3	14	31		
		%	3.9	2	5.9	27.5	60	4.39	0.981
15	Unexpected delay in drug delivery	Count		5	12	22	12		
		%		9.8	23.5	43.1	23.5	3.8	0.917
16	Pharmaceutical warehouse is not being under the direct supervision of pharmacy department.	Count	4	14	9	12	12		
		%	7.6	27.5	17.6	23.5	23.5	3.27	1.313
17	Complexity of pharmaceutical purchase order process	Count		2	14	27	8		
		%		3.9	27.5	52.9	15.7	3.8	0.749
18	Not knowing the expected duration of the drug supply insufficiency	Count	1	4	11	26	9		
		%	2	7.8	21.6	51	17.6	3.7	0.93
19	Unpredictable factors influencing drug demands	Count			13	26	12		
		%			25.1	51	23.5	3.98	0.707
20	Unavailable of alternative medication	Count		9	4	28	10		
		%		17.6	7.8	54.9	19.6	3.76	0.971
21	Delaying of drug clearance by the health authority	Count		8	12	26	5		
		%		15.7	23.5	51	9.8	3.55	0.879
22	Potential safety concerns (major drugs recall)	Count		7	9	34	1		
		%		13.7	17.6	66.7	2	3.57	0.755
23	High prices of medication	Count	4	13	18	15	1		
		%	7.8	25.5	35.3	29.4	2	2.92	0.977
24	Rely on PFSA only for drugs supply	Count	2	6	9	15	19		
		%	3.9	11.8	17.6	29.4	37.3	3.84	1.173
25	Nonfunctional DTC committee in Hospital contributes to drugs supply insufficiency	Count		8	7	16	20		
		%		15.7	13.7	31.4	39.2	3.94	1.085
26	lack of funding is reason for drugs unavailability	Count	5	9	11	18	8		
		%	9.8	17.6	21.6	35.3	15.7	3.29	1.221

27	Internal bureaucracy is reason for drugs unavailability	Count		3	7	24	17		
		%		5.9	13.7	47	33.3	4.08	0.0845
28	Unavailability of storage space is reason for drugs insufficiency	Count	1	3	7	15	25		
		%	2	5.9	13.7	29.4	49	4.18	1.014
29	Poor procurement practices is common in SPHMMC	Count		10	5	19	17		
		%		19.6	9.8	37.3	33.3	3.84	1.102
30	A set of activities and procedures that ensure the health commodities are available, accessible and of high quality is missed	Count		12	15	21	3		
		%		23.5	29.4	41.2	5.9	3.29	0.901
31	The activities that health care provider perform to get sufficient commodities of assured quality at competitive prices in accordance with national and international laws is missed	Count		12	20	15	4		
		%		23.5	39.2	29.4	7.8	3.22	0.901
32	poor proper inventory, storage and distribution system in place	Count	1	7	9	25	9		
		%	2	13.7	17.6	49	17.6	3.67	0.993
33	Transporting drugs between store and dispensing unit in STPHMMC is with difficulty	Count	3	8	11	20	9		
		%	5.9	15.7	21.6	39.2	17.6	3.47	1.138
34	Inadequate availability of health commodities is common in SPHMMC	Count	3	5	9	24	10		
		%	5.9	9.8	17.6	47.1	19.6	3.65	1.092

Source: own survey, 2017

From the table above large numbers of respondents strongly agreed with the variable "lack of computerized alert system for low of stock drugs" (n=31, 60%) considers for the cause of drugs supply insufficiency due to organizational effect. While (n=27,57.9), (n=26,51%), (n=26,51%), (n=28,54.9%) and n=26,51%) agreed with the statements of "Complexity of pharmaceutical purchase order process, Not knowing the expected duration of the drug supply insufficiency, Unpredictable factors influencing drug demands, Unavailable of alternative medication, and Delaying of drug clearance by the health authority" respectively as causes and outcomes of drugs supply insufficiency in st.paul's hospital MMC.

Most of the respondents agreed with the statements of " Lack of computerized alert system for low of stock drugs(4.39 mean score), Unexpected delay in drug delivery(3.8 mean score), Complexity of pharmaceutical purchase order process (3.8 mean score), Unpredictable factors influencing drug demands (3.98 mean score) Nonfunctional DTC committee in Hospital

contributes to drugs supply insufficiency (3.94 mean score), Internal bureaucracy is reason for drugs unavailability(4.08 mean score), Unavailability of storage space is reason for drugs insufficiency (4.18 mean score) as organizational causes for drugs supply insufficiency

A low numbers of respondents disagreed and strongly disagreed with the statements listed as a causes for drugs supply insufficiency in st.paul's hospital MMC by organizational itself. The majorities of the respondents agreed and strongly agreed with variables listed as a causes for drugs supply insufficiency in st.paul's hospital by the organizational itself.

3, Human resource Factors

Table.10 Summary of responses to Human causes that lead to drug supply insufficiency

	Table 4.2.3 Summary of responses to Human causes that lead to drug supply insufficiency								
SN	Statements		Str. Disagree	Disagree	Neutral	Agree	str. disagree	Mean	Std. Deviation
35	Lack of effective communication among pharmacy, pharmaceutical warehouses and purchasing department	Count	1	3	12	21	14	3.86	0.96
		%	2	5.9	23.5	41.2	27.5		
36	Staff shortage in pharmaceutical warehouses and purchasing departments	Count	3	7	10	18	13	3.61	1.185
		%	5.9	13.7	19.6	35.3	25.2		
37	Improper drug purchase order request by assigned staff	Count	1	10	11	21	8	3.49	1.049
		%	2	19.6	21.6	41.2	15.7		
38	Lacking a good relationship with pharmaceutical companies or other hospitals	Count	2	8	12	22	7	3.47	1.046
		%	3.9	15.7	23.5	43.1	13.7		
39	Inadequate follow up by pharmacy, pharmaceutical warehouse and purchasing department regarding the requested drug	Count	1	6	13	23	8	3.61	0.961
		%	2	11.8	25.5	45.1	15.7		
40	Misuse of drugs by pharmacy staffs	Count	4	16	19	12		2.76	0.907
		%	7.8	31.4	37.3	23.5			
41	Unavailability of skilled labour is reason for drugs unavailability	Count	3	21	16	9	2	2.73	0.0961
		%	5.9	41.2	31.4	17.6	3.9		
42	Drugs are not in dispensary may available in store due to reluctant effect of staff	Count	2	11	29	9		2.88	0.739
		%	3.9	21.6	56.9	17.6			
43	Unclear specification by staff leads to the wrong drugs acquisition	Count	1	9	21	17	3	3.24	0.885
		%	2	17.6	41.2	33.3	5.9		

44	Lack of cooperation from supply chain members	Count		7	13	26	5	3.57	0.855
		%		13.7	25.5	51	9.9		
45	Poor management of supply chain inventories (Stock) causes drug supply insufficiency	Count	2	5	9	24	11	3.75	1.041
		%	3.9	9.8	17.6	47.1	21.6		

Source: own survey, 2017

From the table above most respondents had neutral argument with the statement "Drugs are not in dispensary may available in store due to reluctant effect of staff "(n=29, 56.9%).

Beyond this a majorities of the respondents agreed and strongly agreed with the statements listed to evaluate human causes of essential drugs supply insufficiency in the hospital.

A numbers of respondents disagreed with the statement (n=21, 41.2%) and (n=16, 31.4%) respondents neither agreed nor disagreed with "Unavailability of skilled labour is reason for drugs unavailability" that means the are enough skilled professionals to manage drugs supply in the hospital.

On other hand majorities of respondents agreed with the statement of "Lack of effective communication among pharmacy, pharmaceutical warehouses and purchasing department (3.86 mean score), Staff shortage in pharmaceutical warehouses and purchasing departments (3.61 mean score), Inadequate follow up by pharmacy, pharmaceutical warehouse and purchasing department regarding the requested drug (3.61 mean score), Poor management of supply chain inventories (Stock) causes drug supply insufficiency(3.75 mean score) in causing drugs supply insufficiency in st.paul's hospital MMC by professionals themselves.

Relatively more respondents disagreed and strongly disagreed with the statements mentioned to test the human causes in the hospital in this case.

5 Drugs manufacturers factors

Table 10. Summary of responses to drugs manufacturers' performance in causing drug supply insufficiency

	Table 4.2 Summary of responses to Drugs manufacturers performance in causing drug supply insufficiency								
SN	Statements		Str. Disagree	Disagree	Neutral	Agree	str. disagree	Mean	Std. Deviation
46	There are below expected drugs manufacture in Ethiopia	Count	2	2	5	26	16		
		%	3.9	3.9	9.8	51	31.4	4.02	0.969
47	The existed manufactures produces drugs below communities' demand	Count		3	6	30	12		
		%		5.9	11.8	58.8	23.5	4	0.775
48	Under performance of local drugs manufactures is a significantly causes drugs supply insufficiency to st.paul's hospital	Count		9	13	21	8		
		%		17.9	25.5	41.2	15.7	3.55	0.966
49	Drugs manufacturers in Ethiopia not follow GMP(good manufacturing practices)	Count		16	22	10	3		
		%		31.4	43.1	19.6	5.9	3	0.872
50	Packaging material of manufactures uses is not adequate to maintain the quality of drugs	Count		9	20	17	5		
		%		17.6	39.2	33.3	9.8	3.35	0.89
51	There is a recall or reverse logistic due to production defect, quality or safety problems by manufacturers	Count		16	16	17	2		
		%		31.4	31.4	33.3	3.9	3.1	0.9
52	Most of essential drugs are produced by foreign drugs manufacturers	Count	1	1	6	19	24		
		%	2	2	11.8	37.3	47.2	4.25	0.891
53	The unavailability of raw materials manufacturers use to produce drugs are a cause for drugs insufficiency	Count		10	11	21	9		
		%		19.6	21.6	41.2	17.6	3.57	1.005
54	There is poor relationship between manufacturers and st.paul's hospital MMC	Count	1	10	8	14	18		
		%	2	19.6	15.7	27.5	35.3	3.75	1.197

Source: own survey, 2017

From the table above, most of the respondents (n=26, 51%), (n=30, 58.8%) agreed with the statements "There are below expected drugs manufactures and, The existed manufactures produces drugs below communities' demand" respectively. In causing drugs supply insufficiency in st.paul's hospital MMC.

The other statements are relatively proportionally responded from strongly agreed to disagreed. But there are statements with no respondents strongly disagreed in causing drugs supply

insufficiency by drugs manufactures. For example, statements (n=0,0%) "The existed manufactures produces drugs below communities' demand, Under performance of local drugs manufactures is a significantly causes drugs supply insufficiency to st.paul's hospital, Packaging material of manufactures uses is not adequate to maintain the quality of drugs etc"

Most respondents agreed with the statements" There are below expected drugs manufacture in Ethiopia (4.2 mean score), Most of essential drugs are produced by foreign drugs manufacturers(4.25 mean score) There is poor relationship between manufacturers and st.paul's hospital MMC (3.75) in causing drugs supply insufficiency in st. paul's hospital by manufacturer side.

4.5 The consequence of essential drugs supplies insufficiency in st.paul's hospital MMC.

From the data collected from respondents and observational study, the outcomes of essential drugs supply insufficiency in st.paul's hospital MMC significantly affect the patients in addition to,

- The increasing frequency of drug insufficiency creates complex challenges for health care providers and facilities.
- Drugs supply insufficiency have a profound impact on patient safety, clinical outcomes, quality control, health care facility management.
- The supply insufficiency force patients to cope by trying to procure medications from other health providers or from the local market at greater cost, using inappropriate substitute medications, and by seeking treatment abroad.
- Cancer patients requiring on-going chemotherapy have also been referred outside for treatment due to supply insufficiency of these drugs.

Chapter five

Summary, Conclusion and Recommendation

This chapter presents the summary of research finding, the conclusions inferred from the findings, and recommendations forwarded in relation to what is concluded is presented in the following subsections.

5.1 Summary of the findings

This study was conducted to investigate the extent, causes and outcome of drugs supply insufficiency in st.paul's hospital MMC. The study was done through structured questionnaires and by collecting information from 51 employees of st.paul's MMC which constitutes dominantly pharmacy professionals.

The selected sample is dominated by male respondents comprised of 62.7(n = 32) compared to 37.3(n = 19) female respondents. The age category of respondents within fall between 21-30 (no=25 or 49%) and 31-40(no=25 or 49%) are equally. The age category below 20 constitute (no=1 or 2%). There is no respondents' age category above 40. With regard to years of work experience in the case hospital 20(39.2%) have 1-3 years experience , 39.2% (20) of them have 4-7 year experience , 17.5 (9) employees have an experience of 8-11 years. The remaining of them 2(3.9%) have above 12 years of experience. Regarding the education level, majority of the respondents which represents 44 (86.3%) are first degree holders and 5 (9.8%) are master's degree holders and 2(3.9%) of them are diploma holder.

The results of descriptive statistics regarding drugs supply insufficiency caused by suppliers performance indicates the majorities of the respondents agreed that "PFSA service is not satisfactory to the facility" (4.2 mean score and SD of 0.969) and "PFSA is the sole supplier for

the hospital result in drugs supply insufficiency" (3.76 mean score, SD of 1.159) in causing drugs supply insufficiency in st.paul's hospital by suppliers side. Most respondents are agreed on statements "A gap of order fill rate of drugs from the suppliers is visible" (n=32, 62.7%), "local suppliers services are not satisfactory to the facility" (n=28, 54.9%), "inadequate information flows to and from suppliers significantly lead to drugs supply insufficiency" (no= 26, 51%).

The results of descriptive statistics regarding organizational causes for drugs supply insufficiency are, most of the respondents agreed with the statements of " Lack of computerized alert system for low of stock drugs (M=4.39, SD=0.981), Unexpected delay in drug delivery(M=3.8, SD=0.917), Complexity of pharmaceutical purchase order process (M=3.8, SD= 0.749), Unpredictable factors influencing drug demands (M=3.98, SD=0.707) Nonfunctional DTC committee in Hospital contributes to drugs supply insufficiency (M=3.94,SD=1.085), Internal bureaucracy is reason for drugs unavailability(M=4.08, SD=0.0845), Unavailability of storage space is reason for drugs insufficiency (M=4.18, SD= 1.014) for organizational causes for drugs supply insufficiency.

The results of descriptive analysis for human causes to drug supply insufficiency in st.paul's hospital is summarized as majorities of respondents agreed with the statement of "Lack of effective communication among pharmacy, pharmaceutical warehouses and purchasing department (M=3.86,SD=0.96), Staff shortage in pharmaceutical warehouses and purchasing departments (M=3.61, SD= 1.185), Inadequate follow up by pharmacy, pharmaceutical warehouse and purchasing department regarding the requested drug (M=3.61, SD=0.961), Poor management of supply chain inventories (Stock) causes drug supply insufficiency(M=3.75, SD=0.0961) in causing drugs supply insufficiency in st.paul's hospital MMC by professionals themselves.

Finally the results of descriptive analysis for drugs manufacturers in causing drugs supply insufficiency in st.paul's hospital were discussed and most respondents agreed with the statements" There are below expected drugs manufacture in Ethiopia (M=4.2, SD=0.969), Most of essential drugs are produced by foreign drugs manufacturers(M=4.25, SD=0.891). There is

poor relationship between manufacturers and st.paul's hospital MMC (M=3.75, SD=1.197) in causing drugs supply insufficiency in st. paul's hospital by manufacturer side.

5.2 Conclusion

The following are the major conclusions drawn from the findings of the study.

- Most of the respondents agreed that the drugs suppliers' performance is poor in supplying essential drugs to st.paul's hospital MMC.
- The performance of PFSA is poor in delivering essential drugs in quantity and variety.
- Depending on sole supplier causes drugs supply insufficiency in St.paul's hospital MMC.
- The majorities of Pharmacists estimate the availability of essential drugs in st.paul's hospital MMC in between 50-70%.
- The outcomes of essential drugs supply insufficiency significantly affect the patients.
- Transportation issue is the main problem in st.paul's hospital in supplying drugs.
- Non functional DTC committee contributed for drugs supply insufficiency inst.paul's hospital MMC.
- Internal bureaucracy is a reason for drugs supply insufficiency
- The storage space or warehouses shortages considered as the main problem in st.paul's hospital MMC.
- Poor managements of supply chain inventories (stocks) causes drugs supply insufficiency in st.paul's hospital.
- The existence of limited numbers of drugs manufacturers and under capacity production of these manufactures contributed in causing drugs supply insufficiency.

5.3 Recommendations

Base on the major findings that have been discussed so far the following points are recommended for practical application to enhance essential drugs supply sufficiently to st.paul's MMC.

- A dedicated person needs to be appointed at key areas where drugs supply management needs well trained or educated by logistics and supply chain managements.
- Proper storage space for a medicine store should be provided with adequate shelving, ventilation, light and temperature control systems inst.paul's hospital to reduce drugs supply insufficiency. The necessary infrastructure needs to be budgeted for and the pharmacist should insist on delivering a service in a suitable environment.
- The transport department needs to be trained, convince them to give priority for transporting pharmaceutical commodities and needs to budget for and provide a separate vehicle and a designated driver for the transportation of drugs. Failure to address this issue will result in continuous drugs supply insufficiency in the hospital.
- Currently st.paul's hospital MMC have a manual drug ordering system. The hospital needs to consider and plan for an automated logistics information management system that tracks stock levels and consumption patterns, making the inventory transparent throughout the system.
- The hospital should assigned and encourage the staff members to be more organized and to use stock cards (bin cards) for the medicine store along with the maintenance and regular update of the stock register and other records.

- Appropriate methods for quantifying drug requirements based on actual need should be utilized in st.paul's hospital MMC. A control system that allows decisions on 'when to re order' and 'how much to order' should be introduced.
- The availability of all vital and essential drugs at in st.paul's hospital should be ensured.
- Use of buffer and safety stock for maintaining a desirable service level which can deal with emergency situations should be introduced in this hospital. This would allow for less drugs supply insufficiency situations to arise.
- The communication gaps between PFSA and the hospital needs to be strengthened thereby ensuring that the hospital is informed of drug delivery dates, newly arrived drugs, out of stock drugs, short dated stock, protocol changes, etc.

By implementing these recommendations, the st.paul's hospital should be able to address the challenges identified in this study. This should improve drug availability and ultimately improve patient care in st.paul's hospital MMC.

5.4 Future research Direction

One of the limitations of this study was the exclusion of the others giant hospitals and its suppliers in the sample to establish whether similar scenarios exist. Further research needs to be conducted to establish whether there are any bottlenecks in drugs supply in the hospital. To examine order fill rate of drugs from suppliers, levels of patients' satisfaction and problems regarding drugs procurement further studies needed.

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Appendices

Data collection instrument

Appendix I. data collection instrument for health professionals

Questionnaire:

Addis Ababa University

School of Commerce

Questionnaire to be filled by respondents

A Study of essential drugs supply insufficiency in st.paul's hospital MMC: prevalence, causes and outcome

Dear Respondent;

Thank you for agreeing to fill this questionnaire. The study is being conducted by a student of Addis Ababa University Gutema Misgana to gather information about the ***essential drugs insufficiency*** in st. paul's hospital MMC.

The questionnaire should take 10-15 minutes of your time. Your participation is voluntarily and information given will be treated with utmost confidence for academic research only. Anonymity and confidentiality will be assured.

Thank you for taking your time to share the insight with me.

Yours faithfully,

Do I have your permission?

1.Yes ☐ 2.No ☐. If Yes, Continue

- For comments/questions please contact Gutema Misgana (0912 90 49 04), principal investigator for the study.

PART I Personal Information

1. **Gender :** 1. Male ☐ 2. female ☐

2. Age : 1. Below 20 ☐ 2. 21-30 ☐

3, 31-40 ☐ 4. Above 40 ☐

3. For how long have you worked in st.paul's hospital MMC?

1. 0-3 years ☐ 2. 4-7 years ☐

3 8-11 years ☐ 4. Above 12 ☐

4. Professional title

- Pharmacy administration ☐
- Senior pharmacist ☐
- Pharmacist ☐
- Clinical pharmacy ☐
- Druggist ☐

5. Educational status

1. Master degree ☐ 3. Diploma ☐

2. First degree ☐ 4. Technician ☐

PART II

A. Dear respondent, kindly indicate whether you agree or disagree by ticking with the following statements on the ***Suppliers underperformance in supplying essential drugs*** to st.paul's hospital MMC

(key 1- Strongly disagree, 2- disgree, 3- neutral, 4-Agree 5. Strongly agree)

SN	variables	Five scale rating				
		Strongly disagree	disgree	neutral	agree	Strongly agreed
A	***Suppliers performance in supplying essential drugs***	1	2	3	4	5
1	PFSA service is not satisfactory to the facility					
2	Local suppliers services are not satisfactory to the facility					
3	Buying drugs from PFSA is less cost effective					
4	Having a poor working relations with suppliers results in untimely delivery of drugs					
5	Poor quality of drugs supplied by PFSA result in drugs shortage					
6	There are a recall or reverse logistics due to drugs quality defect by suppliers					
7	Inadequate information flows to and from suppliers significantly lead to drugs supply insufficiency					
8	A gap of order fill rate of drugs from the suppliers is visible					
9	Transporting drugs between PFSA and SPHMMC is difficult					
10	PFSA deliver drugs by own fleets to reduce drug supply insufficiency					
11	The location of the PFSA is not convenient to supply drugs for st.paul's hospital					
12	PFSA is the sole supplier for the hospital result in drugs supply insufficiency					

13	The time spent during procuring drugs from PFSA is large					

B. Kindly indicate whether you agree or disagree with the following statements on ***organization causes that lead to drug supply shortage*** in st. paul's hospital MMC.

SN	variables	Five scale rating				
		Strongly disgree	disagree	neutral	agree	Strongly agree
	Organization causes that lead to drug supply insufficiency	1	2	3	4	5
14	Lack of computerized alert system for low of stock drugs					
15	Unexpected delay in drug delivery					
16	Pharmaceutical warehouse is not being under the direct supervision of pharmacy department.					
17	Complexity of pharmaceutical purchase order process					
18	Not knowing the expected duration of the drug supply insufficiency					
19	Unpredictable factors influencing drug demands					
20	Unavailable of alternative medication					
21	Delaying of drug clearance by the health authority					
22	Potential safety concerns (major drugs recall)					
23	High prices of medication					

24	Rely on PFSA only for drugs supply					
25	Nonfunctional DTC committee in Hospital contributes to drugs supply insufficiency					
26	lack of funding is reason for drugs unavailability					
27	Internal bureaucracy is reason for drugs unavailability					
28	Unavailability of storage space is reason for drugs insufficiency					
29	Poor procurement practices is common in SPHMMC					
30	A set of activities and procedures that ensure the health commodities are available, accessible and of high quality is missed					
31	The activities that health care providers perform to get sufficient commodities of assured quality at competitive prices in accordance with national and international laws is missed					
32	poor proper inventory, storage and distribution system in place					
33	Transporting drugs between store and dispensing unit in STPHMMC is with difficulty					
34	Inadequate availability of health commodities is common in SPHMMC					

C. Kindly indicate whether you agree or disagree with the following statements on ***human causes that lead to drug supply insufficiency*** in st. paul's hospital MMC.

SN	Perception areas	Five scale rating				
		Strongly disagreed	disagreed	neutral	agree	Strongly agreed
	Human causes that lead to drug supply insufficiency	1	2	3	4	5
35	Lack of effective communication among pharmacy, pharmaceutical warehouses and purchasing department					
36	Staff shortage in pharmaceutical warehouses and purchasing departments					
37	Improper drug purchase order request by assigned staff					
38	Lacking a good relationship with pharmaceutical companies or other hospitals					
39	Inadequate follow up by pharmacy, pharmaceutical warehouse and purchasing department regarding the requested drug					
40	Misuse of drugs by pharmacy staffs					
41	Unavailability of skilled labour is reason for drugs unavailability					
42	Drugs are not in dispensary may available in store due to reluctant effect of staff					
43	Unclear specification by staff leads to the wrong drugs acquisition					

44	Lack of cooperation from supply chain members					
45	Poor management of supply chain inventories (Stock) causes drug supply insufficiency					

D. Kindly indicate whether you agree or disagree with the following statements on ***drugs manufacturers performance*** in causing essential drugs insufficiency st. paul's hospital MMC.

SN	Variables	Five scale rating				
		Strongly disgreed	disreed	neutral	agree	Strongly agreed
	Drugs manufacturers performance	1	2	3	4	5
46	There are below expected drugs manufacture in Ethiopia					
47	The existed manufactures produces drugs below communities' demand					
48	Under performance of local drugs manufactures is a significantly causes drugs supply insufficiency to st.paul's hospital					
49	Drugs manufacturers in Ethiopia not follow GMP(good manufacturing practices)					
50	Packaging material of manufactures uses is not adequate to maintain the quality of drugs					
51	There is a recall or reverse logistic due to production defect, quality or safety problems by manufacturers					
52	Most of essential drugs are produced by foreign drugs manufacturers					
53	The unavailability of raw materials manufacturers use to produce drugs are a cause for drugs insufficiency					
54	There is poor relationship between manufacturers and st.paul's hospital MMC					

PART III

1. What is your opinion in the availabilities of essential drugs in st. paul's hospital MMC in percentage?

1. Below 50%	☐	2.50-70	☐	3.70-85	☐
4. 85-95	☐	5.95-100	☐		

2. Please give your suggestions on the outcomes of essential drugs supply insufficiently and how the facility may improve services regarding drug supply?

1……

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2……

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3……

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