



EFFECTS OF COVID-19 ON THE SUPPLY CHAIN PRACTICES OF PHARMACEUTICAL SUPPLIES:-

THE CASE OF THE TASK FORCE FOR GLOBAL HEALTH ETHIOPIA

BY

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DECLARATION

I hereby declare that the work which is being presented in this thesis entitled “The effect of COVID-19 on the supply chain practices of pharmaceutical supplies, the case of The Task Force for Global Health Ethiopia” is original work of my own, has not been presented for a degree to any other university and all the materials used for the thesis have been duly acknowledged.

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The Case of the Task Force for Global Health Ethiopia

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ABSTRACT

This paper examines the effects of COVID-19 proxies on the supply chain practices of The Task Force for Global Health Ethiopia. As human activities are stopped and many production centers are closed as a result of the pandemic, supply chain disruptions are occurred. This effect also contributed on pharmaceutical supplies supply chain of The Task Force for Global Health Ethiopia.

Incorporating evidence from reviews, survey questionnaire and focus group discussion, this study demonstrate the effect of COVID-19 on the supply chain practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia. Descriptive analysis used in this study suggested that measures taken as a result of COVID-19 significantly affected the supply chain practices of pharmaceutical supplies.

Finally, this paper provides guidelines for practitioners and scholars to better address the effect of COVID-19 proxies on other supply chain practices.

Key words: Supply chain practices, COVID-19, supply chain disruption

LIST OF ABBREVIATIONS

API Active Pharmaceutical Ingredients

B2B Business to Business

CTKs Cargo Tonne-Kilometers

COVID Coronavirus Disease

CRM Customer Relationship Management

CSCMP Council of Supply Chain Management Professionals

DIM Data and Information Management

FMoH Federal Ministry of Health

GSC Global Supply Chain

IATA International Air Travel Association

IBM International Business Machine

ITI International Trachoma Initiative

NGO Non-Governmental Organization

NTD Neglected Tropical Disease

RHB Regional Health Bureau

RL Reverse Logistics

SAFE Surgery, Antibiotics, Face cleanliness, Environmental protection

SC Supply Chain

SCD Supply Chain Disruption

SCM Supply Chain Management

SNNAP South Nation Nationality And People

SPSS Statistical Package of Social Science

VC Value Chain

WHO World Health Organization

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CHAPTER ONE

INTRODUCTION

This topic begins with a brief background to the research topic, which leads to an introduction of the case company, The Task Force for Global Health Ethiopia, statement of the problem, study question and objectives of the study will then be presented.

1.1 Background of the study

The coronavirus disease 2019 (COVID-19) is an infectious disease. Since its first appearance in China in December 2019, it spread globally, resulting in an ongoing pandemic (Statista, 2020). The pandemic has provoked serious social and economic disruption globally, including strict social distancing, travel restrictions, and one of the largest global recessions since the Great Depression (Wheelock, 2020). There are events such as earthquakes, tsunamis, nuclear or radiation accidents, and wars, which are usually limited to specific geographic locations over relatively short periods can greatly, affect the global supply chains. Based on the scope and magnitude, the effects of COVID-19 are different from those of all previous events. On the other side, within a limited period of the first outbreak, COVID-19 virus had spread throughout the earth, sending billions of people into lockdown and total confinement, and contributing to partial or total shutdown on major manufacturing sectors. Also, there is a complete inability to predict when this pandemic will be contained; any single infected area in the globe is undoubtedly a high risk for a new outbreak.

In a press release released on March 13, 2020 by the World Health Organization, General Director Dr. Tewodros Adhanom delivered a speech on the pandemic of Ghebreyesus. In order to reduce Covid-19's rate of spread, he said the following; "You can't fight a virus that you don't know where." To split the COVID-19 spread chain, detect, isolate, test and treat! The propagation of the disease will be constrained by any case we identify and treat." The use of the term is descriptive about the direction the disease will follow. (Üstün, 2020: 143).

The outbreak of COVID-19 has now become a global pandemic. Not only is this epidemic medical. It has created a variety of social, professional, political, economic, ethical and moral implications. Due to the fact that the world is not prepared for the COVID-19 epidemic, some

delays and misunderstanding exist in the steps to be taken, the epidemic spread has been calculated to become a pandemic (Üstün, 2020: 147).

The disruptions in the supply chain occur due to natural calamities and crises. COVID-19 has resulted not only in the global tragedy for human deaths but also touches the economic sectors and activities, including manufacturing, supply chain practices, etc. (WHO, 2020a).

During the beginning of the global outbreak in March, supply chain (SC) management (SCM) has had major problems to cope with an unpredicted demand for certain products when enforced and is still struggling to recover from this (Mazareanu, 2020). Business operations are trying to adapt to the newsituation and will probably face changes that will remain even after the pandemic might be over. In the news, SCs in relation to the pandemic are widely discussed, and scientific research on the implications of the crisis has already started (Lopes de Sousa Jabbour *et al.*, 2020; Queiroz *et al.*, 2020; Schmidt, 2020). However, traditional research paradigms fail to keep up with the pace of the current epidemic and economic developments, and thus there is still little empirical evidence on how the coronavirus pandemic affects SC.

Nowadays providing high quality product or service, product or service with low price does not guarantee the organization to sustain its operation. Great attention has been taken on the creation of an effective supply chain which has been known to be a critical tool in product or service management and improving the competitive advantage for organization (Miyare, 2014). To have effective supply chain, organizations have to use effective supply chain management practices. The term “SCM practice” refers to the entire collection of activities carried out by firms to increase the efficiency of their internal supply chains. The modern review of SCM methods includes collaboration with suppliers, outsourcing procedures, compression of cycle times, consistency of process flow, and exchange of technology and information, through the use of acquiring goods and services of high quality and relationships with customers. SCM practices are defined as a set of activities undertaken in an organization to promote effective management of its supply chain. Supply base management refers to the how firms utilize their suppliers processes, technology and capabilities to enhance supply chain performance and competitive advantage and how the manufacturing, logistics, materials, distribution and transportation functions are coordinated within organizations, also state that SCM in practice means includes the involved companies planning and strategy for coordination of their supply chain including collaboration between functions internally as well as across company. SCM practices are defined

also as approaches applied in managing integration and coordination of supply, demand and relationships in order to satisfy consumers in effective and profitable manner. A recent study found that firms often use supplier evaluation or performance measurement to identify specific supplier deficiencies and to develop plans to address them. Such efforts may involve the measurement of supplier's delivery, quality, and cost performance, site visits, certification of supplier's products and processes, and the setting of performance goals (International Journals of Science and Research, vol.3 8, Aug, 2014).

1.2 General information about The Task Force for Global Health Ethiopia

The Task Force for Global Health, founded nearly 40 years ago to advance health equity, works with partners in more than 150 countries to eliminate diseases, ensure access to vaccines and essential medicines, and strengthen health systems to protect populations. The Task Force for Global Health is an international, nonprofit organization that works to improve health of people most in need, primarily in developing countries. The organization is founded in 1984 by global health pioneer Dr. Bill Forge. The Task Force consists of programs focused on neglected tropical diseases (NTDs), vaccines, field epidemiology, public health informatics, and health workforce development. The Task Force works in partnership with ministries of health and hundreds of organizations, including major pharmaceutical companies that donate billions of dollars annually in essential medicines. Major funders include the Bill & Melinda Gates Foundation, World Health Organization, Robert Wood Johnson Foundation, de Beaumont Foundation, U.S. Agency for International Development, Sight savers, Pfizer, Merck, Johnson and Johnson. The Task Force team consists of 120 scientists, program experts, logisticians, and other global health professionals. It is affiliated with Emory University, headquartered in Decatur, Georgia, and has regional offices in Guatemala and Ethiopia. The Task Force currently supports work in 151 countries. Expertise include neglected tropical diseases (NTDs) and other infectious diseases; vaccine safety, distribution and access; and health systems strengthening, including supply chains for essential medicines, public health informatics for data to inform programs and policies, and training and support for epidemiologists and laboratory systems to prevent and respond to outbreaks. The organization mainly focused on trachoma elimination through distribution and efficient and effective management of Zithromax. The elimination strategy is summarized by the acronym "SAFE", which means Surgery for advanced disease, Antibiotics to

clear Chlamydia trachomatis infection, Facial cleanliness and Environmental improvement to transmission. Working closely with the Federal Ministry of Health (FMoH), Reginal Health Bureaus (RHBs) and their respective implementing partners, ensure the timely and accurate planning for, delivery of and reporting on the use of the drug donation, providing technical support to assess and, as needed, strengthen the capacity of stakeholders to effectively play their roles.

Their COVID-19 activities include giving vaccinations safety recommendations, offering guidance on digital contact tracing, training epidemiologists on disease surveillance and response, distributing vital protection and treatments to hard hit communities, utilizing existing health programs to ensure protection for vulnerable groups, such as those suffering from other diseases, and utilizing their existing supply chains for ongoing response and to assist countries in delivering vaccines.

1.3 Statement of the problem

COVID-19 is the black swan event that finally forces many companies, and their entire industries, to think and transform their global supply chain model. A highly contagious viral disease, COVID-19 has stopped virtually every human activities at global scale, as peoples movement restricted by way of controlling the spread of the pandemic (Fetzer, T.*et al.*, March 2020, Politico, March 19/2020). Major production and distribution centers have been closed as a result of worldwide lockdown, which leads to severe supply chain disruptions in all manufacturing centers. SCDs referred to the unplanned events that disturb the flow of goods and services across the supply chain (Craighed *et al.*, 2007). With the shutdown in production activities and transportation disruption, the global prices of raw materials and intermediate suppliers have increased (Maffioli, 2020). Boarder restrictions and transportation disruptions have led to substantial interruptions in actual goods flows, product mobility, and have affected the entire supply chain.

The government of different countries restored to lockdown strategy to prevent the spread of this COVID-19 virus because of the mode of transmitting COVID-19, that is, droplet transmission, contact transmission, and aerosol transmission. These process of makes the spread of the virus harsh thatwas why the WHO declared it a global health emergency in January, 30th 2020. The

transmission through droplets occurs when an infected person coughs or sneezes and a non-infected person in a close environment inhale it. (NHCPRC, 2020).

In Africa, many people have the misconception that they may acquire infection if they visit a healthcare facility due to a lack of trust in the care provided by healthcare facilities and thus, often take preventive and care measures on their own. According to a health behavior model, information knowledge and practices have been identified as important factors for increasing hospital visits among patients with low levels of trust (Lee *et al.* 2020).

Ethiopia announced the first case of coronavirus on March 13, 2020; the Ethiopian government has adopted different measures endorsed by the WHO. These measures include informing the public about regular handwashing with soap and water, physical distancing, contact tracing, self-isolation and quarantine measures. Also, the government has announced school and workplace closures, limited public gathering and establishing COVID-19 task force at different levels (Hagos N. 21 May 2021). Since then coronavirus has taken the single most topic grasping the dialogue among the Ethiopian society. The government of Ethiopia has also considered the issue a number one national agenda, where a number of measures and actions taken to fight the spread of the disease (Africa News, REUTERS). The Ethiopian government has been very active in disseminating preventing messages on radio and television, at federal and regional levels and there are strong initiatives and recognition of the public health importance of COVID-19 (Screening, quarantine, and treatment centers) (Kebede Y.*et al.* 2020). The government also took several measures ranging from public health emergency response to the state of emergency. The government has strongly obtained various measures like lockdown and a state of emergency. However, it was not strict and has not been heavy handed that much (NDRMC, ETHIOPIA 2020).

In the context of the COVID-19, little attention has been given to examine the pandemic effects on supply chain practices and its resultant effects on supply chain disruptions (SCDs). Literatures repossessed by the researcher mainly focused on different aspects of SCM practices in developed countries and contexts. Hence, there is understanding gap on how COVID-19 pandemic have effect on supply chain practices in developing country, particularly on The Task Force for Global Health Ethiopia. As far as to the level of understanding of the researcher concerned, there are no

empirical studies conducted on the effects of COVID-19 pandemic, on the supply chain practices of developing countries with regard to reverse logistics, customer relationship, procurement, transportation, distribution, and warehousing. Therefore, the researcher wants to make a modest attempt to fill the knowledge gap in this area and assess the effects of the pandemic on supply chain practices on The Task Force for Global Health Ethiopia.

1.4 Research Question

- To what extent does measures taken as a result of COVID-19 affected the SCM procurement practices of pharmaceutical supplies?
- To what extent does measures taken as a result of COVID-19 affected the SCM distribution practices of pharmaceutical supplies?
- To what extent does measures taken as a result of COVID-19 affected the SCM transportation practices of pharmaceutical supplies?
- To what extent does measures taken as a result of COVID-19 affected the SCM reverse logistics practices of pharmaceutical supplies?
- To what extent does measures taken as a result of COVID-19 affected the SCM customer relationship management practices of pharmaceutical supplies?

1.5 Objective of the study

1.5.1. General objective of the study

The general objective of the study is to assess the effects of COVID-19 proxies on the supply chain practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia.

1.5.2. Specific objective of the study

The specific objective of the study is identifying the extent of effect of COVID-19 proxies on the supply chain practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia under the below stated.

- To assess the extent of the effects of COVID-19 on SCM procurement practices of pharmaceutical supplies.
- To determine the extent of the effect of COVID-19 on SCM reverse logistics practices of pharmaceutical supplies.

- To assess the extent of the effect of COVID-19 on SCM customer relationship management practices of pharmaceutical supplies.
- To assess the extent of the effect of COVID-19 on the SCM transportation practices of pharmaceutical supplies.
- To assess the effect of COVID-19 on the SCM distribution practices of pharmaceutical supplies.

1.6 Significance of the study

The study will be helpful for managers, employees, donors and others stakeholders who would like to operate supply chain practices during a pandemic particularly COVID-19. The study could also open room for further research so as to look for strategies used to overcome supply chain disruptions during such a pandemic (COVID-19). The study may serve as a starting reference for new researchers to include the effects of other supply chain practices which were not included under this study.

1.7 Scope of the study

This study only covered the work of The Task Force for Global Health Ethiopia that mainly operates in three regions of the country with selected areas in Oromia, Amhara, and South Nations Nationalities and People (SNNAP).

The study does not include all the nine supply chain practices mentioned by Banerjee and Mishra (2017). It only incorporates five of them (reverse logistics, customer relationship, procurement, transportation, and distribution) based on the organization best used in operation. The study will only include 2020 and 2021 Years effects of COVID-19 on supply chain practices of The Task Force for Global Health Ethiopia.

1.8 Definition of terms and concepts

1.8.1. Conceptual definition

Supply chain- Tecc.com.au (2002) defines supply chain as “a chain starting with raw materials and finishing with the sale of the finished goods”. Supply chain is referred to be “ a connected set of resources and processes that starts the sourcing of raw materials and expands through the delivery of completed items to the end consumers” by Bridge field Group (2006).

Black swan- Taleb (2007) defines a black swan as an improbable event that defies prediction. If not handled properly, the incident has a potential to destroy an organization. Black swan occurrences are distinguished by their great rarity, significant impact, and the common occurrence in which they were clear in hindsight.

Supply chain disruption-is defined as “disturbance or problems that interrupt an event, activity, or process.” So, a supply chain disruption definition is a breakdown in the manufacture flow of goods and their delivery to customers. A supply chain disruption refers to an interruption in the flow of materials or products in a supply chain network, and it occurs because of a triggering event(s) (Melnyk, Rodrigues & Ragatz, 2009).

1.8.2. Operational definition

Supply chain- is operations that include the systems, structures and processes to plan and execute the flow of goods and services from supplier to customer. To maximize effectiveness, it is critical to evaluate both internal operations and the extended supply chain that includes suppliers and customers.

Black swan- is an occurrence that happens haphazardly and unexpectedly and has far reaching effects. The typical response to an occurrence is introspection and the fallacious justification that it was inevitable.

Supply chain disruption-is any incident that disrupts the manufacture, sale, or distribution of goods. Supply chain distributions can include events such as natural disasters, regional conflicts, and pandemics.

1.9. Organization of the study

This paper is organized as follows. The first chapter highlights the introduction section of the study, followed by presenting the related literature reviews on the second chapter that incorporate theoretical review, empirical review and conceptual framework. The third chapter is about methodology of the study having research design, population under study and sampling, methods of data collection and data type, and data analysis methods. Chapter four presents study findings and discussion. Finally, chapter five presents summary, conclusion and recommendations resulted from the findings.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviews related literatures about the effects of COVID-19 pandemic on the supply chain practices written by other researchers. Supply Chain Management practices, supply chain disruption and Covid-19 pandemic and its effect on the global supply chains are examined in detail. The researcher will also present the theoretical, empirical, and conceptual reviews.

2.1. Theoretical framework of the study

The global outbreak of the COVID-19 pandemic has spread worldwide, affecting almost all countries and territories. The outbreak was first identified in December 2019 in Wuhan, China. The countries around the world cautioned the public to take responsive care. The public care strategies have included handwashing, wearing face masks, physical distancing, and avoiding mass gathering and assemblies. Lockdown and staying home strategies have been put in place as the needed action to flatten the curve and control the transmission of the disease (Sintema, 2020). Bhutan first declared closing of schools and institutions and reduction of business hours during the second week of March 2020 (Kuensel, 2020, 6 March). The complete nationwide lockdown was implemented from 1 August 2020 (Palden, 2020). In between, movements were allowed, offices began functioning, schools and college reopened for selected levels and continued with online class for others. More than 170,000 children in Bhutan from classes PP–XII are, today, affected by the school closure. The impact is far reaching and has affected learning during this academic year or even more in the coming days. Several schools, colleges and universities have discontinued face-to-face teaching. There is a pressing need to innovate and implement alternative educational and assessment strategies. The COVID-19 pandemic has provided us with an opportunity to pave the way for introducing digital learning(Dhawan, 2020).

An ongoing outbreak of pneumonia associated with a novel coronavirus, severe acute respiratory syndrome (SARS) coronavirus 2, was reported in Wuhan, Hubei Province, China in December 2019, in the following weeks, infections spread across China and other countries around the world, resulting in a pandemic (Zu et al., 2020). COVID-19 is a large group of viruses that creates illness. It ranges from the common cold to more severe diseases like Severe Acute Respiratory Syndrome (Shubhi & Archana, 2020). The disease, currently there is no

pharmaceutical treatment (Hevia & Neumeyer, 2020). COVID-19 is having major consequences on the world economy, and experts have predicted that the virus will lower global gross domestic product growth by one-half a percentage point for 2020 from 2.9% to 2.4% (Gupta et al., 2020).

The economic consequences of the pandemic have not fallen with equal severity on all shoulders. Existing vulnerabilities have not been exposed, and inequalities entrenched (ILO & OECD, 2020). Humanity will never forget December 2019 when the strange virus emerged. Since then, it threatens to become one of the most difficult tests faced by humanity in modern history with huge potentiality to take lives, overwhelm health systems and trigger lasting socio-economic change (Anthony, 2020). The IMF Report in 2020 observes that in the face of COVID-19 pandemic, the global economy faces its worst downturn since the great depression. Following Oxfam International in her 2020 report warned that half a billion people could be pushed into poverty as a result of the COVID-19 Pandemic (Anthony, 2020).

In addition to its impact on public health, coronavirus disease 2019 has caused a major economic shock. The pandemic had already caused massive dislocation among small businesses just several weeks after its onset, approximately 25% of businesses had temporarily closed and nearly all of these closures were due to COVID-19 (Bartik et al., 2020). Business owners have been shocked with challenges of their businesses to include irregular running of businesses, work methods and possible financial constraint on Companies with uncertain of the future (Stephen, 2020).

The COVID-19 is likely to cause bankruptcy for many well-known brands in many industries as consumers stay at home and economies and shut down (McKee & Tucker, 2020). This is not only having consequences for the economy; all of society is affected, which has led to dramatic changes in how businesses act and consumers behave (Donthu & Gustafsson, 2020). Most major industries faced large drops in the number of business owners with the only exception being agriculture. Construction, restaurants, hotels & transportation all faced large declines in the number of business owners due to COVID-19 (Fairlie, 2020).

2.1.1. Dimensions of supply chain management practices

Koh. *et al.*, (2007) states that SCM's practices involve a set of activities undertaken by organization to promote effective management of their supply chain. Tutuncu and Kucukusta (2008) go beyond that and states that SCM leads to changes in the structure of the organization by integrating internal functions and linking these with the external operation of suppliers, customers and other stakeholders of the supply chain.

Kutsikos and Saka (2014), suggest that supply chain practices are related to supply and materials management issue, operations, information technology and sharing, and customer service. Supply chain management (SCM) practices used for this particular study are procurement, reverse logistics, customer relationship management, transportation, distribution and warehousing.

Banerjee and Mishra(2017) conducted an empirical study taking nine dimensions of supply chain practices namely supply chain characteristics, level of information sharing practices, customer relationship management, reverse logistics, procurement, transportation, forecasting, distribution, warehousing, and data and information management.

Except forecasting, level of information sharing practices, and data and information management the remaining variables are significant for this study as they are best practiced by the organization under study.

2.1.1.1. Reverse logistics

The Council of Supply Chain Management Professionals (CSCMP, 2010:144), defines logistics as the “process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods including service, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements”. However, a "specialist part of logistics focused on the movement and administration of resources after the sale and after delivery to the customer" is how reverse logistics is best described. "Product returns for repair and/or credit" are also included. Additionally, reverse logistics is a method that helps businesses to reduce their environmental impact by recycling, reusing, and using fewer goods. (CSCMP, 2010:151).

According to Roger's and Tibben-Lembke (1998), reverse logistics is the process of organizing, carrying out, and managing the efficient, cost-effective movement of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin with the aim of recapturing value or ensuring proper disposal.

In the 1990s, the concept of reverse logistics was still evolving. Stock devised a definition (Stock, 1992), which stressed the role of recycling in the logistics of waste disposal and reuse. This approach was summarized by Kopicky (Kopicky, *et al.*, 1993), who built on the reverse logistics chain, adding information flow supporting the functioning of the chain. Thierry *et al.*, observed that “The objective of product recovery management is to recover as much of the economic value as reasonably possible, thereby reducing the ultimate quantities of waste” (Thierry *et al.*, 1995). Fuller and Allen highlighted the role of the distinct driving force for reverse logistics, i.e. economics, government, corporate responsibility, technology and logistics (Fuller and Allen, 1995). In 1999, Caldwell noted when meeting executives in a number of companies that it was appropriate to invest in reverse logistics management, as it could result in saving for the business. It was identified as one of the few remaining possibilities of reducing business cost (Daher *et al.*, 2006).

Scientific literature presents a wide choice of different terms, synonyms and definitions for ‘reverse logistics’. Reverse logistics is frequently referred to as opposite logistics, disposal logistics, trash logistics, reversed logistics, and reuse logistics in Polish publications, whereas aftermarket logistics or aftermarket supply chain are terms used in foreign sources (Szoltysek and Twarog, 2017; Kaup *et al.*, 2019).

Reverse logistics (RL) is a relatively new term; it was first mentioned in scientific literature in the 1980s. Lambert and Stock (Lambert and Stock, 1981) defined reverse logistics as a reverse material flow opposite to supply chain. In the 1980s, Murphy and Poist (Murphy and Poist, 1989), inspired by reverse product flow, defined reverse logistics as a material flow of products from consumers to producers in the supply chain. Pohlen and Farris (Pohlen and Farris, 1992) accepted this concept, naming the final consumer and emphasizing that the product flow was in reverse along the supply chain, but they did not specify the primary functions of reverse logistics.

Reverse logistics, which aims to add value to waste produced at each stage of the value chain, begins at the end point of traditional material flows (end of life). Materials near the end of their useful lives are the main components of the flows, and they are handled properly in this way. In contrast to regular chains, reverse supply chain processes are carried out by different companies and include different activities. Reverse logistics involves waste flows and related information. They should be designed with a view to optimizing the detrimental impact of waste on the natural environment. It is particularly important to reduce the amount to integrate waste flows in time and space, while optimizing the costs and developing the best possible solutions for the environment (Sadowski, 2006).

COVID-19 created inability for brand managers and market researchers to conduct in person consumers interviews and on site global research to identify the preferences, attitudes, motivation, and buying behavior of targeted customers.

2.1.1.2. Customer relationship management

Customer relationship management has been defined in various ways. According to K, J.W (2003), CRM is “the strategic use of information, processes, technology, and people to manage the customer’s relationship with your company across the whole customer life cycle.” Tan, K.C., (2001), defined CRM as a set of firms’ activities in managing its relationships with to improve customer satisfaction. Parvatiyar *et al.*,(2000) describe CRM as “a comprehensive strategy and process of acquiring, retaining, and partnering with selective customers to create superior value for the company and the customer. To increase efficiency and effectiveness in providing value to customers, it involves integrating the organization's marketing, sales, customer service, and supply chain departments. CRM is described as a "enterprise strategy to understanding and influencing customer behavior through meaningful communications in order to improve customer acquisition, retention, loyalty, and profitability" by Swift, R. S. (2001). All those practices which are employed by an organization for improvement in customer satisfaction, building a long term relationship and handling customer complaints effectively come under customer relationship. The existence of good relation information process affects the satisfaction level of customers and their firms’ performance is better than those which are not having it (Jayachandran *et al.*, 2005). When a customer oriented strategy is implemented simultaneously with effective SCM practices, it can produce a competitive edge in a number of different ways.

These include increases in productivity, reductions in inventory and cycle time, increased customer satisfaction, market share, and profits. Customer relationship focused towards knowing about customers to generate products or services for the satisfaction of customer need (Tanriverdi and Venkatraman, 2005) which in turn improves buyer supplier relations.

According to Stephen D. 2020 COVID-19 made crisis on reverse logistics by adding increased volumes of returned items, companies must also deal with potential health risk associated with those items.

2.1.1.3. Procurement

Procurement involves procuring goods and services needed for the organization. Sourcing in procurement is a process of assessing, selecting, and managing suppliers to acquire the desired goods and services from them. Procurement is a set of processes related to acquiring goods and services to satisfy a company's needs. Procurement is the process of getting the goods and services your company needs to fulfill its business model.

The tasks involved in procurement include: the development of quality standards, Financing purchases, Negotiating price, Goods and services purchases, Aligning purchases to company ethics and policies, Inventory control and Disposal of waste products like the packaging. In the overall supply chain process, the procurement function stops once your company has possession of the goods. The cost of acquiring your items must be lower than the price you can charge for them after deducting any costs related to processing and selling them for your business to turn a profit.

Supply chain scarcity, according to Steel et al. (2020), is caused by a lack of crucial suppliers as a result of the pandemic's visible effects, such as production halts, a lack of raw materials and finished goods, lockdowns, quarantines, and restrictions on the movement of people and resources. Procurement functions are facing demand imbalances leading to inventory challenges, uncertain reliability of delivery as well high risk of risk to supplier in single-source supplier situations. COVID-19 has disrupted the business world and challenged supply chain reliability.

2.1.1.4. Transportation

When referring to a supply chain, the term "transportation" describes the movement of goods from one place to another. This movement starts at the beginning of the chain when materials

arrive at the warehouse and continues all the way to the end user when the customer's order is delivered to their door. This necessitates a fresh, comprehensive look at the logistics, supply chain management, and procurement aspects of the transportation supply chain industry. Modern supply chain management has allowed many manufacturers and retailers to cut inventory and warehousing expenses while accelerating delivery to the final consumer.

COVID-19 has also caused significant negative effect on travel behavior, transport volume, and freight capacity (de Vos, 2020; Loske, 2020).

2.1.1.5. Distribution

Distribution management is the process used to oversee the movement of goods from supplier to manufacturer to wholesaler or retailer and finally to the end consumer. Numerous activities and processes are involved, including raw good vendor management, packaging, warehousing, inventory, supply chain, logistics and sometimes even blockchain.

Distribution is a management system within logistics that is focused on order fulfillment throughout distribution channels. A distribution channel is the chain of agents and entities that a product or service moves through on its way from its point of origin to a consumer. E-commerce sites, wholesalers, retailers, and third-party or independent distributors are a few examples of distribution channels.

Order fulfillment, order shipment, and consumer or commercial packaging are all considered to be part of the distribution process. In a nutshell, commercial or sales distribution is the easiest way to understand distribution. Distribution management not only increases profitability but also reduces waste in a variety of ways, from less spoilage to lower warehousing expenses since items and goods can be distributed as needed ("just in time" inventory) rather than stored in larger quantity ("just in case" inventory). Distribution management facilitates "one stop shopping" and other conveniences and benefits, such customer loyalty reward programs, and reduces shipping costs and expedites delivery to customers. It also makes things simpler for purchaser.

Guan, *et al.*, (2020), suggests that the pandemic has forced distribution to e-commerce, prompting companies to invest to digital sales training and online capabilities.

2.1.1.6. Warehousing

Warehousing is the process of storing physical goods or inventory in a warehouse or storage facility before they are sold or distributed. Warehouse safely and securely store and protect products in an organized way, making it easy to track an item's location, when the items arrived, how long the item has been there, and the quantity on hand (Kristin Lopinenski, 2018)

Warehouses are a key aspect of modern supply chains and play a vital role in the success, or failure, of businesses today (Frazelle, 2002a). Although many companies have examined the possibilities of synchronized direct supply to customers, there are still many circumstances where this is not appropriate. This is because the supplier lead times cannot be reduced cost effectively to the short lead times required by customers and hence these customers need to be served from inventory rather than to order (Harrison and van Hoek, 2005).

COVID-19 has necessitated the need for warehouse to function optimally amidst reduce workforces and social distancing (Singh, *et al.*, 2020).

2.1.1.7. Data and Information Management (DIM)

DIM refers to the set of people, processes, and technologies supporting information assets. Also, it comprises policies, procedures, and best practices to ensure that data information is understandable, trusted, visible, accessible, and interoperable (Lapaas, 2020). DIM includes processes for strategy, planning, modeling, security, access control, visualization, data analytics, and quality. Outcomes encompass improving data quality and assurance, enabling information sharing, and fostering data reuse by minimizing data redundancy.

During this particular crisis(COVID-19), as conducting regular field data collection and exchange with communities got more challenges, humanitarian actors were forced to adapt their data collection and information management practices.

2.1.1.8. Forecasting

Supply chain forecasting is looking as past data about product demand to help, make business decisions around planning, budgeting, and stock inventory. It can help a business from experiencing a loss, especially during a crisis (Jessica Wynne Lockhart, 2022).

2.1.1.9. Level of information sharing practices

The level of information sharing within the network dictates how much a supplier knows about its customer and other agents in the network. In our simulation experiments, we model information sharing by giving the agents in the network varying levels of access to demands of downstream agents. The information sharing level is a reflection of the information an agent possesses of its environment.

H. Baker, (2022) on his study on information practices during the COVID-19, COVID-19 make challenges on the level of information sharing practices that can arise due to the prolonged circulation of out of date information.

2.2. Empirical Literature Review

2.2.1. COVID-19 Pandemic

On December 31, 2019, the World Health Organization China Country Office confirmed cases of pneumonia, the cause of which is not currently known, in Wuhan, China's Hubei province. A new coronavirus that had not been observed in humans before was identified on January 5, 2020. Covid-19 was later named for this disorder, which was first called 2019-nCoV. It gradually infected the entire world three months after it was found in China (WHO, 2020).

The impact of coronavirus disease 2019 (COVID-19) is viewed as significant across the globe. Different public health strategies have been imposed by the relevant officials to prevent the virus spread, including social distancing, requirements on wearing masks and face coverings, transition to remote operations, temporary closure of certain businesses (e.g., shopping malls, restaurants, entertainment facilities), restrictions on public gatherings, deployment of contact tracing measures, and others. Some governments set rather radical control measures, e.g., border closures and lockdowns, resulting in significant supply chain (SC) disruptions. Many countries impose border closures which lead to disrupted SCs across the world, mainly when there is a fear of transmitting the virus by food.

The COVID-19 pandemic induced restrictions have led to the disablement of economical operations, and impacted transportation networks in maritime, rail, air, and trucking industries (de Vos, 2020; Gossling *et al.*, 2020). Ultimately, trade restrictions, demand restraint, and transport disruptions have significantly impacted supply chain and consequently impacted freight volumes. The COVID-19 pandemic had caused a range of major disruption in transport and logistics services, including flight cancellations, which also cramped air freight capacity,

disrupted global circulation, and slowed down the customs clearance. Social distancing as a result of COVID-19 pandemic also plays negative role on information sharing, reverse logistics, and customer relationship dimensions of the supply chain management practices.

2.2.2. Effects of COVID-19 Pandemic on the global Supply Chain

As Baldwin and Tomiura (2020) point out, COVID-19 is as contagious economically as it is medically. To slow down the spread of the coronavirus, many countries imposed some forms of restrictions on people and businesses. Previous studies have shown that the COVID-19 had large negative effects on global supply chain (Baldwin and Freeman 2020, Bonadio *et al.* 2020), international trade (Hayakawa and Mukunoki 2021), and the subjective uncertainty of global firms (Chen *et al.* 2021).

The COVID-19 pandemic has significantly affected end-to-end GSC activities, especially medical and food supplies. Thus, the integrity and stability of the value chain (VC) have been compromised. The global media has covered other angles from threats to accusations and even intercepting shipments, where countries scrutinize anything that enters respective territories, given its right to protect people and avoid catastrophe by all means. Such events have profoundly impacted GSCs.

The COVID-19 pandemic has impacted global supply chains substantially (Chowdhury *et al.*, 2021). Some studies on the current COVID-19 pandemic identify the effects of challenges of major outbreaks on the supply chain operations. Ivanov, 2020a, Ivanov, 2020b notes the simultaneous effect on demand, production, supply, and other logistics operations of this extraordinary outbreak. Considering the multiple implications of the COVID-19 pandemic, production recovery models must simultaneously address these multiple effects (Paul and Chowdhury, 2020a).

Global supply chain (GSC) disruptions started after the World Health Organization (WHO) declared the coronavirus disease outbreak to global health emergency at the end of January 2020. During the first half of 2020, the virus spread to almost all the countries in partial or total lockdown (McKenzie, 2020). Such a crisis affects the supply network at the source and destination, has extreme effects on GSC, and interrupts production process (Choudhury, 2020).

Pandemic outbreaks are special cases of SC risks with indefinite disruptions, propagation, and considerable uncertainty (Ivanov, 2020a). The health care SC is global and requires urgent

actions to ensure support to the health care systems during times of crises (Mirchandani, 2020). The COVID-19 pandemic has placed the spotlight on SCs and challenged more than 30 years of progress towards globalization. The COVID-19 outbreak introduced an unprecedented and extraordinary situation for SC flexibility (Ivanov and Dolgui, 2020c), during which SC survivability requires larger scale flexibility.

Supply chains have encountered many severe disease outbreaks in the recent past; thus far, the WHO reported 1,438 epidemics just between 2011 and 2018 (Hudecheck *et al.*, 2020). However, the current COVID-19 pandemic is unique. It has had even more severe, diversified, and dynamic effect than that of previous epidemic outbreaks such as the 2003 SARS epidemic or the 2009 H1N1 epidemic (Haren and Simchi-Levi, 2020, Koonin, 2020). A report published by *Fortune* magazine on 21 February 2020, before the WHO reclassified the COVID-19 outbreak as a pandemic on 11 March 2020, revealed that due to the COVID-19 pandemic, 94% of the *Fortune* 1000 companies were facing disruption in their supply chain (*Fortune*, 2020). Moreover, unlike other previous outbreaks, this pandemic has impacted all the nodes (supply chain members) and edges (ties) in the supply chain simultaneously (Gunessee and Subramanian, 2020, Paul and Chowdhury, 2020a); hence, the flow of the supply chain has been disrupted substantially.

According to Nayler, J., and Subramanian, L. (2021) on COVID-19 Health Supply Chain Impact Preliminary Evidence from Africa, the COVID-19 pandemic has had a devastating human effect and exerted unrelenting pressure on pharma and healthcare supply chains. On his literature review he also identified key supply areas of effect of the COVID-19 pandemic, which include production stoppages, Shortages of raw materials and finished goods, transportation disruption, delayed shipments and stock outs. His survey respondents also highlighted key areas impacted by the pandemic, the most frequently mentioned being procurement, supply chain planning, and distribution. Other common areas of disruption include sourcing, inventory management, and forecasting and quantification.

Pandemics are special cases of supply chain risk management, different than typical supply chain disruptions, (Carighead, C. W., Ketchen (2020), that are characterized by long term disruption, a ripple (spreading) effect of disruption propagation, and extreme uncertainty.

Government interventions, such as social distancing and lock downs, have led to disruptions in the health supply chain. A recent modelling study predicted that low and middle income countries, especially in Africa, are particularly vulnerable to the indirect effects of COVID-19 on supply chain (Robertson *et al.*, 2020).

As the researcher observed from the literature reviewed, government interventions taken as a result of COVID-19 have led to disruptions in the health supply chain. But there is still a gap that to what extent that these interventions have effect on the supply chain practices of the low and middle income countries. So this study brings the extent that the interventions have effect on the supply chain practices of one of the low income country organization, The Task Force for Global Health Ethiopia.

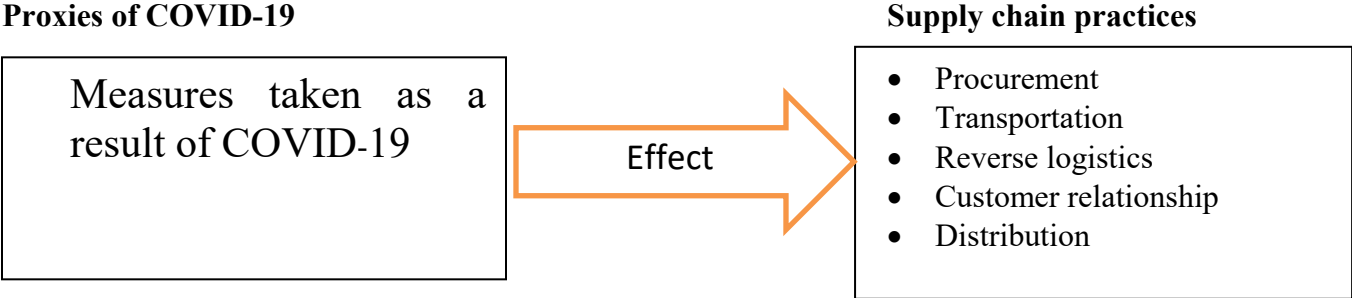
2.3. Conceptual framework

Although “With the launch of the United Nations Millennium Development Goals (MDGs) in the year 2000, and later continuing through the 17 Sustainable Development Goals (SDGs) begun in 2016, we have been living in a time of globalism” (Hotez 2019), pandemics are “a perfect example of the kind of crises to which global capitalism (with its constant movement of people and goods) is particularly vulnerable” (Davis 2020). Specifically in the COVID-19 pandemic, production of medicines and personal protective equipment (PPE) in other countries, while there is a global shortage, has forced governments to consider which supply chains are to be deemed vital to national security. In the United States, the pharmaceutical companies remain the global leaders in drug discovery and research/development, but most manufacturing has moved offshore. In one striking detail, the last American plant to make the key ingredients for penicillin closed its doors in 2004. Chinese pharmaceutical companies have supplied “more than 90 percent of U.S. antibiotics, vitamin C, ibuprofen, and hydrocortisone, as well as 70 percent of acetaminophen and 40 to 45 percent of heparin.” (Swanson 2020). Before the pandemic, China (where COVID-19 originated) produced approximately half the world’s face masks (Ranney, Griffeth, and Jha 2020). With the nonstop coverage of the COVID-19, the desire of the generation that experienced the pandemic to promote nationalism and “close ranks” around the country’s border is highly likely.

Among various supply chain practices, the researcher selected procurement, reverse logistics, customer relationship, transportation, distribution and warehousing for which the organization

best used in operation and analyzed the effects of COVID-19 on supply chain management practices of The Task Force for Global Health Ethiopia. In this study COVID-19 (the proxies of COVID-19 includes lockdown, social distancing, shutdown of production, border restriction, and state of emergency) is the independent variable and procurement, reverse logistics, customer relationship, transportation, and distribution are the dependent variables.

Figure 2.1 Conceptual Framework



CHAPTER THREE

METHODOLOGY OF THE STUDY

This chapter presents the methodological aspects of the research. It addresses the research design, target population, sampling design and sample size, data collection instruments and methods of data analysis.

3.1. Descriptions of the study area

This study assessed the effect of COVID-19 proxies on the supply chain practices of The Task Force for Global Health Ethiopia. The rationale is to identify how COVID-19 pandemic affects the procurement, distribution, transportation, reverse logistics, distribution and customer relationship of The Task Force for Global Health Ethiopia. The Task Force for Global Health Ethiopia is a non-profit organization mainly works with International Trachoma Initiative (ITI) in eliminating the world's leading cause of infectious blindness. The Task Force for Global Health is an independent, nongovernmental organization based in Atlanta, GA, USA, with field office in Addis Ababa, Ethiopia. The organization take on the world's worst and most intractable diseases to eliminate them or bring them firmly under public health control while strengthening health systems so that countries can protect the health of their populations, Their programs focus on eliminating diseases and protecting populations. Since the founding in 1984, the organization only take on problems they know can be solved, and they do it through powerful, global collaborations because they are in the business of solving problems.

The Task Force for Global Health has expertise in mobilizing population through disease elimination campaigns to ensure that medicines, supplies, and interventions are provided, distributed, and implemented throughout communities around the world. The organization protect the health of populations by building strong health systems that can train qualified disease detectives, build evidence based structure to get medicines and vaccines to people, and ensure that communities have the supplies and information they need to fight diseases.

3.2. Research approach

The three most popular methodologies for conducting research, according to Creswell (2005), are mixed, quantitative, and qualitative approaches. None of these methodologies is better than

the others. Everything depends on how the researcher wants to carry out the investigation. He asserted that quantitative research is a type of academic inquiry in which the investigator chooses the topic of inquiry, formulates focused, narrow research questions, gathers numerical (numbered) data from participants, uses statistics to analyze this data, and conducts the inquiry in a neutral, unbiased manner.

Whereas finding the significance of results that are typically evaluated or quantified using a quantitative method requires the use of a qualitative approach. When conducting a study, a mixed research method is one in which both quantitative and qualitative research methods are used (Kothari, 2004). This study used mixed research because it combines the best aspects of qualitative and quantitative methods. According to Greener, 2008 and Saunders et al. (2007), the benefit of using mixed methods is that it enables you to triangulate and support the data and results acquired via questionnaire.

3.3. Research design

Several authors mention three different types of study designs. The three categories are exploratory, which emphasizes the discovery of fresh perspectives and ideas, descriptive, which concentrates on determining how frequently an event occurs, and explanatory, which explains why something occurs (concerned with determining the cause and effect relationships). Based on the purpose of the research and the nature of the focus area, the study employed descriptive research design, as it is a type of research design that aims to obtain information to systematically describe a phenomenon, situation, or population. More specifically, it helps answer the what, when, where, and how questions regarding the research problem, rather than the why.

3.4. Population of the study

The population for this particular study was selected SCM department managers, employees particularly related to SCM practices of The Task Force for Global Health Ethiopia, Federal Ministry of Health staffs working with The Task Force for Global Health Ethiopia on SCM practices and SCM practice staffs of international NGO's working with the organization. Regional health bureau, zonal, and wereda staffs working with The Task Force for Global Health Ethiopia on SCM practices would be included. A total of 204 people are population of the study.

3.5. Sampling design

Basically there are two sampling techniques which are probability and non-probability sampling used in a research. The researcher has chosen systematic random probability sampling. Systematic sampling is a probability sampling method in which a random sample, with fixed periodic intervals, is selected from a large population. The advantage of this methodology includes eliminating the phenomenon of clustered selection and a low probability of contaminating data. A total of 204 sample people are considered as population under the study. At a confidence level of 95% Sanders *et.al*, (2009) and Israel (2009) from total population of 204, a statistical sample of 135 sample respondents who have a direct relationship with the issues being studied from the earlier indicated organizations would be selected by applying this statistical formula:-

$$n = \frac{N}{1 + N \cdot (e)^2}$$

Where n= sample size required

N= number of people in the population

e=allowable error(%)

$$n = \frac{N}{1 + N \cdot (e)^2}$$

$$n = \frac{204}{1 + 204(0.05)^2}$$

$$n = \frac{204}{1.51}$$

$$n = 135$$

3.6. Data source, type and collection methods

Both Primary and secondary data sources would be employed in this study. Primary data would be collected through survey questionnaires and focus group discussion from The Task Force for Global Health Ethiopia SCM practices related workers and selected individuals from different organization working with in supply chain practices. Secondary data collected from company reports, published journals and online portals.

For the total of 135 sample respondents would be included under survey questionnaire and 16 sample respondents would also be covered again under focus group discussion in two groups (8 respondents in each group) from the organization and NGO's working with the organization at field work. The objective behind data collection is to capture quality evidence that allows analysis to lead to the formulation of convincing and credible answers to the posed questions. The

number of focus groups sample selected by probability sampling technique is limited to 16 respondents in two groupseach to decrease information saturation and biases.

Table 3.1 Population distribution

Participants sources	Number of populations
Department managers (SCM)	2
Company employees	66
FMoH staffs	11
International NGO's	74
RHB staffs	6
Zonal health bureau staffs	6
Wereda health bureau staffs	39
TOTAL	204

3.7. Research instrument

For this study, the researcher used survey questionnaire and focus group discussion as the research instrument. The structured survey questionnaire consists of two parts; the focus group discussion will also be applied with open ended questionnaire.

1. The first part consists of demographic information of the respondents, which includes respondent's gender, age, educational background, marital status, occupation, and work experiences in the organization.
2. The second part includes questions related to the extent of effects of COVID-19 on SCM practices. Accordingly the respondents will be asked to answer all the questions using a Likert scale ranging from 1 to 5 (1= strongly disagree and 5= strongly agree)
3. The third part consists of focus group discussion questions.

3.8. Procedures of Data Collection

The researcher used structured survey questionnaire and open ended focus group discussion questionnaire with selected participants typically those related to supply chain practices

selected by probability sampling technique. Although this study is supported by both theoretical and empirical literatures and secondary data from the case studies, magazines, newspapers, and books, the researcher also used primary data to achieve aforementioned objective and to answer the research questions. Primary data would be collected from selected respondents in the organization, Federal Ministry of Health, International NGOs, regional, zonal and wereda health bureau staffs.

3.9. Methods of data analysis

The collected data through survey questionnaire and focus group discussion would be cross checked for its consistency and completeness before analyzing. After checking the consistency and completeness of the data collected, the researcher coded the received data and inserted into IBM statistical package for social studies (SPSS) version 26 Software, to get the result of the analysis and presented using description statistics such as mean and standard deviation. Multiple regression and correlation analysis be employed for data analysis. Multiple regression also be employed to test the effect or extent of influences of COVID-19 proxies on SCM practices, and the correlation analysis employed to test the relationship between dependent variables (SCM practices) and the independent variables (COVID-19 proxies).

3.10. Validity and Reliability

3.10.1. Validity

Oliver (2010) considers validity to be a compulsory requirement for all types of studies. Validity refers to the accuracy of the measurement and also shows how a specific test is suitable for a particular situation. The researcher used content validity test, as content validity is the extent to which the questions on the instrument and the scores from these questions represents all possible questions that could be asked about the content or skill (Creswell, 2005). The questionnaire were formulated by the researcher and communicated with the advisor to comment and research advisor comments over the formulated questionnaire which finally used as a research instrument.

3.10.2. Reliability

Reliability refers to the consistency of the measurement and how trustworthy is the score of the test. According to Toke *et al.*, (2012), the goal of reliability analysis is to determine the extent to

which a measuring technique produces the same result when performed under the same conditions over again. For this study the researcher used Cronbach's Alpha using SPSS software to assess the reliability of each scale. Alpha values over 0.7 indicate that all scales can be considered reliable (Nunnally, 1978). The below table shows the summary of reliabilities of all measurements.

Table 3.2 Reliability test of SC practices and COVID-19 proxies

Variables	Reliability
SCM Practices	
1. Procurement	0.903
2. Reverse logistics	0.910
3. Customer relationship	0.921
4. Transportation	0.826
5. Distribution	0.876
COVID-19 proxies	
1. Lock down	0.870
2. Social distancing	0.891
3. State of emergency	0.800
4. Boarder restriction	0.831
5. Shut down of production	0.864

Source: own survey result, 2022

3.11. Ethical considerations

Having the official letter from the university to the organization under study, to safeguard the study participant's from problematic encounters, the researcher planned the participant's not to mention their identity, particularly their names while answering survey questionnaires. During making focus group discussions, respondents had been informed about the purpose and benefit of the study along with the full right to accept or refuse the participation. The researcher would also told boldly to the participant's that their response would be kept confidential and their identity should not be exposed.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, RESULTS AND DISCUSSIONS

As explained in the earlier chapter, this study attempted to assess the effect of COVID-19 proxies on the supply chain management practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia. Therefore, the findings of the research are presented and discussed here below.

The questionnaire were designed in five scale ranging from five to one ; where five represent strongly agree, four agree, three neutral, two disagree, and one strongly disagree.

Totally 135 survey questionnaire were personally distributed to the desired respondents selected by probability sampling technique and 127(94.04%) of the questionnaire were obtained valid and included in the analysis. Sixteen (16) respondents in two groups (8 respondents each) also included in the focus group discussion to gather more insight about the extent of the effect of the COVID-19 proxies on the SCM practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia.

The collected data were presented and analyzed using SPSS (version 26) statistical software. Multiple regression and correlation analysis were employed for data analysis. Multiple regression were employed to test the extent of effects of COVID-19 proxies on SCM practices, and the correlation analysis were employed to test the relationship between dependent variables (SCM practices) and the independent variables (COVID-19 proxies).

4.1.Descriptive statistical Analysis

The demographic data of respondents were displayed on table 4.1. It includes educational qualification, years stay at the organization, their field of work, and work experience.

Table 4.1 Overall demographic analyses

Demographic profile	Item	Frequency	Percentage (%)
---------------------	------	-----------	----------------

Gender	Female	30	23.6
	Male	97	76.4
Age	20-30 Years	12	9.4
	30-40 Years	49	38.4
	>40 Years	66	52
Education	College Diploma	42	33.1
	First Degree	57	44.9
	Second and above	28	22.0
Years stayed	Less than 2 years	2	1.6
	2-5 years	37	29.1
	6-10 years	64	50.4
	Over 10 years	24	18.9
Field of work	Administration	17	13.4
	Finance	14	11.0
	Procurement	29	22.8
	Supply chain	28	22.8
	Logistic operation	24	18.9
	Customer relation	15	11.8
Work experience	Under 2 years	12	9.4
	2-5 years	43	33.9
	6-10 years	45	35.4
	Over 10 years	27	21.3

Source: own survey result, 2022

From the demographic analysis on the table 4.1 indicated that 76.4% (97) respondents are male and 23.6% (30) of the respondents are female. Regarding the age distribution of the respondents 52% (66) respondents are above 40 years of age, 38.4% (49) respondents are age between 30-40 years, 9.4% (12) respondents are age between 20-30 years.

The educational background which is the basic issue for respondents to understand and able to answer the questionnaires are also indicated on the table 4.1 shows 44.9% (57) respondents have

first degree holders, 33.1% (42) respondents have college diploma, and 22% (28) respondents have second and above degree holders.

22.8% (29) and 22% (28) respondents are from procurement and supply chain field of background respectively. Other respondents 18.9% (24) from logistics, 13.4% (17) from administration, 11.8% (15) from customer relationship, and 11% (14) from finance department.

4.1.1 Overall descriptive analysis of Dependent variables

As quoted by Mesfin (2016), and Girma Kumissa (2018), used a kind of rule of thumb to create equal gaps for a level of five points Likert scale that range from strongly disagree to strongly agree on the survey questionnaires, the calculated mean value that ranges between 1.00 to 1.49 implies strongly disagree, 1.50 to 2.49 implies disagree, 2.50 to 3.49 implies neutral, 3.50 to 4.49 implies agree, and finally 4.50 to 5.00 strongly agree. In evaluating data, standard deviation was also used which indicates small standard deviation relative to the value of the mean itself implying data are close to the mean, on the other hand a larger standard deviation the data points are distant from the mean. Standard deviation is a measure of how well the mean represents the data (Field, 2009).

Table 4.2 procurement practices

Descriptive Statistics

	N	Mean	Std. Deviation
Measure taken due to COVID-19 affected the procurement practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of compromising supplier selection process	127	4.3228	.46941
Measure taken due to COVID-19 affected the procurement practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of compromising contract award	127	4.3228	.53277
Measure taken due to COVID-19 affected the procurement practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of reliability of contract management	127	4.3071	.54207
Measure taken due to COVID-19 affected the procurement practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of flexibility of supplier relationship management	127	4.3307	.54997
Valid N (listwise)	127		
Grand Mean		4.3208	

Source: own survey result, 2022

From the table 4.2 above, a grand mean of 4.3208 imply that the respondents are agreed on negative effect of COVID-19 proxies on the procurement practices of the pharmaceutical

supplies of The Task Force for Global Health Ethiopia. The obtained respondents result also supported by Nayler, J., and Subramanian, L. (2021) on COVID-19 Health Supply Chain Impact Preliminary Evidence from Africa, the COVID-19 pandemic has had a devastating human effect and exerted insistent pressure on pharma and healthcare supply chains. On his literature review he also identified key supply areas of effect of the COVID-19 pandemic, which include production stoppages, Shortages of raw materials and finished goods, transportation disruption, delayed shipments and stock outs. This study also supported by focus group discussions held at the organizations office that states procurement of pharmaceutical supplies are negatively affected by measures taken as a result of COVID-19 in compromising supplier selection process, compromising contract award, reliability of contract management, and flexibility of supplier relationship management.

Table 4.3 Reverse logistics

Descriptive Statistics

	N	Mean	Std. Deviation
Measure taken due to COVID-19 affected the reverse logistics practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of delaying product distribution	127	4.3150	.46634
Measure taken due to COVID-19 affected the reverse logistics practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of increasing product return	127	4.2992	.52425
Measure taken due to COVID-19 affected the reverse logistics practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of compromising retail	127	4.2835	.51790
Measure taken due to COVID-19 affected the reverse logistics practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of compromising industry functions	127	4.3150	.53006
Valid N (listwise)	127		
Grand Mean	4.3031		

Source: own survey result, 2022

From the table 4.3 we can observe that the grand mean value is 4.3031 which also indicate that the respondents are agreed on the measure taken as a result of COVID-19 pandemic negatively affected the reverse logistics SCM practices of The Task Force for Global Health Ethiopia. This result is also supported by focus group discussion obtained in getting better insight about the

extent of effect of COVID-19 on the reverse logistics practices of the organization. Both focus group discussions indicated that reverse logistics of pharmaceutical supplies are negatively affected as a result of measures taken during COVID-19.

Table 4.4. Customer relationship practices

Descriptive Statistics

	N	Mean	Std. Deviation
Measure taken due to COVID-19 affected the customer relationship practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of misaligning systems with goals and strategy	127	4.3228	.46941
Measure taken due to COVID-19 affected the customer relationship practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of lowering personalize customer interaction	127	4.3150	.53006
Measure taken due to COVID-19 affected the customer relationship practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of detaching segment customers	127	4.2992	.53918
Measure taken due to COVID-19 affected the customer relationship practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of compromising re-evaluate and recalibrate CRM strategy	127	4.3228	.54746
Measure taken due to COVID-19 affected the customer relationship practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of limiting in consolidating customer data	127	4.2362	.51109
Valid N (listwise)	127		
Grand Mean	4.2992		

Source: own survey result, 2022

The grand mean value 4.2992 on the table 4.4 imply that the respondents are agreed on the raised points and their response indicate that measure taken as a result of COVID-19 pandemic negatively affected customer relationship practices of the organization pharmaceutical supplies. The pandemic has particularly affected the marketing processes because of the relevant issues emerging managing physical sales channels and interacting with customers, both in the Business-to-Customer (B2C) and in the Business-to-Business (B2B) market (Kang *et al.*, 2020; Wang *et al.*, 2020). Firms have experienced limits in the interaction with customers during the sales process due to the lockdown, especially when customized products have to be developed.

The study also supported by the result gained from the focus group discussion. The result showed that they cannot get individuals assigned to make surgery and get them medications as a result of measure taken during the crisis.

Table 4.5 Transportation practices

Descriptive Statistics			
Measure taken due to COVID-19 affected the transportation practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of delaying in measuring performance monitoring practices	127	4.4252	.55663
Measure taken due to COVID-19 affected the transportation practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of troubling carrier management practices	127	4.3780	.60329
Measure taken due to COVID-19 affected the transportation practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of flexibility in load planning and optimization practices	127	4.3780	.53347
Measure taken due to COVID-19 affected the transportation practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of adding freight payments and audit practices	127	4.4252	.54218
Valid N (listwise)	127		
Grand Mean		4.4016	

Source: own survey result, 2022

The result obtained showed on the table 4.5 with a grand mean of 4.4016 which imply that respondents are agreed on the points under transportation practices to be exercised. Measures taken due to COVID-19 negatively affected the transportation supply chain practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia. The International Air Travel Association (IATA) stated that industry wide air Cargo Tonne-Kilometers (CTKs) fell by 15.3% year to year in the three months to April 2020. This study also supported by the focus group discussion held at both places. The group concluded that transportation practices of pharmaceutical supplies are hindered as a result of measures taken during COVID-19. As flights are cancelled and production stoppage occurred, the SCM practices faced major challenges and their operation is affected to the large extent as concluded in their discussion.

Table 4.6 Distribution practices

Descriptive Statistics

	N	Mean	Std. Deviation
Measure taken due to COVID-19 affected the distribution practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of dropping quality management system	127	4.3228	.46941
Measure taken due to COVID-19 affected the distribution practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of limiting importation and exportation management	127	4.3228	.53277
Measure taken due to COVID-19 affected the distribution practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of compromising supply chain integrity and security	127	4.2992	.53918
Valid N (listwise)	127		
Grand Mean	4.3149		

Source: own survey result, 2022

Distribution is also one of the SCM practices that support the supply chain practice objective to be fulfilled. As observed on the table 4.6 the grand mean value indicates 4.3149 which imply that respondents are agreed on the raise points that indicate measure taken due to COVID-19 negatively affected the distribution supply chain practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia. This study also held by focus group discussion in that distribution of essential pharmaceutical supplies to the end users is affected as users are not in a place where the service is rendered to them because of measures taken as a result of COVID-19.

4.1.2 Overall descriptive analysis of Independent variables

Table 4.7 Lock Down measure

Descriptive Statistics

	N	Mean	Std. Deviation
Lock down as a result of COVID-19 affected procurement practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2677	.49520
Lock down as a result of COVID-19 restricted customer relationships practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2047	.50926
Lock down as a result of COVID-19 restricted transportation practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.1654	.54575
Lock down as a result of COVID-19 affected distribution practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.1654	.54575

Lock down as a result of COVID-19 affected reverse logistics practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.1811	.54068
Valid N (listwise)	127		
Grand Mean	4.1969		

Source: own survey result, 2022

The listed table 4.7 indicates that the grand mean score of 4.1969 that implies that the respondents are agreed on the lock down measure taken as a result of COVID-19 pandemic have negatively affected the pharmaceutical supplies SCM practices of The Task Force for Global Health Ethiopia. A highly contagious viral disease, COVID-19 has stopped virtually every human activities at global scale, as peoples movement restricted by way of controlling the spread of the pandemic (Fetzer, T.*et al.*, March 2020, Politico, March 19/2020). Major production and distribution centers have been closed as a result of worldwide lockdown, which leads to severe supply chain disruptions in all manufacturing centers. According to Steven Munharo (2021), on Impact of COVID-19 on supply chain in Zimbabwe published on Journal of Public Health International, due to the global effects of COVID-19, pharmaceutical suppliers have reduced their for export production levels and with government imposed lockdowns in their respective countries and the ban of transportation activities there are less exports. The pandemic has further exposed the vulnerability and the consequences of the largely unused utilization of the production capacity of many African countries as there is huge dependence and reliability on the importation to these supplies as well as their raw materials. The result is also reinforced by focus group discussion and the groups have concluded lock down imposed stock out which in turn created negative impact in getting the pharmaceutical supplies from abroad and within the country so as to deliver to the end users.

Table 4.8 Social Distancing measure

Descriptive Statistics

	N	Mean	Std. Deviation
Social distancing affected procurement practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2756	.46594
Transportation practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia has affected by social distancing	127	4.2598	.53767
Social distancing as a result of COVID-19 affected customer relationship practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.1732	.57865
Social distancing affected reverse logistics practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2677	.56972
Social distancing affected distribution practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.3071	.57060
Valid N (listwise)	127		
Grand Mean		4.2567	

Source; own survey report, 2022

The results on the table 4.8 shows that, the grand mean value is 4.2567, which implies that the respondents agreed on the point that social distancing measure taken as a result of COVID-19 pandemic negatively affected the pharmaceutical supplies SCM practices of The Task Force for Global Health Ethiopia.

Government interventions, such as social distancing and lock downs, have led to disruptions in the health supply chain. A recent modelling study predicted that low and middle income countries, especially in Africa, are particularly vulnerable to the indirect effects of COVID-19 on supply chain (Robertson *et al.*, 2020). Focus group discussion also supported the result of the analysis in that, social distancing measure negatively affected the pharmaceutical supplies supply chain practices as service users are not available at a place where service was given to them before.

Table 4.9 State of emergency measure

Descriptive Statistics

	N	Mean	Std. Deviation
Country state of emergency as a result of COVID-19 affected the pharmaceutical supplies demand balances of The Task Force for Global Health Ethiopia	127	4.3071	.47994
State of emergency as a result of COVID-19 caused significant effect on travel behavior, transport volume, and freight capacity of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2677	.51097
State of emergency affected distribution practice of the pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.3071	.61090
State of emergency as a result of COVID-19 restricted in person consumer interview of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2520	.53405
Reverse logistics practice of pharmaceutical supplies of The Task Force for Global Health Ethiopia negatively affected by state of emergency as a result of COVID-19	127	4.2835	.50234
Valid N (listwise)	127		
Grand Mean		4.2835	

Source: own survey report, 2022

According to the table 4.10, the grand mean value is 4.2835 that imply that the respondents are agreed on that state of emergency measure taken as a result of COVID-19 pandemic negatively affected the pharmaceutical supplies SCM practices of The Task Force for Global Health Ethiopia. On Monday March 30, four regional states imposed a ban on public transportation in an effort to contain the spread of COVID-19 in the country. The concerned regional states are Amhara, Oromia, Tigray and the Southern Nations, nationalities, and peoples' region. Border closure and the prohibition of all non-essential inbound and outbound traffic and travel remain in place. Security forces have been deployed to enforce the regulation. On Wednesday, April 8, 2020, the government of Ethiopia declared a state of emergency due to the ongoing outbreak of coronavirus disease (COVID-19). The result also supported by the focus group discussion mainly held at field study in stating that due to the reason that state of emergency was imposed, people who in need of the pharmaceutical supplies from the organization are not willing to attend as per the schedule.

Table 4.10 Boarder restriction measure

Descriptive Statistics

	N	Mean	Std. Deviation
Border restriction delayed procurement practices of the pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2598	.49140
Border restriction impacted transportation practices of the pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2598	.52270
Border restriction affected reverse logistics practices of the pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2283	.53732
Border restriction affected customer relationship practices of the pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2520	.48744
Valid N (listwise)	127		
Grand Mean		4.2499	

Source: Own survey result, 2022

According to the table 4.10, the grand mean value is 4.2499 that imply that the respondents are agreed on that border restriction measure taken as a result of COVID-19 pandemic negatively affected the pharmaceutical supplies SCM practices of The Task Force for Global Health Ethiopia.

According to the study conducted in Nigeria, 2020, on the title assessing the impact of COVID-19 on the global supply chain industry, COVID-19 has disrupted global activities across all economic sectors and industries. The disruptions are largely due to the lockdown measures adopted and implemented by countries globally as a health strategy to mitigate the impact of the pandemic's spread on the human population. Productions terminations, movement restrictions of people and goods, boarder closures, logistical constraints, as well as the slowdown of trade and business activities are fall outs of the COVID-19 lockdown measures. The result is also supported by focus group discussion in that border restriction created shortage of pharmaceutical supplies to deliver services as required.

Table 4.11 shut down of production

Descriptive Statistics

	N	Mean	Std. Deviation
Shut down of production as a result of COVID-19 affected the distribution practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2283	.52234
Shut down of production as a result of COVID-19 affected the procurement practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2205	.51814
Shut down of production as a result of COVID-19 affected the warehousing practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2047	.55404
Shut down of production as a result of COVID-19 affected the transportation practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	127	4.2047	.55404
Valid N (listwise)	127		
Grand Mean		4.2145	

Source: own survey result, 2022

As shown from the table 4.11, the grand mean value is 4.2145 which indicate that respondents are agreed to the point that shut down of production as a result of COVID-19 negatively affected the SCM practice of pharmaceutical supplies of The Task Force for Global Health Ethiopia. The present COVID-19 outbreak affects the global and national production systems and trade on a larger scale. The availability and production of many essential items such as food, grocery, and pharmaceutical products are drastically reduced, and a huge mismatch between supply and demand is observed. In the meantime, the coronavirus pandemic is having a positive impact on the environmental side of production, due to shut down of many manufacturing units and significant reductions in logistics and distribution operations. However, the supply chain network showed poor resilience to this pandemic, and nearly 35% of the manufacturer reported its supply chain network failure due to global coronavirus pandemic (NAM, 2020).According to Mazareanu, (2020), during the beginning of the global outbreak of the COVID-19 in March, supply chain management has had major problems to cope with an unpredicted demand for certain products when simultaneous restrictions for travel and production have been enforced and is still struggle to recover from this. So it is true that shut down of production as a result of COVID-19 negatively affected the SCM practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia as respondents agreed on their survey questionnaire and focus group discussion result.

4.2 Inferential Analysis

Inferential analysis helps to suggest explanations for a situation or phenomenon. It allows the researcher to draw conclusion based on extrapolations, and is in that merely summarize the data has actually been measured, Richard Chin, Bruce Y. Lee, in Principles and Practice of Clinical Trial Medicine, 2008.

4.2.1. Normality test using Skewness and Kurtosis indicators

Multiple regressions require that the independent variables in the analysis be normally distributed.

Normal distribution also known as the Gaussian distribution, is a probability distribution that is symmetric about the mean, showing that data near the mean are more frequent in occurrence than data far from the mean (James chen)

Skewness is a measure of the asymmetry of the distribution of a variable. The skew value of a normal distribution is zero, usually implying symmetric distribution. A positive skew value indicates that the tail on the right side of the distribution is longer than the left side and the bulk of the values lie to the left of the mean. In contrast a negative skew value indicates that the tail on the left side of the distribution is longer than the right side and the bulk of the values lie to the right of the mean. West *et al.* (1996) proposed a reference of substantial departure from normality as an absolute skew value >2.1 .

Kurtosis is a measure of the peakedness of a distribution. The original kurtosis value is sometimes called Kurtosis (proper) and West *et al.* (1996) proposed kurtosis value >7.1 . For medium sized samples ($50 < n < 300$), reject the null hypothesis as absolute z-value over 3.29, which corresponds with an alpha level 0.05, and conclude the distribution of the sample is non normal.

Based on the above references and stand point, skewness and kurtosis for variables that are affected by measures due to COVID-19 are given below and z-score calculated values are within the range of -3.29 to +3.29, which implies the Likert scale data were normally distributed. Therefore the researcher selected Pearson correlation and linear regression for inferential analysis.

Table 4.12 Test for Skewness and kurtosis

Descriptive Statistics

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
LD	127	.754	.215	-.148	.427
SD	127	.489	.215	-.662	.427
SE	127	.594	.215	-.709	.427
BR	127	.643	.215	-.611	.427
SDP	127	.573	.215	-.620	.427
Valid N (listwise)	127				

Source: own study result, 2022

Where:

LD: Lockdown

SD: Social distancing

SE: State of emergency

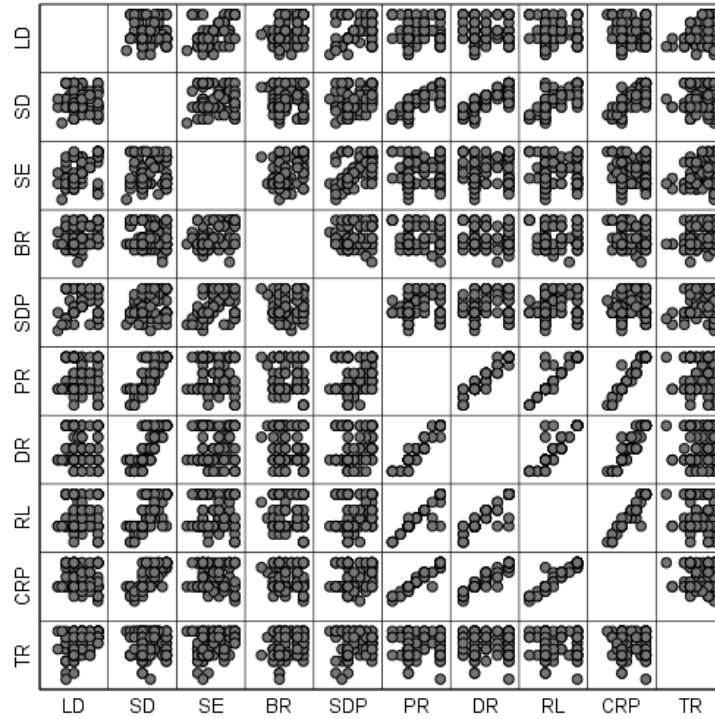
BR: Boarder restriction

SDP: Shut down of production

The skewness and kurtosis statistics for all independent variables are within the acceptable range for normality (-1 to +1). So the assumption of normality is not a question.

4.3. Evaluating linearity and homoscedasticity

Table 4.13 Linearity and homoscedasticity test



Source: own survey result, 2022

Multiple regressions assume a linear relationship between the independent and dependent variables. From visual inspection of the scatter plots by the researcher it suggests that the relationship is linear.

Multiple regressions also assume that the range of variance for the dependent variables is uniform for all values of the independent variables. Even though it is hard to assess the homoscedasticity assumption, inspection of the scatter plots shows good variability in the plots and the researcher proceed with the analysis assuming homoscedasticity is not a major problem.

4.4. Pearson Correlation analysis of COVID-19 proxies on the SCM practices of The Task Force for Global Health Ethiopia

Correlation analysis was employed to realize the specific objective of the study which was to assess the extent of effects of COVID-19 proxies on the SCM practices of The Task Force for Global Health Ethiopia. The relationship between the measures taken due to COVID-19 (Lockdown, social distancing, state of emergency, border restriction, and shut down of

production), and the supply chain practices exercised by the organization namely procurement, reverse logistics, transportation, distribution, and customer relationship. The value of correlation coefficient ranges between -1 to +1. Closer values to +1 implies that the variables being linked have a strong relationship, whereas values closer to 0 implies that there is slight or no linear relationship between the variables.

Table 4.14 Correlation analysis table

Correlations^c

		LD	SD	SE	BR	SDP	PR	DR	RL	CRP	TR
LD	Pearson Correlation	1									
	Sig. (2-tailed)										
SD	Pearson Correlation	-.020	1	.							
	Sig. (2-tailed)	.824									
SE	Pearson Correlation	.560**	.182*	1							
	Sig. (2-tailed)	.000	.041								
BR	Pearson Correlation	.459**	.031	.491**	1						
	Sig. (2-tailed)	.000	.731	.000							
SDP	Pearson Correlation	.282**	.395**	.555**	.343**	1					
	Sig. (2-tailed)	.001	.000	.000	.000						
PR	Pearson Correlation	.035	.861**	.110	.031	.297**	1				
	Sig. (2-tailed)	.698	.000	.217	.729	.001					
DR	Pearson Correlation	.027	.861**	.107	.045	.276**	.979**	1			
	Sig. (2-tailed)	.759	.000	.229	.616	.002	.000				
RL	Pearson Correlation	.024	.814**	.109	.058	.239**	.964**	.947**	1		
	Sig. (2-tailed)	.793	.000	.223	.517	.007	.000	.000			
CRP	Pearson Correlation	.008	.831**	.081	.055	.247**	.980**	.966**	.975**	1	
	Sig. (2-tailed)	.931	.000	.364	.541	.005	.000	.000	.000		
TR	Pearson Correlation	.473**	.113	.380**	.300**	.188*	.124	.127	.115	.117	1
	Sig. (2-tailed)										

Sig. (2-tailed)	.000	.206	.000	.001	.034	.166	.153	.198	.189
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** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

c. Listwise N=127

Source: own survey result, 2022

Where:

LD: Lockdown

SD: Social distancing

SE: State of emergency

BR: Boarder restriction

SDP: Shut down of production

PR: Procurement

RL: Reverse logistics

CRP: Customer Relationship

DR: Distribution

TR: Transportation

To assess multicollinearity, the researcher examines the correlations among the independent variables. If they are larger than 0.90, the researcher concerned about multicollinearity. Here in this study and the distribution of correlation on the table 4.14, none of the coefficients are greater than 0.90, so the researcher assume that multicollinearity is not a problem.

The result of correlation analysis on table 4.14 clearly indicated that there is a significant correlation between lock down measure and transportation supply chain practice with coefficient of .473 at significant level of 0.01. From the table 4.14, there is a positive correlation of .861 between “social distancing” and “procurement” (i.e., as social distancing measure continues the negative effect on procurement of pharmaceutical supplies continues), and that this relationship was statistically significant at the level of 0.01. If the coefficient value lies between + or - .50 and + or - 1, then it is said to be a strong correlation. In this case, the coefficient value is .861, and then the relationship is strong correlation between social distancing measure and procurement supply chain practices. Social distancing measure also have significant positive correlation with distribution, reverse logistics, and customer relationship management with coefficient value of .861, .814, and .831 respectively.

State of emergency measures significantly correlate with transportation supply chain practices of pharmaceutical supplies with coefficient value of .380 as showed on table 4.14, as state of emergency measure continues the transportation of pharmaceutical supplies are significantly affected. Border restriction measures also have a significant correlation with transportation supply chain practices of pharmaceutical supplies with correlation coefficient of .300.

Table 4.14 also indicated that shut down of production measures have significant correlation with procurement (coefficient value .297), distribution (coefficient value .276), reverse logistics (coefficient value .239), customer relationship management (coefficient value .247), and transportation (coefficient value .188) supply chain practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia.

4.5. Evaluating multiple regression analysis

As a statistical tool multiple regressions is frequently used to achieve best predictive relationship for a given set of both dependent and predictor variables, with the aim of evaluating the contribution of specific variables or set of variables and find structural relationship and provide explanation for multiple relationship(Robert, 2006). In this particular study multiple linear regression analysis was used to determine the unique contribution of each dimension of the independent variable to the dependent variables.

Table 4.15 Procurement practice multiple regression analysis

Model Summary^b

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate	Durbin-Watson
1	.868 ^a	.754	.744		.23380	1.846

a. Predictors: (Constant), SDP, LD, SD, BR, SE

b. Dependent Variable: PR

Source: own survey result, 2022

The Durbin-Watson statistic is used to test for independent of residuals. Residuals are the prediction errors or differences between the actual score for a case and the score estimated by the regression equation. The value of the Durbin-Watson statistic ranges from 0 to 4. As a general rule, the residual are not correlated if the Durbin-Watson statistic is approximately 2, and an

acceptable range is 1.50-2.50. For this particular case, Durbin-Watson is 1.846, which is close to 2 and within the acceptable range. The researched assume independence of residuals.

The R Square statistic on the model summary tells us the proportion of variance in the dependent variable that is accounted for by the independent variables. In this study the model accounts for 75.4% of the variance in the independent variables (SDP, LD, SD, BR, and SE). The adjusted R Square is lower, indicating 74.4% of the variance is accounted for by the model.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.248	5	4.050	74.088	.000 ^b
	Residual	6.614	121	.055		
	Total	26.862	126			

a. Dependent Variable: PR

b. Predictors: (Constant), SDP, LD, SD, BR, SE

Source: own survey result, 2022

During doing regression analysis the researcher wants to determine whether or not there is a relationship between the independent and the dependent variables by examining the ANOVA table which brought of as the overall fit of the regression model. If the F statistic is significant, the researcher assume the independent variable, taken together, have a relationship with the dependent variable. In this case, the probability of the F statistic for the regression analysis is 0.000, less than the level of significance of 0.05. So the researcher rejects the null hypothesis that there is no relationship between the dependent variables and the independents.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.430	.326		1.319	.190		
	LD	.127	.063	.114	2.009	.047	.630	1.588
	SD	.941	.052	.896	17.988	.000	.819	1.220
	SE	-.128	.080	-.103	-1.593	.114	.486	2.056
	BR	.016	.060	.014	.267	.790	.696	1.436

SDP	-.038	.060	-.037	-.637	.525	.592	1.690
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a. Dependent Variable: PR

Source: own survey result, 2022

Multicollinearity exists when Tolerance is below 0.10 and VIF is larger than 2.5. In this study, all of the tolerance values are greater than 0.10 and the VIF is less than 2.5. So the researcher assume that multicollinearity is a not a problem.

Table 4.16 Distributionpractice multiple regression analysis

Model Summary^b

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate	Durbin-Watson
1	.869 ^a	.755	.745		.23256	1.854

a. Predictors: (Constant), SDP, LD, SD, BR, SE

b. Dependent Variable: DR

Source: own survey result, 2022

The Durbin-Watson statistic is used to test for independent of residuals. Residuals are the prediction errors or differences between the actual score for a case and the score estimated by the regression equation. The value of the Durbin-Watson statistic ranges from 0 to 4. As a general rule, the residual are not correlated if the Durbin-Watson statistic is approximately 2, and an acceptable range is 1.50-2.50. For this particular case, Durbin-Watson is 1.854, which is close to 2 and within the acceptable range. The researched assume independence of residuals.

The R Square statistic on the model summary tells us the proportion of variance in the dependent variable that is accounted for by the independent variables. In this study the model accounts for 75.5% of the variance in the independent variables (SDP, LD, SD, BR, and SE). The adjusted R Square is lower, indicating 74.5% of the variance is accounted for by the model.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.191	5	4.038	74.661	.000 ^b
	Residual	6.544	121	.054		
	Total	26.735	126			

a. Dependent Variable: DR

b. Predictors: (Constant), SDP, LD, SD, BR, SE

Source: own survey result, 2022

During doing regression analysis the researcher wants to determine whether or not there is a relationship between the independent and the dependent variables by examining the ANOVA table which brought of as the overall fit of the regression model. If the F statistic is significant, the researcher assume the independent variable, taken together, have a relationship with the dependent variable. In this case, the probability of the F statistic for the regression analysis is 0.000, less than the level of significance of 0.05. So the researcher rejects the null hypothesis that there is no relationship between the dependent variables and the independents.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.425	.324		1.312	.192		
	LD	.109	.063	.099	1.743	.084	.630	1.588
	SD	.950	.052	.907	18.260	.000	.819	1.220
	SE	-.115	.080	-.093	-1.442	.152	.486	2.056
	BR	.047	.060	.043	.789	.432	.696	1.436
	SDP	-.075	.059	-.073	-1.256	.212	.592	1.690

a. Dependent Variable: DR

Source: own survey result, 2022

Multicollinearity exists when Tolerance is below 0.10 and VIF is larger than 2.5. In this study, all of the tolerance values are greater than 0.10 and the VIF is less than 2.5. So the researcher assume that multicollinearity is a not a problem.

Table 4.17 Reverse logistics practice multiple regression analysis

Model Summary^b

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate	Durbin-Watson
1	.825 ^a	.680	.667		.26131	1.814

a. Predictors: (Constant), SDP, LD, SD, BR, SE

b. Dependent Variable: RL

Source: own survey result, 2022

The Durbin-Watson statistic is used to test for independent of residuals. Residuals are the prediction errors or differences between the actual score for a case and the score estimated by the regression equation. The value of the Durbin-Watson statistic ranges from 0 to 4. As a general rule, the residual are not correlated if the Durbin-Watson statistic is approximately 2, and an acceptable range is 1.50-2.50. For this particular case, Durbin-Watson is 1.814, which is close to 2 and within the acceptable range. The researched assume independence of residuals.

The R Square statistic on the model summary tells us the proportion of variance in the dependent variable that is accounted for by the independent variables. In this study the model accounts for 68% of the variance in the independent variables (SDP, LD, SD, BR, and SE). The adjusted R Square is lower, indicating 66.7% of the variance is accounted for by the model.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.566	5	3.513	51.451	.000 ^b
	Residual	8.262	121	.068		
	Total	25.829	126			

a. Dependent Variable: RL

b. Predictors: (Constant), SDP, LD, SD, BR, SE

Source: own survey result, 2022

During doing regression analysis the researcher wants to determine whether or not there is a relationship between the independent and the dependent variables by examining the ANOVA table which brought of as the overall fit of the regression model. If the F statistic is significant, the researcher assume the independent variable, taken together, have a relationship with the dependent variable. In this case, the probability of the F statistic for the regression analysis is 0.000, less than the level of significance of 0.05. So the researcher rejects the null hypothesis that there is no relationship between the dependent variables and the independents.

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF

1	(Constant)	.643	.364		1.765	.080		
	LD	.084	.071	.077	1.196	.234	.630	1.588
	SD	.896	.058	.870	15.324	.000	.819	1.220
	SE	-.074	.090	-.061	-.824	.412	.486	2.056
	BR	.071	.067	.065	1.055	.294	.696	1.436
	SDP	-.115	.067	-.115	-1.724	.087	.592	1.690

a. Dependent Variable: RL

Source: own survey result, 2022

Multicollinearity exists when Tolerance is below 0.10 and VIF is larger than 2.5. In this study, all of the tolerance values are greater than 0.10 and the VIF is less than 2.5. So the researcher assume that multicollinearity is a not a problem.

Table 4.18 **Customer relationshippractice multiple regression analysis**

Model Summary^b

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate	Durbin-Watson
1	.842 ^a	.709	.697		.24964	1.823

a. Predictors: (Constant), SDP, LD, SD, BR, SE

b. Dependent Variable: CRP

Source: own survey result, 2022

The Durbin-Watson statistic is used to test for independent of residuals. Residuals are the prediction errors or differences between the actual score for a case and the score estimated by the regression equation. The value of the Durbin-Watson statistic ranges from 0 to 4. As a general rule, the residual are not correlated if the Durbin-Watson statistic is approximately 2, and an acceptable range is 1.50-2.50. For this particular case, Durbin-Watson is 1.823, which is close to 2 and within the acceptable range. The researched assume independence of residuals.

The adjusted R square value on the model summary table is a representation of the correlation between the observed values of the dependent variable and the values of the same dependent variable predicted by the multiple regression models. Hence, the adjusted R square value obtained indicates that 69.7% of the variation in the customer relationship can be explained by

the combined variance in the dimensions of the independent variables (SDP, LD, SD, SE, and BR).

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.369	5	3.674	58.949	.000 ^b
	Residual	7.541	121	.062		
	Total	25.910	126			

a. Dependent Variable: CRP

b. Predictors: (Constant), SDP, LD, SD, BR, SE

Source: own survey result, 2022

During doing regression analysis the researcher wants to determine whether or not there is a relationship between the independent and the dependent variables by examining the ANOVA table which brought of as the overall fit of the regression model. If the F statistic is significant, the researcher assume the independent variable, taken together, have a relationship with the dependent variable. In this case, the probability of the F statistic for the regression analysis is 0.000, less than the level of significance of 0.05. So the researcher rejects the null hypothesis that there is no relationship between the dependent variables and the independents.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.665	.348		1.913	.058		
	LD	.085	.067	.078	1.255	.212	.630	1.588
	SD	.912	.056	.885	16.338	.000	.819	1.220
	SE	-.136	.086	-.112	-1.591	.114	.486	2.056
	BR	.084	.064	.077	1.315	.191	.696	1.436
	SDP	-.089	.064	-.089	-1.393	.166	.592	1.690

a. Dependent Variable: CRP

Source: own survey result, 2022

Multicollinearity exists when Tolerance is below 0.10 and VIF is larger than 2.5. In this study, all of the tolerance values are greater than 0.10 and the VIF is less than 2.5. So the researcher assume that multicollinearity is a not a problem.

Table 4.19 Transportationpractice multiple regression analysis

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.508 ^a	.258	.228	.39844	2.334

a. Predictors: (Constant), SDP, LD, SD, BR, SE

b. Dependent Variable: TR

Source: own survey result, 2022

The Durbin-Watson statistic is used to test for independent of residuals. Residuals are the prediction errors or differences between the actual score for a case and the score estimated by the regression equation. The value of the Durbin-Watson statistic ranges from 0 to 4. As a general rule, the residual are not correlated if the Durbin-Watson statistic is approximately 2, and an acceptable range is 1.50-2.50. For this particular case, Durbin-Watson is 2.334, which is within the acceptable range. The researched assume independence of residuals.

The R Square statistic on the model summary tells us the proportion of variance in the dependent variable that is accounted for by the independent variables. In this study the model accounts for 25.8% of the variance in the independent variables (SDP, LD, SD, BR, and SE). The adjusted R Square is lower, indicating 22.8% of the variance is accounted for by the model.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.685	5	1.337	8.422	.000 ^b
	Residual	19.209	121	.159		
	Total	25.895	126			

a. Dependent Variable: TR

b. Predictors: (Constant), SDP, LD, SD, BR, SE

Source: own survey result, 2022

During doing regression analysis the researcher wants to determine whether or not there is a relationship between the independent and the dependent variables by examining the ANOVA table which brought of as the overall fit of the regression model. If the F statistic is significant, the researcher assume the independent variable, taken together, have a relationship with the dependent variable. In this case, the probability of the F statistic for the regression analysis is 0.000, less than the level of significance of 0.05. So the researcher rejects the null hypothesis that there is no relationship between the dependent variables and the independent variables.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.331	.555		2.398	.018		
	LD	.411	.108	.377	3.820	.000	.630	1.588
	SD	.124	.089	.121	1.393	.166	.819	1.220
	SE	.187	.137	.153	1.366	.175	.486	2.056
	BR	.081	.102	.074	.790	.431	.696	1.436
	SDP	-.076	.102	-.076	-.748	.456	.592	1.690

a. Dependent Variable: TR

Source: own survey result, 2022

Multicollinearity exists when Tolerance is below 0.10 and VIF is larger than 2.5. In this study, all of the tolerance values are greater than 0.10 and the VIF is less than 2.5. So the researcher assume that multicollinearity is a not a problem.

4.6 Discussion

From the results achieved by data analysis one of the major interesting findings is that the COVID-19 proxies have influence on the supply chain practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia. As the coronavirus pandemic was the first pandemic with this dimension the world experienced and was not expected in the common society, there are no respective comparison and mostly recent and ongoing research in this field. Many researchers are currently analyzing different topics, that are influenced by the pandemic and there will be many publications dealing with the impacts of the virus in the time to come.

The COVID-19 pandemic has provoked serious social and economic disruption globally, including strict social distancing, travel restrictions, and one of the largest global recessions since the Great Depression (Wheelock, 2020).

During the beginning of the global outbreak in March, supply chain management has had major problems to cope with an unpredictable demand for certain products when simultaneous restrictions for travel and production have been enforced and is still struggling to recover from this (Mazareanu, 2020).

The COVID-19 pandemic has posed significant challenges for supply chain globally. Multiple national lockdowns continue to slow or even temporarily stop the flow of raw materials and finished goods, disrupting manufacturing as a result. However, the pandemic has not necessarily created any new challenges for supply chains. In some areas, it brought to light previously unseen vulnerabilities, and of course, many organizations have suffered staff shortages and losses due to COVID-19. But overall, it has accelerated and magnified problems that already existed in the supply chain. By April 2020, many international COVID-19 lockdowns were eased, going back to place only at the onset of new outbreaks. However, border controls have still limited transportation and travel to some regions, creating impediments for international trade and transportation. More than half of survey respondents experienced a moderate or significant effect from travel restrictions (Jabil, 2020).

Among the limitations of this study is the use of only five supply chain practices and five measures taken as a result of COVID-19. The pandemic also affected in not able to gaining the additional information of the users as social distancing and state of emergency are measures taken not to do so. Therefore, future research should, include other supply chain dimensions and even including semi structured interviews to further investigate the effects of COVID-19 proxies on the supply chain practices.

CHAPTER FIVE

SUMMARY, CONCLUSSION AND RECOMMENDATION

The major objective for this research study was to assess the effect of COVID-19 proxies on the supply chain practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia.

To this effect the researcher has prepared and personally distributed questionnaires and arranged focus group discussion to strength the study result. Inferential statistic, descriptive statistic, correlation and multiple regression analysis were used for analyzing the obtained data. The chapter provides the summary of the findings with respect to the study objectives.

5.1 Summary of findings

Supply chain is a sequence of decision making and execution processes and material, information and money flows that aim to meet final customer requirements and take place within and between different supply chain stages. The supply chain not only includes the manufacturer and its suppliers, but also depending on the logistics flows transporters, warehouses, retailers, and consumers themselves. It includes, but is not limited to, new product development, marketing, operations, distribution, finance, and customer service (Chopra and Meindl, 2001).

From the grand mean score of items under supply chain practices, the mentioned supply chain practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia are affected by the measure due to COVID-19. The result of the correlation analysis clearly indicated that there is a significant correlation between lockdown measure as a result of COVID-19 and transportation supply chain practice with correlation coefficient of .473 at a significant level of 0.01. As it is showed in the result there is also significant positive correlation between social distancing measure and procurement, distribution, reverse logistics, and customer relationship. The correlation analysis also indicated that there is a positive significant correlation between states of emergency measure with transportation.

5.2 Conclusions

The resilience of supply chain management (SCM) is badly affected by the current novel COVID-19 pandemic, which causes emergencies due to the varying demand and supply shortages. Various emergencies resulting due to pandemic are examined and analyzed. An emergency-based SCM is developed for the uncertain product supply and inventory management situation between vendors and manufacturers with imperfections. This research aims to help decision-makers and managers cope with the consequences and global disruption created by the COVID-19 pandemic.

As the study is designed to assess the effects of COVID-19 on the SCM practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia, the results from the finding both in survey study and focus group discussion concluded that COVID-19 proxies

affected the SCM practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia.

In this research, the effect of the coronavirus pandemic on the SCM has been analyzed using selected SC practices of The Task Force for Global Health Ethiopia. Having a little research in the field of pharmaceutical supplies during COVID-19 is in line with the results of this study.

Looking at future research in the field, this work serves as a foundation to obtain all unbiased and complete database. Overall, the COVID-19 pandemic is dangerous for the world economy due to the resulting short term and long term global SCM disruption. However, in the current scenario, industries need to face this challenge with timely proactive approaches to avoid irreparable losses.

5.3 Recommendation

Having the study results from the survey questionnaire and focus group discussion in to account, here are the researcher recommendations for The Task Force for Global Health Ethiopia to sustain and continue the SCM practices operation during the pandemic.

- Strengthening local supply networks in investing on local suppliers to produce substitutable products instead of solely depend on foreign and single supplier.
- Supply chain visibility in seeing a shift from linear supply chains to more integrated network connecting many players.
- Increasing efficiency and reskilling supply chain workers will also be taken as major priorities for the organization.
- Based on the previous history of demand, the organization move essential products to a closer place where a product or service consumer is located, which is called explore supply chain regionalization.
- It is a must to communicate with the desired organization or person about reverse logistics issues as it is indicated in focus group discussion, how to handle, dispose and to reverse if possible those pharmaceutical supplies if they become expired.
- Educate employees on COVID-19 symptoms and prevention
- Restrict non-essential travel and promote flexible working arrangement.
- Prepare for increased absenteeism.

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Dear Respondents,

I am a graduate student at Addis Ababa University, School of commerce and currently conducting a research on the effect of COVID-19 proxies on the supply chain practices for the completion of MA degree in Logistics and Supply Chain Management (MLSCM).

The aim of this questionnaire is to seek information regarding the effect of COVID-19 proxies on the supply chain practice that shall assist in assessing the extent of the effect on the pharmaceutical supplies of the organization.

The information gathered will be kept confidential and will be used strictly for the purpose of this research only.

Your participation is regarded as a great input to the quality of the research results. Indeed, your honest and thoughtful response is invaluable.

If you would like to get further information or clarification about this study, or have any problem in completing this questionnaire, you can contact me on +251911680904 or bekanbuli@gmail.com any time.

There is no need to write your name.

Thanking you in advance for your participation.

Your sincerely,

Fikadu Debele

Questionnaire

Kindly tick (✓) your answer in the appropriate box or respond by writing if required.

SECTION ONE:

1. **Gender** A. Female B. Male
2. **Age** A. Under 20 Years old B. 20-30 Years old C. 30-40 Years old
 D. Over 40 Years old
3. **Educational Qualification**
- A. Grade 10 completed B. Grade 12 completed C. College Diploma
 D. First Degree E. Second Degree and above
4. **Years stayed at the organization**
- A. Less than 2 years B. 2-5 Years C. 5-10 Years
 D. Over 10 Years
5. **Your field of work at the organization?**
- A. Administration B. Finance C. Procurement D. Supply chain
 E. Logistics operation F. Customer relation
6. **How long you have been working in your field of work (SC) at your organization?**
- A. Under 2 Years B. 2-5 Years C. 5-10 Years
 D. Over 10 Years

SECTION TWO:

Kindly rate how strongly you agree or disagree to the extent of effect of COVID-19 on supply chain practices of pharmaceutical supplies of by circling the appropriate number in the box.

Where 1= strongly disagree (SDA), 2= Disagree (DA), 3= Neutral (N), 4= Agree (AG), 5= strongly agree (SAG)

NB. COVID-19 in this questionnaire is peroxided by social distancing, lock down, state of emergency, shut down of production, and border restriction.

SCM practices	Scale				
A. The effect of COVID-19 on procurement practices					
1. Measure taken due to COVID-19 affected the procurement practices of The Task Force for Global Health Ethiopia in terms of compromising supplier selection process	1	2	3	4	5
2. Measure taken due to COVID-19 affected the procurement practices of The Task Force for Global Health Ethiopia in terms of compromising contract award	1	2	3	4	5
3. Measure taken due to COVID-19 affected the procurement practices of The Task Force for Global Health Ethiopia in terms of reliability of contract management	1	2	3	4	5
4. Measure taken due to COVID-19 affected the procurement practices of The Task Force for Global Health Ethiopia in terms of flexibility of supplier relationship management	1	2	3	4	5
B. The effect of COVID-19 on Reverse logistics practices	Scale				
5. Measure taken due to COVID-19 affected the reverse logistics practices of The Task Force for Global Health Ethiopia in terms of delaying product distribution	1	2	3	4	5
6. Measure taken due to COVID-19 affected the reverse logistics practices of The Task Force for Global Health Ethiopia in terms of increasing product return	1	2	3	4	5
7. Measure taken due to COVID-19 affected the reverse logistics practices of The Task Force for Global Health Ethiopia in terms of compromising retail	1	2	3	4	5
8. Measure taken due to COVID-19 affected the reverse logistics practices of The Task Force for Global Health Ethiopia in terms of compromising industry functions	1	2	3	4	5
C. The effect of COVID-19 on customer relationship	Scale				

practices					
9.Measure taken due to COVID-19 affected the customer relationship practices of The Task Force for Global Health Ethiopia in terms of misaligning systems with goals and strategy	1	2	3	4	5
10.Measure taken due to COVID-19 affected the customer relationship practices of The Task Force for Global Health Ethiopia in terms of lowering personalize customer interaction	1	2	3	4	5
11.Measure taken due to COVID-19 affected the customer relationship practices of The Task Force for Global Health Ethiopia in terms of detaching segment customers	1	2	3	4	5
12.Measure taken due to COVID-19 affected the customer relationship practices of The Task Force for Global Health Ethiopia in terms of compromising re-evaluate and recalibrate CRM strategy	1	2	3	4	5
13.Measure taken due to COVID-19 affected the customer relationship practices of The Task Force for Global Health Ethiopia in terms of limiting in consolidating customer data	1	2	3	4	5
D. The effects of COVID-19 on the transportation practices	Scale				
14.Measure taken due to COVID-19 affected the transportation practices of The Task Force for Global Health Ethiopia in terms of delaying in measuring performance monitoring practices	1	2	3	4	5
15.Measure taken due to COVID-19 affected the transportation practices of The Task Force for Global Health Ethiopia in terms of troubling carrier management practices	1	2	3	4	5
16.Measure taken due to COVID-19 affected the transportation practices of The Task Force for Global Health Ethiopia in terms of flexibility in load planning and optimization practices	1	2	3	4	5
17.Measure taken due to COVID-19 affected the transportation practices of The Task Force for Global Health Ethiopia in terms of adding freight payments and audit practices	1	2	3	4	5
E. The effect of COVID-19 on distribution practices	Scale				
18.Measure taken due to COVID-19 affected the distribution practices of pharmaceuticalsupplies of The Task Force for Global Health Ethiopia in terms of dropping quality management system	1	2	3	4	5
19.Measure taken due to COVID-19 affected the	1	2	3	4	5

distribution practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of limiting importation and exportation management					
20.Measure taken due to COVID-19 affected the distribution practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia in terms of compromising supply chain integrity and security	1	2	3	4	5
Proxies of COVID-19	<i>Scale</i>				
1. The effects of lock down on SCM practices					
21.Lock down as a result of COVID-19 affected procurement practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
22. Lock down as a result of COVID-19 restricted customer relationships practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
23. Lock down as a result of COVID-19 restricted transportation practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
24.Lock down as a result of COVID-19 restricted distribution practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
25. Lock down as a result of COVID-19 affected warehousing practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
26. Lock down as a result of COVID-19 affected reverse logistics practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
2. The effect of social distancing in SCM practices	<i>Scale</i>				
27.Social distancing negatively affected procurement practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
28.Transportation practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia has	1	2	3	4	5

negatively enhanced by social distancing					
29.Social distancing affected the warehousing practices of pharmaceutical supplies The task Force for Global Health Ethiopia	1	2	3	4	5
30.Social distancing as a result of COVID-19 affected customer relationship practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
31. Social distancing affected reverse logistics practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
32.Social distancing affected distribution practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
3. The effect of state of emergency on SCM practices	<i>Scale</i>				
33.Country state of emergency as a result of COVID-19 affected the pharmaceutical supplies demand balances of The Task Force for Global Health Ethiopia	1	2	3	4	5
34.State of emergency as a result of COVID-19 caused significant effect on travel behavior, transport volume, and freight capacity of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
35.State of emergency affected distribution practice of the pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
36.State of emergency as a result of COVID-19 restricted in person consumer interview of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
37. State of emergency as a result of COVID-19 affected warehousing practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5

38.Reverse logistics practice of pharmaceutical supplies of The Task Force for Global Health Ethiopia affected by state of emergency as a result of COVID-19	1	2	3	4	5
4.The effect of border restriction on SCM practices	<i>Scale</i>				
39. Border restriction delayed procurement practices of the pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
40.Border restriction impacted transportation practices of the pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
41. Border restriction affected reverse logistics practices of the pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
42. Border restriction affected customer relationship practices of the pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
5.The effect of shut down of production on SCM practices	<i>Scale</i>				
43.Shut down of production as a result of COVID-19 affected the distribution practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
44. Shut down of production as a result of COVID-19 affected the procurement practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
45. Shut down of production as a result of COVID-19 affected the warehousing practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5
46. Shut down of production as a result of COVID-19 affected the transportation practices of pharmaceutical supplies of The Task Force for Global Health Ethiopia	1	2	3	4	5

SECTION THREE:

1. To what extent does measures taken as a result of COVID-19 affected the SCM procurement practices of pharmaceutical supplies?
2. To what extent does measures taken as a result of COVID-19 affected the SCM distribution practices of pharmaceutical supplies?
3. To what extent does measures taken as a result of COVID-19 affected the SCM transportation practices of pharmaceutical supplies?
4. To what extent does measures taken as a result of COVID-19 affected the SCM reverses logistics practices of pharmaceutical supplies?
5. To what extent does measures taken as a result of COVID-19 affected the SCM customer relationship practices of pharmaceutical supplies?